Joint Meteorology and Oceanography (METOC) Handbook

3rd edition

1 May 2000

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MEMORANDUM FOR: Distribution List (Annex Z)

1. This publication is the 3rd edition of the Joint Meteorology and Oceanography (METOC) Handbook (JMH), and hopefully is an edition more easily read and reviewed by METOC personnel. This document is a major reorganization of the initial 1997 release (updated in 1999), which was compiled from inputs by Senior METOC Officers, former and current Joint Task Force METOC Officers, and METOC experts in various Service organizations.

2. The Handbook reflects comments from across the METOC community: unified commands, US Joint Forces Command's component commands, Service headquarters, and leading Air Force, Navy, and Marine Corps METOC organizations. The purpose of this Handbook is to serve as a reference tool for prospective Joint Task Force (JTF) METOC officers on the infrastructure, policies, principles, and responsibilities inherent in providing joint METOC support to the warfighter and in conducting joint METOC operations. This Handbook can also serve as a guide for unified command Senior METOC Officers.

3. The Joint METOC Handbook does not constitute a requirements document or initial doctrine. Joint Publication 3-59, Joint Doctrine, Tactics, Techniques, and Procedures for METOC Operations, serves as joint doctrine. This Handbook serves solely to provide the JTF METOC Officer (JMO), his staff, and Service and functional component METOC units, an easy to use manual to help plan and execute METOC support for joint operations.

4. This document is updated as required by the USJFCOM Senior METOC Officer. Point of contact is CDR Ryan Schultz, DSN 836-7851, comm. (757) 836-7851, or email j335wx@hq.jfcom.mil (no attachments) or j335wx@hq.jfcom.smil.mil. This handbook is a living document and as a recipient, your comments and suggestions are welcomed.

RYAN R. SCHULTZ
Commander, U.S. Navy
USJFCOM Senior METOC Officer

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JOINT METOC HANDBOOK

RECORD OF CHANGES

Change Number	Copy Number	Date of Change	Date Entered	Posted By	Remarks

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EXECUTIVE SUMMARY

The Joint Meteorology and Oceanography (METOC) Handbook (JMH) was originally compiled to provide information to participants in U.S. Joint Forces Command training exercises and operations. The Services' METOC communities found the Handbook useful, and it is now distributed throughout the Services to aid those who may suddenly find themselves fulfilling the role of Joint Task Force (JTF) METOC Officer (JMO). This document does not constitute a requirements document or initial doctrine. This handbook intends to provide the JMO, his staff, and Service and functional component METOC personnel, an easy to use reference manual to assist the planning and execution of METOC support for joint operations.

The Joint METOC Handbook describes existing joint structure, how METOC personnel and organizations are integrated into the combatant command and JTF structures, and what METOC resources are available. Separate chapters cover METOC capabilities and support to operational forces within Service organizational structures. It is important to understand the joint operational planning process and how the METOC officer fits into that process. The duties and responsibilities of the Senior METOC Officer (SMO) and JMO and their interaction during a joint operation are important concepts. The coordination between the JMO and his Service and functional component METOC units is vital to the success of joint METOC operations. The concept of “one theater, one forecast,” highlighted in Joint Publication 3-59, is the cornerstone of METOC support to a joint operation. Coordination is critical. METOC support to the overall joint operation as well as the JTF headquarters element is important.

Joint METOC personnel should understand the capabilities of Service level METOC equipment and tactical and fixed communication systems for interoperability. The sources of METOC data and available products and services from various METOC production sites and theater level operational commands are useful for any military operation.

The appendices provide Service METOC personnel and equipment information for Time Phased Force and Deployment Data and formats for METOC inputs to Operations Plans. A starting list of criteria for METOC impacts to operations is provided for many types of operations; during an actual operation, METOC personnel must tailor impacts to the mission and its critical thresholds. Examples of Joint Operational Area Forecasts (JOAFs), METOC Letters of Instruction (LOIs), and joint METOC briefing slides come from previous joint operations and exercises.

METOC personnel wishing a copy of this handbook should contact their Service distribution point, listed in Appendix Z. Additionally, the handbook is located on USJFCOM’s METOC SIPRNET homepage, http://157.224.120.250/weathr.nsf/metoc (go to Pubs and Documents). The goal of the JMH is to provide an easy to use reference manual for all METOC personnel. Toward that goal, the USJFCOM SMO will attempt to revise this Handbook annually, so that new and important information can be incorporated into one document and provided to the METOC community at large.

Chapter 1 - Joint Structure and Organization

This chapter describes existing joint structure, mission, and responsibilities, and how meteorology and oceanography (METOC) personnel and commands are integrated into the joint arena.

1.1 Chairman of the Joint Chiefs of Staff and Joint Staff

1.1.1 Organization for National Security.

The Chairman of the Joint Chiefs of Staff (CJCS) is the head of the Joint Chiefs of Staff and the senior-ranking member of the Armed Forces and the principal military advisor to the President. The CJCS does not exercise military command over any combatant forces. The CJCS functions within the chain of command by transmitting communications to the commanders of the combatant commands from the President and Secretary of Defense [National Command Authorities (NCA)].

The Joint Chiefs of Staff consist of the Chairman, the Vice Chairman, the Chief of Staff of the Army, the Chief of Naval Operations, the Chief of Staff of the Air Force, and the Commandant of the Marine Corps. The Joint Chiefs of Staff, supported by the Joint Staff, is the immediate military staff of the Secretary of Defense. The Joint Chiefs of Staff have no executive authority to command combatant forces. The organization for National Security is shown in Figure 1-1.

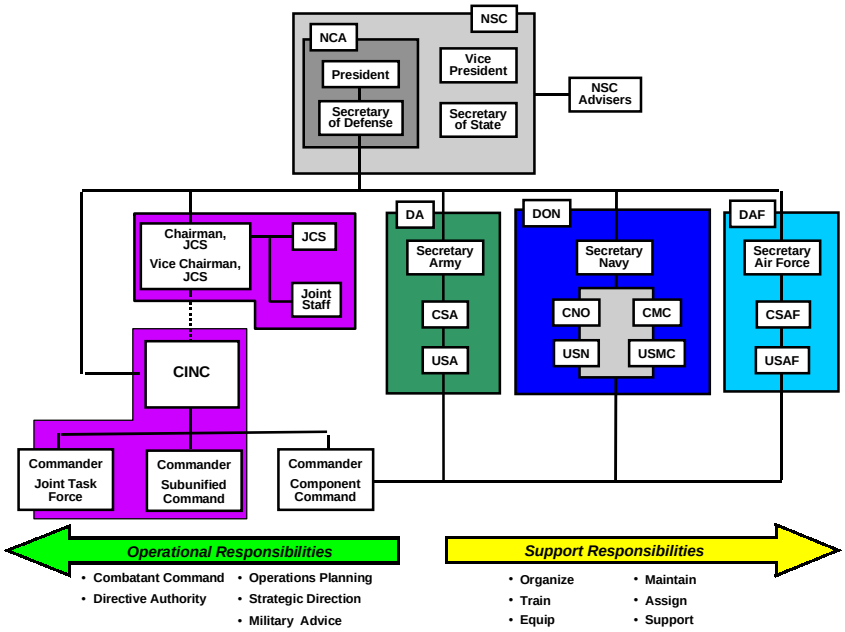

Figure 1-1. Organization for National Security

The Joint Staff assists the CJCS with strategic direction, strategic planning, and joint operation planning. The CJCS organizes joint planning and execution for joint operations

by establishing the supported and supporting command relationships between the combatant commands.

1.1.2 Joint Staff METOC Resources.

The Joint Staff currently has two METOC billets, though both are "dual-hatted" and have additional duties outside of METOC. JCS METOC personnel will occasionally stand watch when a Crisis Action Team (CAT) is activated, and will deal with METOC issues involving international organizations (*e.g.*, WMO, NATO). Currently assigned:

- Joint Staff J-38/ROD (AF O-5 billet, Lt. Col. William Burnette)

  DSN: 225-0581 MSG: JOINT STAFF WASHINGTON DC//J-38/ROD//
  SECURE: 225-0581 Mail: Joint Staff
  COMM: 703-695-0581 J-38/ROD
  FAX: (UNCLAS) 224-6690 Pentagon Room 2D921G-6
  FAX: (SECURE) 227-8042 Washington DC 20318-3000
  EMAIL: burnetwf@js.pentagon.mil
  SIPRNET: william.burnette@js.pentagon.smil.mil

- Joint Staff J-3/JOD (Navy O-5 billet, CDR Mike Stewart)

  DSN: 225-2995 MSG: JOINT STAFF WASHINGTON DC//J-3/JOD//
  SECURE: 225-2995 Mail: Joint Staff
  COMM: 703-695-2995 J-33/JOD
  FAX: (UNCLAS) 225-3792 Pentagon Room 2B885
  FAX: (SECURE) 225-0988 Washington DC 20318-3000
  EMAIL: stewartmr@js.pentagon.mil
  SIPRNET: stewartmr@js.pentagon.smil.mil

- Joint Staff typically links to the Air Force Weather Agency (AFWA) and uses weather briefings from the Air Force Operations Group (AFOG), http://ga14.af.pentagon.smil.mil:8000/afog/wx/

1.2 Unified Commands

The National Security Act of 1947 and Title 10 of the U. S. Code provide the basis for the establishment of unified combatant commands (Figure 1-2). A unified command has broad, continuing missions and is composed of forces from two or more military departments. The Unified Command Plan (UCP) establishes the missions, responsibilities, and force structure for commanders of unified combatant commands, as well as their general geographic areas of responsibility (Figure 1-3) and functions.

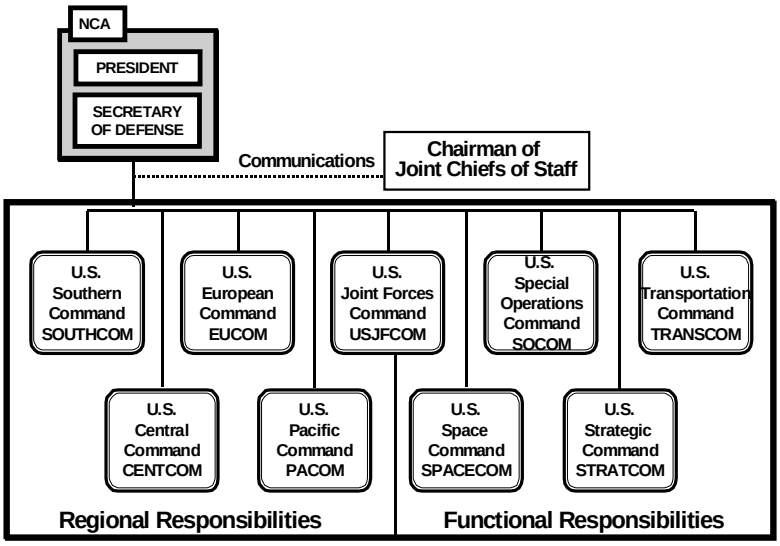

Figure 1-2. Unified Combatant Commands

Forces assigned to unified combatant commands will be under combatant command of the commanders of the unified combatant commands. Forces will be assigned to such commands by the Secretary of Defense's memorandum entitled "Forces for Unified Commands." Except as otherwise directed by the President or the Secretary of Defense, all forces operating within the geographic area assigned to a unified combatant command shall be assigned or attached to the commander of that command.

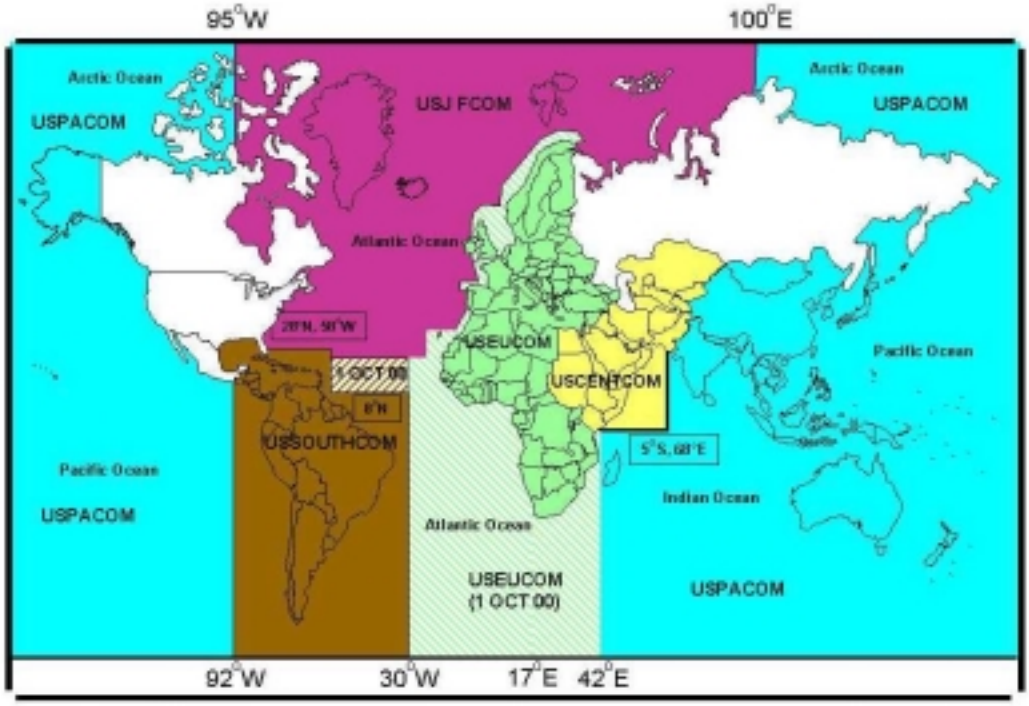

Figure 1-3. Geographic Commander's Area of Responsibility

1.2.1 Missions.

1.2.1.1 USJFCOM.

A functional and geographic unified command that provides military forces where needed throughout the world, and ensure those forces are integrated and trained as joint forces capable of carrying out their assigned tasks. Mission as the Joint Experimenter leverages Service efforts to move DoD toward Joint Vision 2010. USJFCOM has one standing task force, Joint Task Force - Civil Support (JTF-CS), which controls the military response to weapons of mass destruction incidents in CONUS and US territories.

1.2.1.2 USCENTCOM.

A geographic unified command that promotes and protects U.S. interests, ensure uninterrupted access to regional resources, assist friendly states in providing for their own security and contributing to the collective defense, and deter attempts by hostile regional states to achieve geo-political gains by threat or use of force.

1.2.1.3 USEUCOM.

A geographic unified command that maintains ready forces to conduct the full spectrum of military operations unilaterally or in concert with coalition partners; enhance transatlantic security through support of NATO; promote regional stability and advance U.S. interests in Europe, Africa, and the Middle East.

1.2.1.4 USPACOM.

A geographic unified command that fosters peace, democracy, and freedom while promoting U.S. interests in the area of responsibility. The command serves to deter conflict through combat-ready U.S. and allied military forces in-place or readily available, or to engage in combat if ordered by the President.

1.2.1.5 USSOUTHCOM.

A geographic unified command that strengthens democratic institutions in Central and South America by assisting host nations in eliminating threats to their security; supporting continued economic and social progress; assisting host nations and U.S. agencies in attacking drug production; assisting the Government of Panama to ensure an open and neutral Panama Canal; and enhancing military professionalism. USSOUTHCOM has a standing task force, Joint Interagency Task Force - East (JIATF-East), which coordinates the US effort in drug interdiction.

1.2.1.6 USSOCOM.

A functional unified command that prepares special operations forces to successfully conduct worldwide special operations, civil affairs, and psychological operations in peace

and war and in support of the regional combat commanders, American ambassadors and their country teams, and other government agencies.

1.2.1.7 USSPACECOM.

A functional unified command that conducts joint space operations to include: Space Forces Support--placing satellites in space and operating them; Space Force Enhancement--supporting the warfighter with intelligence, communications, weather (including space weather), navigation, and ballistic missile attack warning products; Space Force Application--applying force from or through space against terrestrial targets; and Space Force Control--enforcing space superiority through protection, negation, and surveillance.

1.2.1.8 USSTRATCOM.

A functional unified command that assesses the potential for, and deter, any military attack on the United States and its allies, and should deterrence fail, employ forces to achieve national objectives. Employment, if it should prove necessary, will include command and control of strategic forces and providing support to other combatant command commanders.

1.2.1.9 USTRANSCOM.

A functional unified command that provides global air, land and sea transportation to meet national security objectives by maintaining command and control of lift forces and logistical infrastructure, setting operational lift policy, providing crisis planning for force deployment and sustainment, providing Joint Operations Planning and Execution System (JOPES) training worldwide, and advocating improvements to the common user mobility systems.

1.2.2 Unified Command METOC, Components, and Supporting METOC Staff Organizations.

Most unified commands have a Senior METOC Officer (SMO) assigned, to provide and arrange support for the command and its operations. As Quadrennial Defense Review manpower reductions occur, some unified commands are losing in-house METOC support. Each unified command has Service components that provide forces to the command. In many instances, each component has a supporting METOC organization (component contact information is available in applicable Service chapters of this Handbook).

1.2.2 1 USJFCOM.

USJFCOM has two METOC billets (1 Navy O-5, 1 AF O-4) and four component commands: Air Combat Command (ACC), Forces Command (FORSCOM), Atlantic Fleet (LANTFLT), and Marine Forces Atlantic (MARFORLANT), plus three sub-unified commands: Iceland Defense Force, U.S. Forces Azores, and Special Operations Command

Joint Forces Command (SOCJFCOM). The AF joint METOC billet is deleted as of 1FY03.

- Senior METOC Officer: CDR Ryan Schultz
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  SECURE: 836-7851 Mail: U.S. Joint Forces Command
  COMM: 757-836-7851 Senior METOC Officer/Code J335WX
  FAX (unclass): 836-7766 1562 Mitscher Ave, Suite 200
  FAX (secure): 836-7859 Norfolk, VA 23511-2488
  EMAIL (unclass): j335wx@hq.jfcom.mil (no attachments)
  EMAIL (secure): j335wx@hq.jfcom.smil.mil
  SIPRNET: http://157.224.120.250/weathr.nsf/metoc

- Component support:

- ACC	Langley AFB, VA	Director of Weather
- FORSCOM	Ft McPherson, GA	Staff Weather Officer
- MARFORLANT	Norfolk, VA	Normally delegated to II MEF Staff Weather Officer
- LANTFLT	Norfolk, VA	Staff Oceanographer
- SOCJFCOM	Norfolk, VA	No METOC staff; Support typically provided by Naval Atlantic METOC Center (NLMOC)

- Supporting theater METOC forecast centers:
  - Naval Atlantic METOC Center (NAVLANTMETOCCEN) Norfolk, VA
  - Air Combat Command (ACC) AOS/AOW (Weather Support Unit), Langley AFB, VA

1.2.2.2 USCENTCOM.

USCENTCOM has four METOC billets (1 Navy O-5, 2 AF O-4s, and 1 AF O-3) and five component commands: U.S. Central Command Air Forces (CENTAF), U.S. Central Command Army Forces (ARCENT), Marine Forces U.S. Central Command (MARCENT), Naval Forces U.S. Central Command (NAVCENT), and Special Operation Forces, U.S. Central Command (SOCCENT).

- Senior METOC Officer: CDR A. Rost Parsons
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  COMM: 813-828-3021 7115 South Boundary Blvd
  FAX (unclass): 968-6218 MacDill AFB, FL 33621-5101
  FAX (secure): 968-6543
  EMAIL (unclass): parsonsr@centcom.mil or ccj3ow@centcom.mil
  EMAIL (secure): parsonsr@centcom.smil.mil

SIPRNET:
http://www.centcom.smil.mil/CCJ3/ccj3ops/weather/weather2.htm#USCENTCOM METOC PRODUCTS

- Component support:
  - CENTAF — Shaw AFB, SC — Staff Weather Officer
  - ARCENT — Ft McPherson, GA — Staff Weather Officer
  - MARCENT — Camp Smith, HI — Officer Addu fm MCAF
  - NAVCENT — Bahrain — Staff Oceanographer
  - SOCCENT — MacDill AFB, FL — Staff Weather Officer

- Supporting theater METOC forecast centers:
  - Naval Pacific METOC Facility Bahrain (NAVCENTMETOC FAC)
  - Shaw Operational Weather Squadron (28 OWS), Shaw AFB SC

1.2.2.3 USEUCOM.

USECOM has no METOC billets; USAFE provides staff METOC support. EUCOM has five component commands: U.S. Air Forces Europe (USAFE), U.S. Army Forces Europe (USAREUR), Marine Forces Europe (MARFOREUR), Naval Forces Europe (NAVEUR), and Special Operations Command Europe (SOCEUR).

- EUCOM SMO (USAFE Liaison Officer): Maj. Robert Hardwick (in-place Jul 00)
  DSN: 314-430-8146/8141 MSG: USCINCEUR VAIHINGEN GE//ECJ33-WE//
  SECURE: 314-430-4111 Mail: HQ USEUCOM J33-WE
  COMM: 011-49-711-680-4111 Unit 30400 Box 1000
  FAX (unclass): 314-430-8451 APO AE 09128
  FAX (secure): 314-430-4287
  EMAIL: hardwickr@eucom.mil *(likely format)*
  SIPRNET: http://www.eucom.smil.mil/ecj3/metoc/
  Note: if unable to contact the EUCOM SMO at any of the numbers listed, please contact USAFE/DOW at DSN 314-480-7001/7564 / comm. (49) 6371-47-7001/7564.

- Component support:
  - USAFE — Ramstein AB, GE — Director of Weather
  - USAREUR — Heidelberg, GE — Staff Weather Officer
  - MARFOREUR — Boeblingen, GE — Normally delegated to II MEF Staff Weather Officer
  - NAVEUR — London, UK — Staff Oceanographer
  - SOCEUR — Stuttgart, GE — No METOC staff

- Supporting theater METOC forecast centers:
  - Naval European METOC Center (NAVEURMETOCCEN) Rota, SP
  - USAFE Operational Weather Squadron (OWS), Sembach, GE

1.2.2.4 USPACOM.

USPACOM has one METOC billet (1 Navy O-5) and five component commands: Pacific Air Forces (PACAF), U.S. Army Forces Pacific (USARPAC), Marine Forces Pacific (MARFORPAC), Pacific Fleet (PACFLT), and Special Operations Command Pacific (SOCPAC), as well as three subordinate unified commands: Alaska Command (ALCOM), U.S. Forces Japan (USFORJAPAN) and U.S. Forces Korea (USFORKOR).

- Senior METOC Officer: Capt. C.W. Green
  DSN: 315-477-5740 MSG: USCINCPAC HONOLULU HI//J319//
  SECURE: 315-477-5740 Mail: USCINCPAC / J319
  COMM: 808-477-5740 Camp H. M. Smith HI 96861-5025
  FAX (unclass): 315-474-3602
  FAX (secure): N/A
  EMAIL (unclass): cwgreen0@hq.pacom.mil
  EMAIL (secure): greencw0@hq.pacom.smil.mil
  SIPRNET: http://164.213.23.19/j3/metoc.htm

- Component support:

- PACAF	Hickam AFB	Director of Weather
- USARPAC	FT Shafter	Staff Weather Officer
- MARFORPAC	Honolulu	Officer ADDU fm MCAF
- PACFLT	Pearl Harbor	Staff Oceanographer
- SOCPAC	Pearl Harbor	No METOC Staff

- Supporting theater METOC forecast centers:
  - Naval Pacific METOC Center (NAVPACMETOCCEN), Pearl Harbor, HI
  - Korean OWS (607 WS), Yongsan, South Korea
  - Alaska OWS (11 OWS), Elmendorf AFB, AK
  - Joint Typhoon Warning Center (JTWC), Honolulu, HI
  - Yokota Operational Weather Squadron (20 OWS), Yokota, Japan*
  - PACAF Operational Weather Squadron (17 OWS), Hickam, HI*
    * The two OWSs are to be activated in Oct 2000, with IOC in Jan 01 (17 OWS) and Apr 01 (20 OWS)

1.2.2.5 USSOUTHCOM.

USSOUTHCOM has two METOC billets (1 AF O-5, 1 AF O-3) and five component commands: U.S. Southern Air Forces (USSOUTHAF), U.S. Army Forces South (USARSO), Marine Forces South (MARFORSOUTH), Atlantic Fleet (LANTFLT), and Special Operations Forces South (SOCSOUTH).

- Senior METOC Officer: Lt. Col. Bill Delehunt
  DSN: 567-3712 MSG: USCINCSO MIAMI FL//SCJ322METOC//
  SECURE: 567-3712 Mail: USSOUTHCOM SCJ322METOC

COMM: (305) 437-3712 3511 NW 91st Ave
FAX (unclass): 3744 Miami, FL 33172-1217
FAX (secure): 3745
EMAIL (unclass): delehunw@hq.southcom.mil
EMAIL (secure): delehunw@hqs.southcom.smil.mil
SIPRNET: http://scnet.hq.southcom.smil.mil/SCJ3/scj32/metoc/default.htm

- Component support:
  - USSOUTHAF Davis-Monthan AFB, AZ Director of Weather
  - USARSO Ft Buchanan, PR Staff Weather Officer
  - MARFORSOUTH Norfolk, VA Normally delegated to II MEF Staff Weather Officer
  - LANTFLT Norfolk, VA Staff Oceanographer
  - SOCSOUTH Miami, FL No METOC staff

- Supporting theater METOC forecast centers:
  - Davis-Monthan OWS (25 OWS), Davis-Monthan AFB, AZ
  - Naval Atlantic METOC Center (NAVLANTMETOCCEN) Norfolk, VA

1.2.2.6 USSOCOM.

USSOCOM has deleted its two METOC billets. SOCOM has three component commands: Air Force Special Operations Command (AFSOC), U.S. Army Special Operations Command (USASOC), Naval Special Warfare Command (NSWC), and one sub-unified command: Joint Special Operations Command (JSOC).

- Senior METOC Officer: CDR Greg Eisman
  DSN: 968-4295/2519/2331 MSG: USCINCSOC MACDILL AFB FL//SOOP-OM//
  SECURE: 968-4295
  COMM: (813) 828-4295 Mail: USSOCOM/SOOP-OM
  FAX (unclass): 968-2812 7701 Tampa Point Blvd
  FAX (secure): 968-3139 MacDill AFB FL 33621-5323
  EMAIL: eismang@socom.mil
  EMAIL (secure):
  SIPRNET: http://soop.socom.smil.mil/html/weather.html

- Component support:
  - AFSOC Hurlburt AFB, FL Command Meteorologist
  - USASOC Ft Bragg, NC Staff Weather Officer
  - NSWC NAB Coronado, CA Staff Oceanographer
  - JSOC Ft Bragg, NC Staff Weather Officer

- Supporting METOC forecast centers:
  - Air Force Weather Agency (AFWA), Offutt AFB, NE
  - Fleet Numerical METOC Center (FLENUMMETOCCEN), Monterey, CA

- Naval Oceanographic Office (NAVOCEANO), Stennis Space Center, MS
- Theater Operational Weather Squadrons (AF) and METOC Centers (Navy), as appropriate

1.2.2.7 USSTRATCOM.

has the largest complement of METOC billets (8: 1 Navy O-5, 1 Navy O-4, 2 AF O-4, 1 Navy O-3, 3 AF O-2), helping support STRATCOM's flying mission. STRATCOM utilizes the strategic forces of PACFLT, LANTFLT, and ACC.

- Senior METOC Officer: CDR Bob Beard
  DSN: 271-5333 / 2510 MSG: USSTRATCOM OFFUTT AFB NE//J3624//
  SECURE: 271-8050 Mail: USSTRATCOM/J315
  COMM: 402-294-5333 913 SAC Blvd
  FAX (unclass): 271-2820 Suite 1B25
  FAX (secure): 271-9170 Offutt AFB NE 68113-6300
  EMAIL: beardr@J3.stratcom.af.mil
  EMAIL (secure): beardr@stratnets.stratcom.smil.mil
  SIPRNET: http://www.gccs.stratcom.smil.mil/metoc_j3/sipr2.html

- Supporting METOC forecast centers:
  - Air Force Weather Agency (AFWA), Offutt AFB, NE
  - Fleet Numerical METOC Center (FLENUMMETOCCEN), Monterey, CA
  - Air Force Combat Climatology Center (AFCCC), Asheville, NC
  - Fleet Numerical METOC Detachment (FLENUMMETOC Det), Asheville, NC
  - 55 SWXS, Schriever AFB, CO
  - Theater Operational Weather Squadrons (AF) and METOC Centers (Navy), as appropriate

1.2.2.8 USSPACECOM.

USSPACECOM has one METOC billet, a GS-12 civilian meteorologist. SPACECOM has three component commands: Air Force Space Command (AFSPC), Army Space Command (ARSPACE), and Naval Space Command (NAVSPACE).

- Senior METOC Officer: Mr. Mike Baker
  DSN: 692-3029 MSG: USSPACECOM PETERSON AFB
  SECURE: call first CO//J33W//
  COMM: 719-554-3029 Mail: USSPACECOM/J33W
  FAX (unclass): 692-6986 250 S. Peterson Blvd, Ste. 116
  FAX (secure): call Peterson AFB CO 80914-9060
  EMAIL (unclass): mbaker@spacecom.af.mil
  EMAIL (secure): mbaker@netspot.usspace.spacecom.smil.mil
  SIPRNET: http://www.usspace.spacecom.smil.mil/sj3/j33/j33tw.htm

- Component support:
  - AFSPACE Vandenberg AFB, CO Staff Weather Officer
  - AFSPC Peterson AFB, CO Staff Weather Officer
  - USA ARSPACE Colorado Springs, CO No METOC staff
  - NAVSPACE Dahlgren, VA Staff Oceanographer (N5)

- Supporting METOC forecast centers:
  - 55 SWXS, Schriever AFB, CO
  - Air Force Weather Agency (AFWA), Offutt AFB, NE
  - Fleet Numerical METOC Center (FLENUMMETOCCEN), Monterey, CA

1.2.2.9 USTRANSCOM.

USTRANSCOM has 3 METOC billets (1 AF O-5, 1 Navy O-4, 1 AF O-4) and three component commands: Air Mobility Command (AMC), Military Traffic Management Command (MTMC), and Military Sealift Command(MSC).

- Senior METOC Officer: Lt. Col. Jerry Borger
  DSN: 576-8406 MSG: USCINCTRANS SCOTT AFB IL//J3-ODM//
  SECURE: same Mail: USTRANSCOM TCJ3-ODM
  COMM: 618-256-8406 508 Scott Drive
  FAX (unclass): 576-8144 Scott AFB IL 62225-5357
  FAX (secure): 576-8029
  Note: all phone and fax numbers (including DSN prefix) will change by early Summer 2000. New numbers have not been assigned; old numbers will be valid for a 120-day period following the change.
  EMAIL (unclass): Gerald.Borger@hq.transcom.mil
  EMAIL (secure): borgergr@transcom.smil.mil
  SIPRNET: http://websvr1.transcom.smil.mil/j3/mcc/wx/wx.htm

- Component support:
  - AMC Scott AFB, IL Director of Weather
  - MTMC Falls Church, VA No METOC staff
  - MSC Bayonne, NJ No METOC staff

- Supporting METOC forecast centers:
  - Air Force Weather Agency (AFWA), Offutt AFB, NE
  - Fleet Numerical METOC Center (FLENUMMETOCCEN), Monterey, CA
  - Naval Oceanographic Office (NAVOCEANO), Stennis Space Center, MS
  - All Air Force Operational Weather Squadrons (see paragraph 8.5.2)
  - All Navy Meteorology and Oceanography (METOC) Centers (see paragraph 7.5)

Chapter 2 - Joint Planning and Task Force Formation

References:
a. Joint Pub 5-0, "Doctrine for Planning Joint Operations."
b. Joint Pub 5-0.1, "Joint Tactics, Techniques, and Procedures for Joint Campaign Planning."
c. Joint Pub 5-00.2, "Joint Task Force Planning Guidance and Procedures."
d. CJCSI 3122.01, "Joint Operation Planning and Execution System, Vol. I, Planning Policies and Procedures."
e. CJCSI 3122.02, Joint Operation Planning and Execution System, Execution Planning."
f. CJCJI 3122.03, Joint Operation Planning and Execution System Vol. II, Planning Formats and Guidance."

2.1 Joint Planning - Overview

2.1.1 Joint Planning for Peace and Crises.

Joint operation planning is conducted within the chain of command that runs from the NCA to the combatant commanders and is primarily the responsibility of the CJCS and the combatant commanders. The Joint Planning and Execution Community (JPEC) includes the NCA, NSC, State Department, DOD, CJCS, Combatant Commands and their components, the Services, USTRANSCOM, and other supporting commands. Joint operation planning includes mobilization, deployment, employment, sustainment, and redeployment. See Figure 2-1 for an overview.

- *Campaign Planning*. Combatant commanders develop theater campaign plans to implement national and theater level strategy. Campaign planning encompasses both deliberate and crisis action planning. The campaign plan describes how a series of joint major operations are arranged to achieve a strategic objective (*e.g.*, Desert Storm Campaign Plan). Campaign plans guide the development of supporting OPLANs or OPORDs and facilitate national level coordination of strategic priorities and resource allocation. Campaign plan models are contained in proposed Joint Pub 5-00.1, "Joint Tactics, Techniques, and Procedures for Campaign Planning".

- *Deliberate Planning.* Deliberate planning is conducted principally in peacetime to develop joint operation plans for contingencies identified in strategic planning documents. The Joint Strategic Capabilities Plan (JSCAP) apportions the forces and identifies the minimum required deliberate plans for the combatant commander. Plans developed during deliberate planning provide a foundation for and ease the transition to crisis resolution. The Deliberate Planning Process has five phases: Phase I, Initiation; Phase II, Concept Development; Phase III, Plan Development; Phase IV, Plan Review; and Phase V, Supporting Plans (See Figure 2-2).

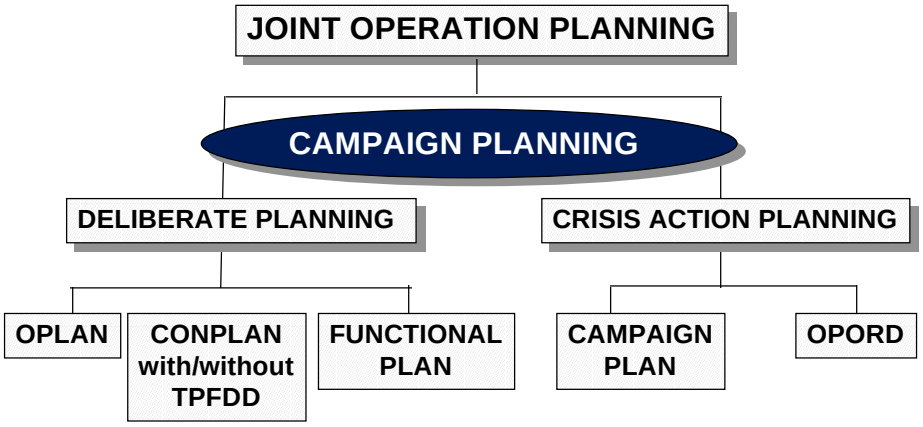


Figure 2-1. Joint Operation Planning

- OPLANs (Operation Plan). A complete and detailed operation plan contains a full description of the concept of operations and all required annexes and appendixes. OPLANs are written when the contingency has a compelling national interest, a specific threat is critical to national security, and whose scope and nature (large scale) requires detailed prior planning.

- CONPLANs (Concept Plans). CONPLANs (with or without a TPFDD) are operation plans in an abbreviated format, requiring considerable expansion for conversion into an OPLAN, campaign plan, or OPORD. CONPLANs are written for common type missions that may develop rapidly but take on many different forms; *e.g.* noncombatant evacuation operations.

- Functional Plans. Functional plans involve the conduct of military operations in a peacetime or permissive environment. These plans are developed for specific functions or specific tasks, such as disaster relief, peacekeeping, or counterdrug operations.

- *Crisis Action Planning (CAP).* CAP is based on current events and is conducted in time-sensitive situations. Forces for planning are allocated by the NCA through the CJCS. A crisis is defined as an incident or situation involving a threat to the U.S., its territories, citizens, military forces, and possessions or vital interests that develops rapidly and creates a condition that commitment of U.S. military forces and resources is contemplated to achieve a national objective. In crisis situations, formally established CAP procedures are followed (see references above). CAP procedures provide for the rapid and effective exchange of information and analysis, the timely preparation of military Course of Actions (COAs) for consideration by the NCA, and the prompt transmission of NCA decisions to supported commanders.

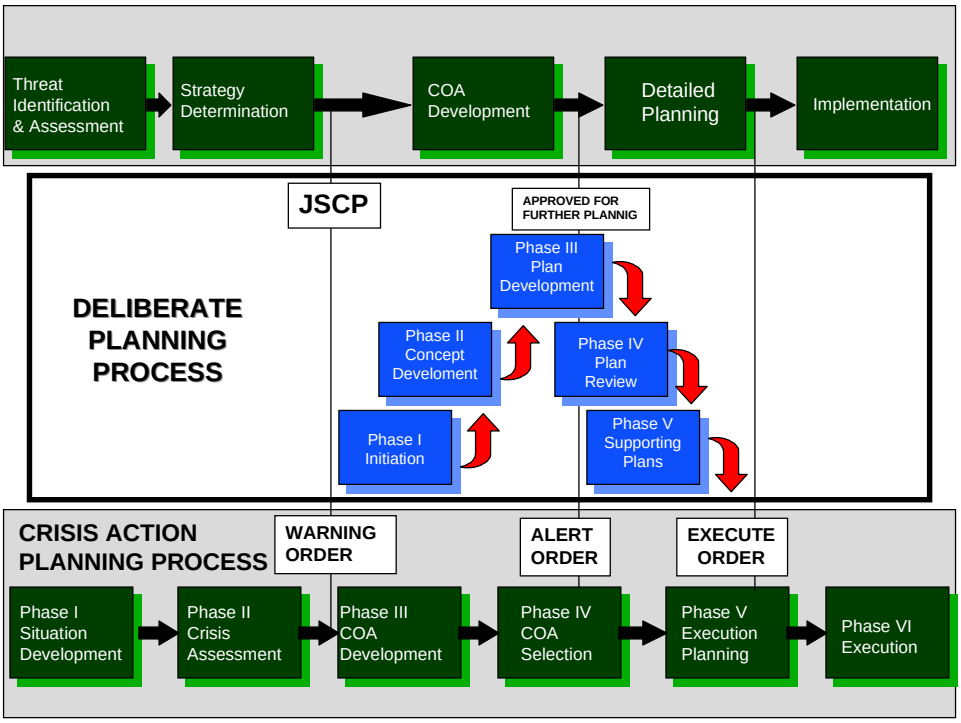


Figure 2-2. JOPES Deliberate Planning Process and Crisis Action Planning Process Functional Alignment

- Operation Order (OPORD). OPORDs are created during crisis action planning using prescribed formats. They are in the form of a directive issued by a commander to subordinate commands to effect the coordinated execution of an operation.

- *Joint Operations Planning and Execution System (JOPES).* JOPES is policies and procedures that guide joint operation planning efforts. Detailed policies, procedures, planning formats, and guidance are contained in JOPES Vol. I and II as referenced above.

2.1.2 Crisis Action Planning (CAP) Procedures.

- *Phase I - Situation Development.* The focus of this phase is on the combatant commander in whose areas the event occurs and who will be responsible for the execution of any military response. The initial report of the incident may be reported by the combatant commander or from the National Military Command Center. The supported commander prepares and submits an assessment of the event to the NCA and the CJCS. The assessment includes amplifying information regarding the situation, actions being taken, forces available, expected time for commitment of forces, and major constraints on the employment of forces.

- *Phase II - Crisis Assessment.* The NCA, CJCS and other members of the Joint Chiefs of Staff analyze the situation through available intelligence and determine whether a

military option should be prepared. The crisis assessment phase ends with a strategic decision by the NCA to return to pre-crisis situation or to have military options developed for consideration and possible use.

- *Phase III - COA Development.* The COA development phase implements an NCA decision or CJCS planning directive to develop military options. The CJCS issues a planning guidance directive to the supported commander directing the preparation of COAs. Normally the directive will be a CJCS WARNING ORDER. The directive establishes command relationships and identifies the mission and any planning constraints. In response to the directive, the supported commander develops and analyzes COAs. Joint operation plans are reviewed for applicability and used when needed. Supporting commanders, subordinate joint force commanders, and component commanders begin TPFDD development. USTRANSCOM reviews the proposed COAs and prepares deployment estimates. The supported commander analyzes the COAs and submits his recommendations to the NCA and the CJCS. This phase ends with the submission of the supported commander's estimate.

- *Phase IV - COA Selection.* The focus of this phase is on the selection of a COA by the NCA and the initiation of execution planning. The CJCS reviews and evaluates the COAs provided in the supported commander's estimate and prepares recommendations and advice for consideration by the NCA. The NCA selects a COA and directs that execution planning be accomplished. Upon the NCA decision, the CJCS issues a CJCS ALERT ORDER implementing the NCA decision. The ALERT ORDER describes the COA in sufficient detail to allow the supported commander and other members of the JPEC to conduct the detailed planning to deploy forces. In some cases, a PLANNING ORDER initiates the execution of planning activities before the NCA selects a COA.

- *Phase V - Execution Planning.* An NCA approved COA is turned into an OPORD during the execution phase. Actual forces, sustainment resources, and strategic mobility resources are identified and the concept of operations is described in OPORD format. Following CAP procedures and using capabilities provided through JOPES, the supported commander develops the OPORD and supporting TPFDD by modifying an existing OPLAN, expanding an existing CONPLAN (with or without a TPFDD), or developing a new plan. Supporting commanders identify and task specific units and provide movement requirements. Component commanders identify and update sustainment requirements in coordination with the Services. USTRANSCOM develops transportation schedules. CJCS monitors execution planning and reviews the supported commander's OPORD. This phase terminates when the NCA decides to implement the OPORD.

- *Phase VI - Execution.* The execution phase begins when the NCA decides to execute a military option in response to the crisis. A military response is implemented and operations are conducted by the supported commander until crisis resolution. The CJCS EXECUTE ORDER directs the deployment of forces and employment of forces, defines the timing for the initiation of operations, and conveys guidance. The supported CINC issues an EXECUTE ORDER to subordinate and supporting

commanders. The execution phase continues until the crisis terminates or the mission terminates and force redeployment is completed.

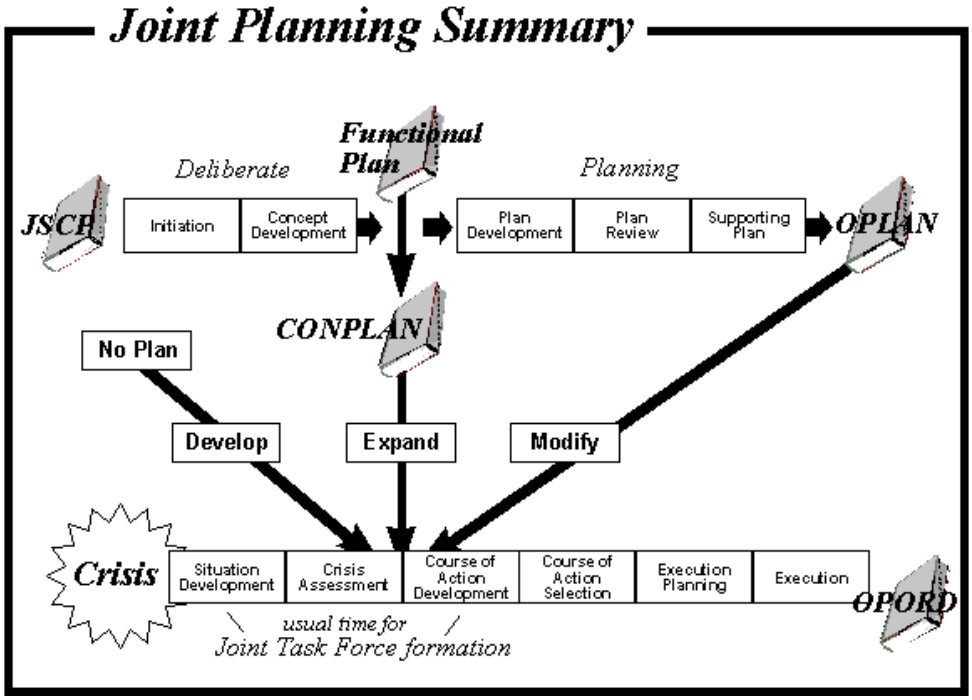


Figure 2-3. Summary of the Deliberate and Crisis Planning Processes

2.1.3 METOC Support During Crisis Action Planning.

METOC personnel must be involved in every CAP phase. METOC resources may be required on very short notice to help assess the crisis, determine and make known to decision makers the impact of the environment on possible courses of action, and to provide forecasts for the execution area.

- *Phase I.* During Situation Development, any major METOC constraints on the employment of forces should be considered. This includes current and forecast METOC conditions in the crisis area, climatological factors, the space environment, the suitability of sites for employment of forces, and the degree of accuracy and limitations of forecast products.

- *Phase II.* During Crisis Assessment, METOC conditions are monitored while the NCA and CJCS assess the situation. The CINC Senior METOC Officer should interact with the Joint Staff METOC officers at this time. A “first cut” communication concept can be developed at this time, with emphasis on communications capabilities both into and out of the theater and between the components. METOC support can help determine if/when military action should begin, or how environmental conditions could impact the potential military operations.

- *Phase III.* COA development involves Intelligence Preparation of the Battlefield and preparation of the Intelligence Estimate and the Commander's Estimate. (Formats for these two documents are in Appendix C of this handbook). Climatological and environmental databases must be searched and summarized for operational planners. Senior METOC personnel must work closely with the Intelligence section to provide the impacts of METOC on the COA. Within OPSEC constraints, liaison with component commands (including theater SOCs), to coordinate METOC requirements for personnel and equipment. TPFDD development begins.

- *Phase IV.* During COA Selection, continue monitoring METOC conditions and TPFDD development. This phase is a time for communication between the planners and the proposed subordinates who will be tasked to carry out the plan. This is also a critical time for communication between the CINC Senior METOC Officer (SMO), the Joint Force METOC Officer (JMO), on the staff of the Joint Force Commander or to be assigned, and Service component METOC planners, who will provide personnel, resources, and services to support the planned operation. The SMO and the JMO can discuss manning requirements for the JTF HQ and functional JTF component commands. Liaison with METOC Forecast Centers for initial products and services for the joint operation area.

- *Phase V.* The OPORD is developed during the Execution planning phase. Formats for the required METOC inputs (Annex H and other annexes) to the OPORD are contained in Appendix B. Actual forces are identified at this time. Coordinate with supporting commands for identification of METOC personnel and equipment. Liaison with subordinate METOC planners to identify any shortfalls in personnel and equipment.

- *Phase VI.* During the execution phase, the JMO assembles his organization and implements METOC operations. Real-time observations and forecasts will be critical during the execution phase. The EXECUTE ORDER will deploy forces and commence operations. The CINC SMO and JTF JMO chapters detail the duties and responsibilities during the execution phase of a joint operation.

2.2 Joint Task Force Headquarters Master Training Guide

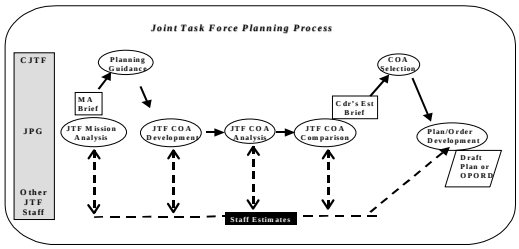
2.2.1 JTF HQ MTG Task Steps for METOC Support Operations.

The JTF HQ MTG is a Joint Staff sponsored document written and updated every three years by U.S. Joint Forces Command and used to train JTF staffs. This section is taken from Task Number 215J and is assigned to the JTF METOC Officer (JMO) and related to Universal Joint Training List (UJTL) Task OP 2.3.2.

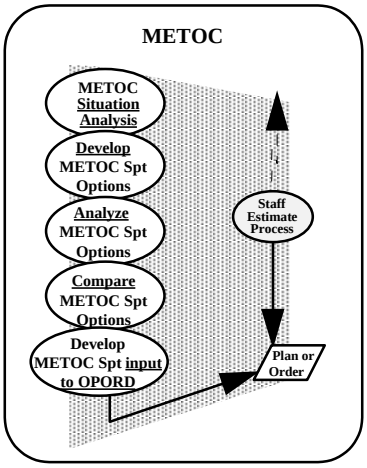
TASK 215J**: Develop Operations Estimate - METEOROLOGICAL & OCEANOGRAPHIC (METOC) SUPPORT OPERATIONS**

ELEMENT: J2/J3/METOC Officer (JMO) (Relates to UJTL Task OP 2.2, 2.3, 2.4, 2.5)

MTG TASK SITUATION: The JTF has been assigned a mission from the CINC. A Joint Planning Group has been assembled and the planning of an operation is beginning. The Joint Task Force METOC Officer (JMO) has been assigned.



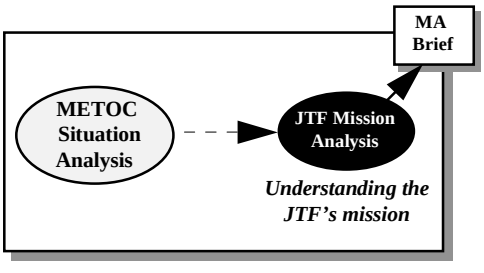
MTG TASK PURPOSE: To provide meteorological and oceanographic (METOC) input into a JTF's planning effort. METOC incorporates all facets of meteorological, oceanographic, and space environmental phenomena from the bottom of the earth's oceans to the space environment. The JTF use of Service component METOC assets, as well as Service-unique assets that support the components, must enhance joint planning and execution of operations. Climatology, real-time data, and accurate forecasts are considered in a manner that supports the campaign or major operation and prepares the JTF to exploit environmental windows of opportunity. The structure of this input is the same as the overall planning processes described in this MTG. See the references below for task detail.



REFERENCES: JP 2-0, JP 3-0, JP 3-59, JP 5-00, JP 5-00.2; US Joint Forces Command Joint METOC Handbook

2.2.2 MTG Task Steps.

1. **Contribute to JTF's overall mission analysis** (Task 215J-01-JMO)
   a. Determine known facts, current status, or conditions.
      (1) Conduct an initial METOC analysis. Provide past, present, and future states of space, air, and ocean environments to JTF staff. Consider climatology of operational area, observations, and forecasts, including forecast product accuracy and limitations.
      (2) Provide METOC input into the Joint Intelligence Preparation of the Battlespace.



(3) Provide METOC input to the Joint Planning Group (JPG).
(4) Provide METOC input to the J4/JLRC affecting logistics.
(5) Provide METOC input to the J6/JCCC affecting communication.

b. Develop assumptions to replace missing or unknown facts.
(1) Consider effects of METOC in operational area.
(2) Determine status of friendly METOC support.
(3) Identify METOC data requirements for METOC support operations.

c. Analyze the CINC's mission and intent from a METOC perspective.

d. Determine limitations caused by METOC conditions.
(1) Things the JTF's METOC forces must do (constraints).
(2) Things the JTF's METOC forces cannot do (restraints).
(3) Others (*e.g.*, use of riot control agents--see CJCSI 3110.07 for advance authorization to use these agents).

e. Identify tasks to be performed by joint METOC forces.
(1) Determine *specified* tasks.
(2) Determine *implied* tasks.
(3) From (1) and (2) above, determine *essential* tasks.

f. Conduct an *initial* METOC force structure analysis. Determine shortfalls in forces or capabilities that will impact the conduct of METOC support operations.

g. Conduct an *initial* risk assessment based on METOC conditions.

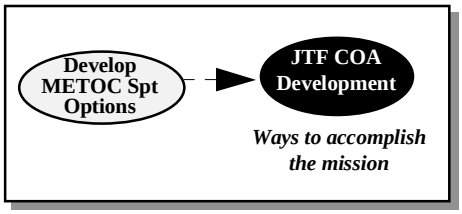
h. Assist in development of the mission analysis briefing for the CJTF.

2. **Receive CJTF planning guidance** (Task 215J-02-JMO). CJTF should provide guidance at this point (see Task 202). Planning guidance should be disseminated to METOC personnel and the components. If needed, ask the CJTF for any guidance necessary for continued planning.

3. **Develop METOC support options to the JTF's courses of action** (Task 215J-03-JMO). The JTF staff should now develop multiple friendly COAs. METOC personnel should advise JTF planners on how METOC conditions impact each developing JTF COA. See Task 206 for more information.

a. Determine METOC impacts on *land forces, air forces, maritime forces, special operations forces,* and *space operations* conducting maneuver, firepower, protection, support, and establishment of command & control.

b. Test the *validity* of each COA. Conduct a preliminary test for *feasibility* within the constraints of the physical environment.



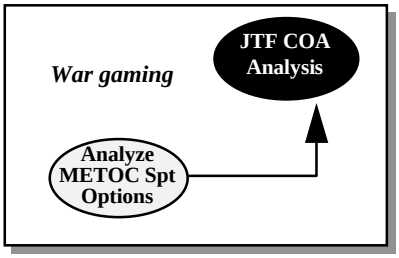
c. Provide input to other staff estimates:
(1) Prepare METOC input to the Intelligence Estimate. Provide METOC characteristics of area of operations and effect on military operations.
(2) Prepare METOC input to the Operations Estimate. Provide METOC impacts on combat and supporting operations.
(3) Prepare METOC input to the Logistics Estimate. Provide METOC impacts on logistics situation (key installations, transportation routes).

(4) Prepare METOC input to the Command, Control, Communications, and Computers (C4) Estimate. Provide METOC impacts on C4 systems (line of sight, satellite (SATCOM), UHF SATCOM, ground mobile command post, Defense Satellite Communications System (DSCS) ground mobile segment, and Defense Communications System (DCS) interface).

d. Provide input to *JTF COA* statement and sketches.

e. Coordinate support options with the CINC Senior METOC Officer (SMO), Service METOC planners, and METOC Forecast Centers (MFCs) as appropriate.

4. **Participate in COA analysis (war-gaming)** (Task 215J-04-JMO). Be prepared to contribute to the process of war-gaming by mentally "fighting the battle" in time and space. The process may use the structure of action-reaction-counteraction sequences for critical events (e.g., D-Day actions).



a. METOC impacts on critical events and decision points.

b. METOC impacts on the duration and timing of critical events.

c. Opportunities for deception and surprise using expected METOC conditions.

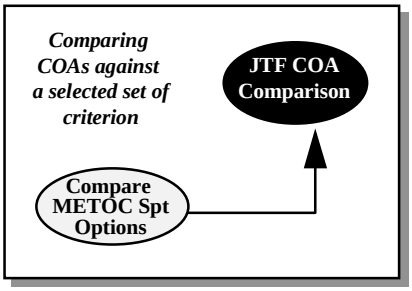
d. METOC impacts on high payoff targets.

e. METOC impacts on required reconnaissance and surveillance.

f. METOC impacts on required logistics support and constraints.

g. METOC impacts on communications requirements.

5. **Participate in COA comparison** (Task 215J-05-JMO). Provide quantitative impact of METOC conditions on the COAs.



a. Participate in determining the criteria to be used for comparing COAs. Criteria could come from:

(1) Commander's intent.

(2) Factors of METT-T:

(a) Mission accomplishment.

(b) Enemy.

(c) Terrain.

(d) Troops available.

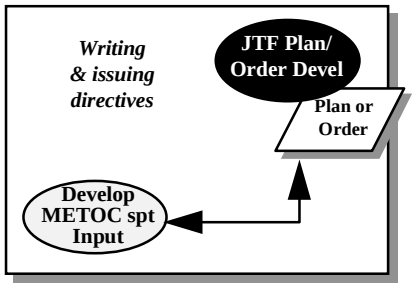
(e) Time available.

b. Ensure that recommendations for METOC have been coordinated with components of the JTF, as well as the CINC SMO, the Service METOC planners, and MFCs, as appropriate.

6. **Receive CJTF's decision on COAs** (Task 215J-06-JMO). The CJTF may select or modify the recommended COA. Based on that decision, the Commander's Estimate document (or slides) will normally be sent/briefed to the CINC for approval.

7. **Develop Annex H and METOC perspective in JTF plan/order** (Task 215J-07-JMO). After the COA is selected the plan/order is physically developed. Most of the information needed for this task should have already been developed through the estimate process

(mission analysis through COA selection). METOC input can be in many sections of the plan/order. See Task 210 for the joint (JOPES) plan/order format.



a. Prepare Annex H. Document METOC CONOPS and task coordination (use a Letter of Instruction (LOI) to provide additional information, if necessary).
b. Provide METOC input to Annex B. Identify METOC characteristics of, and impacts to, the operational area.
c. Provide METOC input to Annex C. Identify METOC conditions relating to conduct of combat and supporting operations.
d. Provide METOC input to Annex D. Identify transportation and logistic requirements for METOC support operations.
e. Provide METOC input to Annex J. Indicate channels for command and control of METOC operations if different from the command relationships outlined in the Basic Plan or Annex J.
f. Provide METOC input to Annex K. Identify METOC initial and sustaining communications requirements.
g. Provide METOC input to Annex N. Identify METOC space requirements.
h. Provide METOC input to the Basic Plan. Use “Coordinating Instructions” to include instructions common to two or more components or subdivisions, and “Administration and Logistics” for broad guidance on how logistics and administration support for METOC forces is to be furnished (can reference Annex D).
i. Coordinate (during execution planning) with supporting commands and METOC planners to identify and task METOC personnel and equipment.

2.3 Additional Guidance

2.3.1 Joint Publications.

Joint publications provide guidance on JTF formation, planning, and operations. Access to the Joint Electronic Library (JEL) is available through the NIPRNET (http://www.dtic.mil/doctrine) or SIPRNET (http://nmcc20a.nmcc.smil.mil/users/dj9j7ead/doctrine/jel/index.html)

- JP 0-2, Unified Action Armed Forces (UNAAF), discusses functions of DoD, the Joint Chiefs, and the Services at a top level
- 5-series provides guidance on planning
  - JP 5-0 provides an overview of joint planning, including mobilization and employment planning, types of plans and orders, and deliberate versus crisis action planning
  - JP 5-00.2 outlines JTF planning guidance and procedures, as well as JTF and component functions and responsibilities
  - JP 5-03.1 (Joint Operation Planning and Execution System contains formats for such documents as deployment and warning orders, Commander's Estimate of the Situation, etc.

- 3-series covers joint operations, covering the entire spectrum of war, including multinational operations and specific areas, such as air and amphibious operations, interdiction, close air support, reconnaissance, and meteorological and oceanographic operations (JP 3-59)

2.3.2 US Joint Forces Command.

The USJFCOM J-7 Training Directorate acts as a lead in developing and refining joint doctrine, and has initiatives underway to improve availability of joint training and lessons learned to improve JTF formation and planning processes. Refinements to joint doctrine and information on specific functions of JTFs are available online on the NIPRNET (http://www.jtasc.acom.mil), with more information available on SIPRNET (http://www.jtasc.acom.smil.mil).

2.3.3 Armed Forces Staff College.

AFSC publishes the "Purple Book", The Joint Staff Officer's Guide, which is a comprehensive, overall guide to DoD organization and joint staff guidance. The volume includes information on the Joint Staff, combatant commands, staff work, a survey of key joint publications, and overviews of the deliberate and crisis action planning processes, including formats for important documents (*e.g.*, Intelligence Estimate, Commander's Estimate of the Situation, OPORDs, etc.) The Guide, known officially as AFSC Pub 1, is available through the Superintendent of Documents, US Government Printing Office, Washington DC 20402, or from the school at Armed Forces Staff College, Joint and Combined Staff Officer School, ATTN: Pub 1 Coordinating Editor, 7800 Hampton Blvd, Norfolk VA 23511-1702. The Guide is also available online at http://www.afsc.edu/pub1/afsc0000.htm (NIPRNET) or http://www1.eucom.smil.mil/eccs-or/library/ndu/afscpub1/ (SIPRNET). A .PDF (Adobe Acrobat) version is available on USJFCOM METOC's SIPRNET homepage, http://157.224.120.250/weathr.nsf/metoc (scroll down to Pubs & Documents, click on Joint Operations--applicable documents). PDF and html versions are also available on the Joint METOC CD published by the U.S. Joint Forces Command METOC branch.

Chapter 3 - METOC Support to Joint Task Force Headquarters

This chapter summarizes the structure of a Joint Task Force headquarters and the types of METOC support that might be required by its various elements (J-codes, boards, and centers).

3.1 Joint Task Force Headquarters METOC Support

3.1.1 Structure.

The JTF METOC organization may range in scope from a small briefing cell to a full-function METOC forecast activity. With the current emphasis on minimizing the footprint of US forces forward, the size of the JTF staff and thus the allowable number of JTF METOC personnel collocated with the headquarters will be small. Economy of force will normally dictate the use of METOC Regional Centers to provide products and services that the JTF HQ METOC personnel will be unable to provide.

3.1.2 Relationship.

JTF METOC personnel report to the Joint Force METOC Officer (JMO; see Chapter 6), who is responsible for the direction and coordination of METOC activities under the Joint Force Commander's operational control. OPCON is the authority exercised by commanders at or below the combatant command, to organize and employ commands and forces, assign tasks, designate objectives, and give authoritative direction necessary to accomplish the mission; it does not include authoritative direction for matters of administration, discipline, internal organization, or unit training.

3.1.3 Assets.

Variable, depending on scope of the organization and assigned responsibilities.

3.1.4 Roles and Responsibilities.

As assigned to directly support CJTF/JMO.

- To the maximum extent allowable, produce products and forecasts (*e.g.*, the Joint Operations Area Forecast, JOAF) to support ongoing operations and give METOC guidance to the components.
- Assist the JMO in providing full spectrum support to the JTF HQ staff, boards, and centers.
- Functionally coordinate METOC data and product support from externally tasked assets per Annex H.

3.1.5 METOC Support Capabilities and Requirements.

Will vary with scope of JTF’s mission and Service requirements:

- ***Considerations***
  - Customer backbone communications and data collection
  - Minimum numbers of personnel and appropriate equipment available
    > Contingency manning (no days off). Additional manning required for long term events

- ***Manning***. Will vary depending on the scope of the operation. Recommend augmentees from Services apart from that of the JTF Commander. As a minimum per shift:
  - Air Force officer/forecaster with JFACC/AOC experience
  - Air Force officer/forecaster with Army/ground experience
  - Oceanographer and/or Navy forecaster
  - USMC officer/forecaster (Depending on scope of MARFOR involvement)

- ***METOC-related duties to support JTF Headquarters.*** Assist in assessing METOC impacts to ongoing and planned operations:
  - Prepare/present briefings
  - Prepare SITREP input
  - Provide climatological information to staff
  - Assist topography team prepare Intelligence Preparation of the Battlefield (IPB) products
  - Attend briefings and provide decision assistance to planners
  - Pass local weather warnings advisories to staff
  - Develop a collection strategy and manage collection program
  - Obtain support for JTF/METOC (*e.g.* Admin, Log)
  - Validate special support requests of combat echelons
  - Assist JTF staff to fill METOC force needs/shortfalls (*e.g.* Comm, Personnel, Log)

- ***METOC duties.*** These duties will depend on personnel manning, equipment, connectivity, and location of METOC assets. The JMO should ensure the following are accomplished, whether by JMO or other designated METOC assets:
  - Obtain and analyze METOC data (all types)
  - Prepare and disseminate JOAF and Discussion (2-4 x per day)
  - Prepare and disseminate special support products
  - Prepare and disseminate AR forecasts
  - Prepare and disseminate JOA Hazards and NEPH prognoses
  - Metwatch forecast areas
  - Amend/update products, as required
  - Perform QC of products
  - Interface with C4 Systems
  - Operate METOC communication net, if one has been established

3.2 JTF METOC Support Requirements to JTF HQ Elements

3.2.1 JTF Structure.

Organization of the Joint Task Force is up to the JTF Commander. A JTF may be built by augmenting a core organization (*e.g.*, XVIII Airborne Corps, II Marine Expeditionary Forces) or *ad hoc* from various "contributors"; additionally, it may have select Service components, subordinate joint task forces, and/or functional components. The JTF Commander will also determine what joint boards and centers will meet--each of which may require METOC support. Figure 3-1 depicts the doctrinal organization of a JTF headquarters.

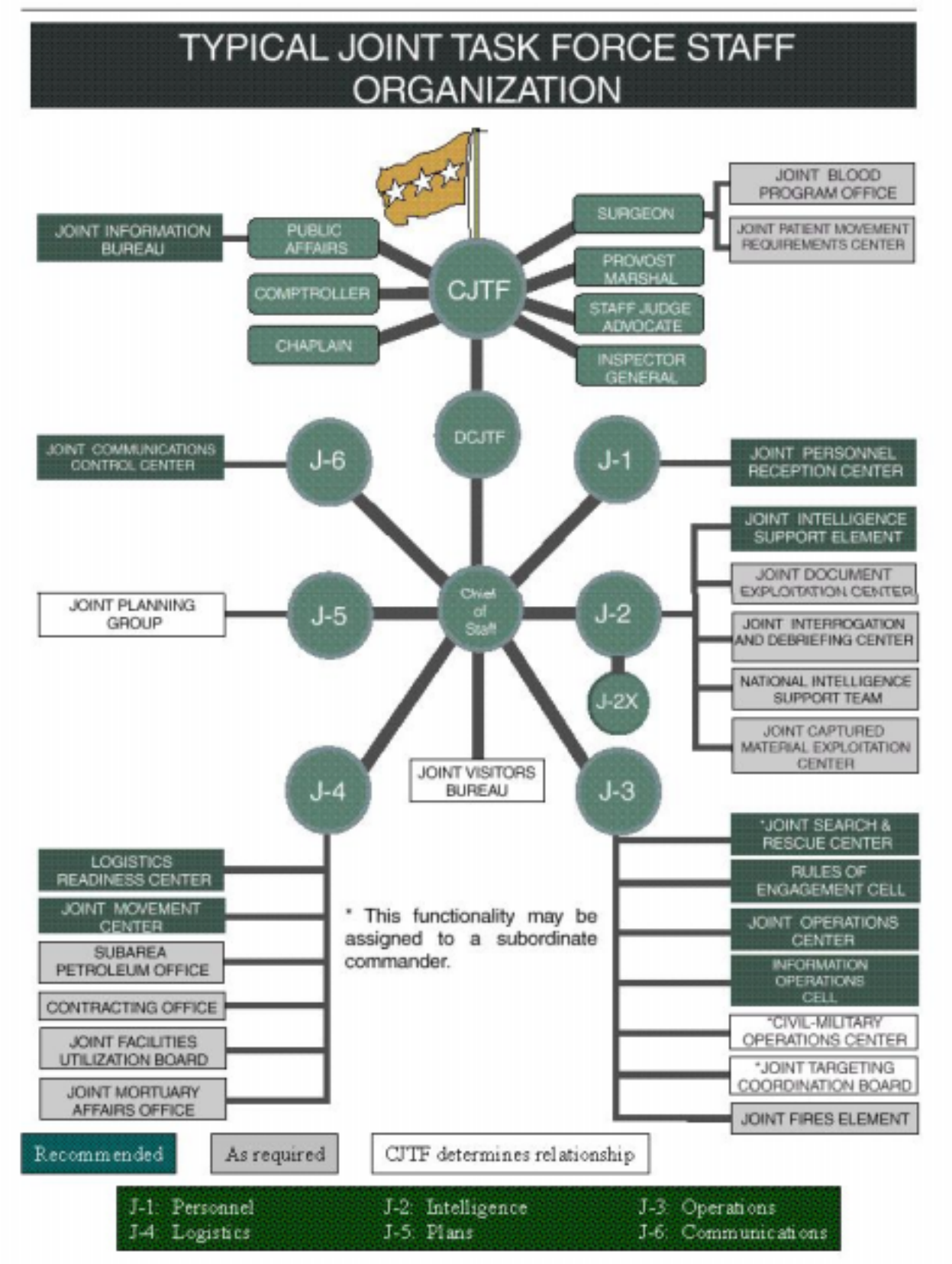


Figure 3-1. Typical Joint Task Force Headquarters Structure (JP 5-00.2)

3.2.2 Potential METOC Support Requirements to the JTF Headquarters.

The JMO, or his representative, should visit each of the elements within the JTF headquarters to determine METOC support requirements. This section highlights the roles of the various JTF J-codes and boards and centers, and potential METOC support required by each.

3.2.2.1 J1/JIB (Personnel/Joint Information Bureau).

Daily forecasts.

3.2.2.2 J-2/JIC (Intelligence/Joint Intelligence Center).

- Assets
  - Joint Deployable Intelligence Support System (JDISS)
  - National Technical Means (NTM) imagery analysis from Naval Oceanographic Office
  - Ability (through CINC) to task National collection assets as required
  - Global Command and Control System (GCCS)

- Roles and Responsibilities
  - Provide METOC Essential Elements of Information (EEIs) during mission planning phase
  - JMO SCI access, possibly SPECAT access, required
  - Monitor spot reports for directly-reported or implied weather data/impacts
  - Provide METOC input to INTSUM

- METOC Requirements
  - Briefings
  - Collection management impacts (cloud-free forecasts, etc.)
  - IPB (friendly and enemy impacts to operations)

3.2.2.3 J-3/JOC (Operations/Joint Operations Center).

- Provide 24-hour watch personnel in the JOC
- Prepare and present briefings
- Warfighting impacts
- 0-24 hour (short range) planning forecasts. Focused on situational awareness - what is going on now and in the near future, and the impact upon ongoing operations
- 24-XX hour (long range) planning forecasts
- Answer METOC Requests for Information (RFIs)--generate RFIs when required
- Contribute to or manage the Common Operational Picture (COP) on GCCS
- Participate in collaborative planning as required

3.2.2.4 J-4/LRC (Logistics/Logistics Readiness Center) and Medical/Surgeon.

- Sea/Air POE/POD and en route weather
- Intra-theater weather (trafficability and air impacts)
- Human factors (wind chill, heat indices, etc.)
- Host nation agreements with respect to METOC support

3.2.2.5 J-5(J-3 Plans)/Joint Planning Group (JPG).

- 24+ hour planning forecasts. Focused on medium and long range forecasts, used to determine the feasibility (due to weather and space environment impacts) of planned operations. If the weather will be detrimental, then a determination to delay or follow alternate courses of action must be made.

3.2.2.6 J-6/JCSE (Communications/Joint Communications Support Element).

- Weather impacts on communications equipment using various portions of the electro-magnetic spectrum
- May include day/night HF propagation conditions; rain rate impacts on SHF & EHF communications systems; or ducting of UHF & VHF signals; x-ray flare and geomagnetic effects on HF propagation and scintillation effects on SATCOM and GPS navigation

3.2.2.7 JPOTF.

(Joint Psychological Operations Task Force). Psychological operations are activities designed to persuade or influence a target audience to accept or support United States (or Coalition) efforts to assist the local population and/or authorities. This is accomplished through such varied activities as leaflet drops, radio and TV broadcasts, loudspeaker operations, handbills and posters.

- METOC requirements: PSYOPS units are normally attached to conventional units and receive weather support from the conventional unit weather team. However, a SOWT-element may deploy with the PSYOPS unit to provide target area forecasts, surface and upper air, in support of these operations. These teams have a critical need for upper air data to provide accurate forecasts for leaflet drop operations.

3.2.2.8 JSAR (Joint Search and Rescue)/CSAR (Combat Search and Rescue).

- High-resolution satellite imagery. Computer derived SAR forecasts are available to assist over water search patterns from NAVFOR METOC.

3.2.2.9 JTCB (Joint Target Coordination Board).

Chaired by the JTF Deputy Commander, composed of component commanders or their representatives, to determine/assign target sets for use in planning of the joint forces

campaign. The JFACC's ATO target lists for the next several cycles (72+ hours) are typically addressed in detail. Target sets, or specific targets, may be assigned to elements of the joint force (JFACC & JSOTF in particular) for planning and execution.

- Stand-up briefing at the daily meeting. Should touch on METOC impacts to operations and reconnaissance for the next four to five days including impacts due to space weather.

3.3 Joint METOC Tools

3.3.1 Theater METOC Products.

The JTF METOC cell (or, alternatively, the Joint METOC Forecast Unit, JMFU) may want or need to develop METOC products such as those listed below for their customers, or have a regional or major forecast center produce supporting products. Additional products required by the functional components (e.g., the JFACC, JFMCC, JFLCC, etc.) are detailed in Chapter 4, JTF Component METOC Support. Additionally, the JTF METOC cell may need to maintain a capability to produce component METOC products, in case a component command "goes down".

- Joint Operational Area Forecast (JOAF)
- Drop Zone Forecast
- Weapons Performance
- Air Refueling (AR) Route Forecasts
- Terminal Aerodrome Forecasts (TAFs)
- Mission Planning Forecasts (MPFs)
- Mission Control Forecasts (MCFs)
- Lower and Upper Level Horizontal Weather Depiction (HWD)
- Significant Weather Prog
- Electro-optics Bulletin
- Surface Analysis
- Specialized Support Bulletins (as requested)

3.3.2 Joint METOC Forecast Unit.

The Senior METOC Officer (SMO), in coordination with the JMO, may select a location for a Joint METOC Forecast Unit (JMFU). Any of the theater METOC facilities are available (*e.g.*, the Naval European METOC Center or the Sembach Operational Weather Squadron in Europe); the JTF HQ METOC cell (afloat or ashore) may be augmented to provide an equivalent capability; or, a designated support element within a Major Forecast Center (e.g., AFWA) can provide JMFU products. The JMFU should integrate and maintain the METOC database for the Joint Operations Area (JOA), and will probably manage the JTF NIPRNET/SIPRNET homepage(s).

- A "virtual" JMFU may be useful: products are produced by JTF and component METOC personnel, or by METOC personnel located at a regional forecast center in a rear area, and are hosted on servers at a designated regional METOC center for all to access. Homepage (and database) management is handled by experienced webmasters at a centralized facility.

- Joint METOC Forecast Capability (JMFC). Air Force Weather reengineering and the concept of reachback has modified the USAF's perspective in providing or arranging "one theater, one forecast" or "one operation, one forecast". Traditionally, the term JMFU implies a single, forward-deployed, operational level facility. Alternatively, JMFC focuses METOC planners on minimizing the forward-deployed footprint by reaching back to Air Force and Navy regional centers for operational level products and services; those centers may need joint augmentation to satisfy joint operational requirements.

3.3.3 Meteorological Equipment.

3.3.3.1 Joint METOC Equipment.

METOC equipment available to the JTF METOC cell will vary, based on the mission and required capabilities at the JTF HQ. Most tactical-level METOC equipment will be located at and below the JTF component level. The JTF METOC cell at a minimum requires computers with NIPRNET/SIPRNET connectivity and access to the Global Command and Control System (GCCS).

3.3.3.2 Service METOC Equipment.

Brief descriptions of tactical meteorological equipment can be found in the Service chapters of this Handbook, as well as in an Appendix of Joint Pub 3-59 (http://www.dtic.mil/doctrine/jel/operations.htm or http://nmcc20a.nmcc.smil.mil/users/dj9j7ead/doctrine/jel/operations.htm) and the Federal Directory of Mobile Meteorological Equipment and Capabilities, published by the Office of the Federal Coordinator for Meteorological Services and Supporting Research (http://www.ofcm.gov/Homepage/text/pubs_linx.htm).

3.3.4 Communications and Computers.

This section describes joint command and control, communications, computers systems, and infrastructure. The discussion is conceptual in nature and highlights DoD's approach toward developing joint collaboration tools the common operational picture (COP).

- *The DII and Joint Technical Architecture.* The Defense Information Infrastructure (DII) provides a seamless, global, standards-based end-to-end joint command and control architecture that provides assured, flexible and affordable information services to the warfighter. The DII encompasses the resources to accomplish information transfer and processing. Information transfer and processing includes data

management and storage, information management, computers, communications, applications, security, people, training, and support. The DII is managed by the Defense Information Systems Agency (DISA) under the sponsorship of the Joint Staff. The DII architecture encompasses the Joint Technical Architecture (JTA), DII Common Operating Environment (COE), DISN, GCCS, and GCSS. The Joint Technical Architecture (JTA) mandates the technical standards and specifications required for interoperability among systems within the DII. The DII COE provides an open systems development and operating environment for information systems within the DII. The Global Command and Control System (GCCS) and Global Combat Support System (GCSS) are systems within the DII COE. The Defense Information System Network (DISN) is the global telecommunications infrastructure that provides end-to-end information transfer and value-added network services. The DISN architecture provides an integrated network service to meet all DoD requirements for voice, video, and data communications. The DISN includes the Secure Internet Protocol Router Network (SIPRNET).

- *Global Command and Control System (GCCS).* The GCCS is a global C4I system that is robust, reliable, interoperable, secure, responsive, and survivable. It presents essential information to the warrior whenever and wherever the warrior directs. It enables the warrior to synchronize actions. The following general description is from the Joint Staff J6 Joint C4 systems description document. The GCCS:

  - Provides a fused, near real-time, true picture of the battlespace
  - Provides open, modern, client-server systems
  - Provides real-time battlefield awareness to commanders
  - Uses sensor, intelligence, and plans data as principal input
  - Uses an evolutionary acquisition strategy
  - Has core functions, to include: crisis planning, force deployment, force status, air operations, intelligence, message handling capability, METOC and narrative information
  - Consists of three elements: core common software, common standards, and CINC unique software
  - Composed of ongoing service C4I modernization programs

  - *GCCS METOC Applications.* With DISA's fielding of the Joint METOC Segments (JMS) and Tactical Forecast System (TFS) in GCCS 3.0, the first METOC segments are available within the DII COE for use by joint METOC personnel. These segments ingest gridded, observational and imagery data for processing and display in the joint mapping and visualization segment. The significance of these segments is twofold: first, the segments provide systems (*e.g.*, GCCS) within the DII COE the capability to display METOC products in the situational awareness picture. Secondly, the Applications Programming Interfaces (APIs) used by the segments are available to other segment developers so that METOC data can be fully integrated in mission support applications (*e.g.*, satellite vulnerability, joint air defense planning, UAV mission planning). The APIs are based on WMO communications formats for binary data exchange (GRIB and BUFR). These

formats are included in the Joint Technical Architecture (JTA). GRIB formatted gridded fields are available from all of the major production centers. Air Force Weather Agency products are available as gridded fields on SAFWIN. Navy products are available from FLENUMMETOCCEN and Navy METOC regional centers.

- *GCCS Configuration*. Typically, the JTF HQ will have two UNIX servers and any number of PCs configured as GCCS workstations. The GCCS 3.X software is implemented within a client/server model, meaning a UNIX server can provide data to a number of clients (other UNIX workstations and/or PCs). One possible configuration is a UNIX database server, UNIX applications server, PC web server, and a large number of PC client desktops. The UNIX applications server can host the Enhanced Linked Virtual Information System (ELVIS-II), which provides the COP and other GCCS products (including METOC products) to any client using web-based (JAVA) technology. The PC web server can host the CJTF's METOC site with updated METOC products.

- *Defense Messaging System (DMS).* DMS is the primary means through which text messages are transmitted to the warfighter. DMS replaced AUTODIN in 1999.

- *SATCOM Systems.* The MILSATCOM programs provide basic long-haul communications support to the warrior. The four key components are UHF systems, SHF systems, EHF systems, and commercial satellite communications. UHF systems are not secure and provide low data rate (LDR) connectivity to deployed forces, while EHF systems are survivable and jam-resistant. Direct broadcast satellite systems, such as the Global Broadcast System, use small, low-cost, commercial type terminals to provide high-capacity transfer of information directly to the warrior. Commercial satellites carry non-sensitive administrative and combat support information. Wideband (Ku and C band) SATCOM systems can add extra bandwidth in support of crisis situations without requiring the Government to launch and operate additional military satellite systems.

Chapter 4 - METOC Support to Joint Task Force Components

This chapter summarizes the types of METOC support that may be required to support functional components of a Joint Task Force: that is, the Joint Force (JF) Air Component Commander (ACC), Land Component Commander (LCC), Maritime Component Commander (MCC), and the Joint Special Operations Task Force (JSOTF).

4.1 JTF Component Structure

Figure 4-1 below depicts several variations for forming a Joint Task Force. The CJTF can form along Service or functional component lines or a combination of both.

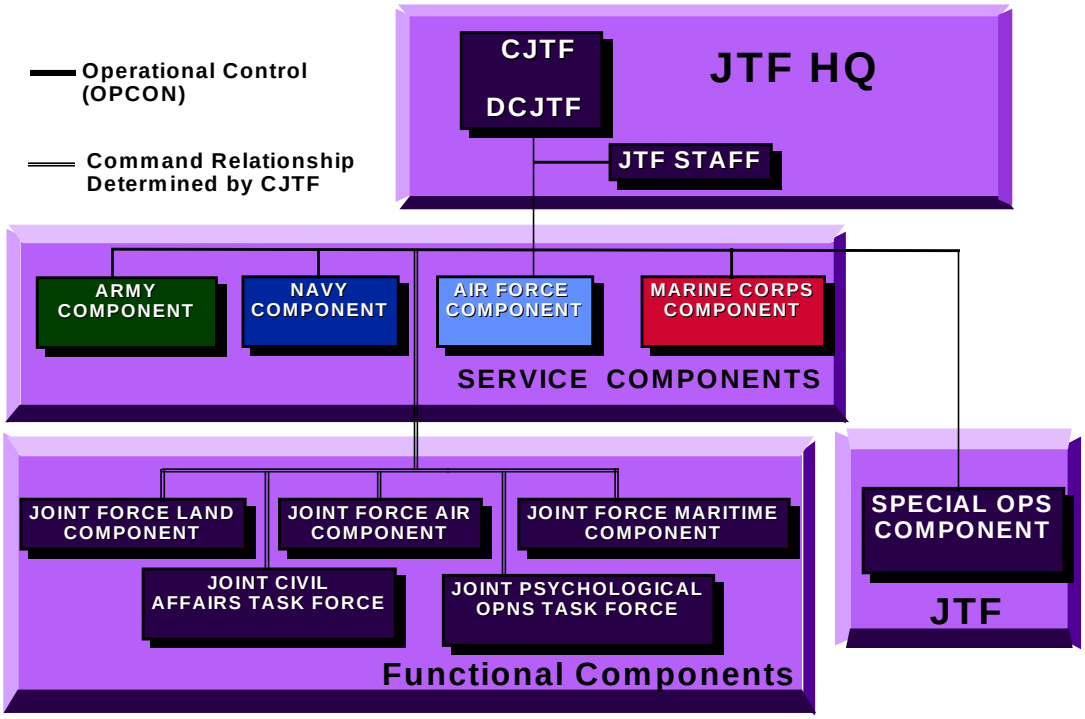


Figure 4-1. Joint Task Force Component Commands

Note: the Joint Special Operations Task Force (JSOTF) and the Joint Force Air Component Commander (JFACC) are usually established. The Army and Marine Corps components may stand-alone or combine to form the Joint Force Land Component Commander. The Joint Civil Affairs Task Force (JCATF) and Joint Psychological Operations Task Force (JPOTF) are frequently formed as part of the JTF HQ. When two service components are combined, the functional component commander's staff weather officer or oceanographer should be the primary METOC contact for that functional command.

4.2 Joint Task Force Components: METOC Structure and Support

4.2.1 JFACC (Joint Force Air Component Commander).

- *Structure*. JFACC Staff Weather Officer (may be the JMO if the JFACC is collocated with the JTF Commander's staff), forecasters/briefers as required to perform assigned tasks and responsibilities. The JFACC is typically the Commander of a Numbered Air Force (NAF), and the SWO is the senior weather officer on his staff.

- *Relationship*
  - Tied closely with JFACC plans cell, Intel/RECCE cell, Joint Guidance and Apportionment Targeting cell (GAT), and the current operations cell
  - Typically works for the Director, Joint Air Operations (JOAC) Center (para. 4.2.1.1)

- *Assets*. No special requirements aside from telephones, PCs, etc.

- *Roles and Responsibilities*
  - Advise JFACC commander of operational limitations due to weather
  - Metwatch launch, landing, and alternate airfields
  - Coordinate with JMO and components as required
  - Establish LCC data collection plan (to include FALOP)
  - Establish ACC data collection plan

- *JFACC METOC Support Requirements*
  - Primary emphasis is briefing and coordinating
  - Monitor execution forecasts (*e.g.*, TAFs and AR route forecasts) and observations
    > JOAF should provide the basis for these forecasts
  - Metwatch JFACC airfields/ships
    > Pass local weather warnings and advisories to staff
  - Target and en route forecasts (as required), to include Tomahawk support
  - Support the Joint Air Operations Cell (JAOC) and the Air Tasking Order (ATO) cycle
    > Prepare/present planning electro-optical/IREPS data
    > Provide decision assistance to ATO planning cell
  - Request special products (Send to JTF JMO)
  - Assist JFACC staff in working METOC support needs/shortfalls

- *Manning*. JFACC minimum recommended manning (assumes collocation with full support METOC unit):
  - One O-5/O-4 OIC
  - Two O-3/5 briefers
  - Three E-6/7 forecasters
  - One GCCS operator

4.2.1.1 JAOC (Joint Air Operations Cell) METOC Cell.

Responsible for supporting the full range of the JTF's air operations. Aside from developing routine staff/mission weather packages, one of the JFACC METOC cell's key roles is to provide critical METOC input to the joint targeting and air tasking cycle (see Figure 4-2). The JFACC and JAOC may be collocated, or more likely, there will be a JFACC-Forward (including the JFACC Commander) and a JAOC-Rear (to minimize the footprint forward).

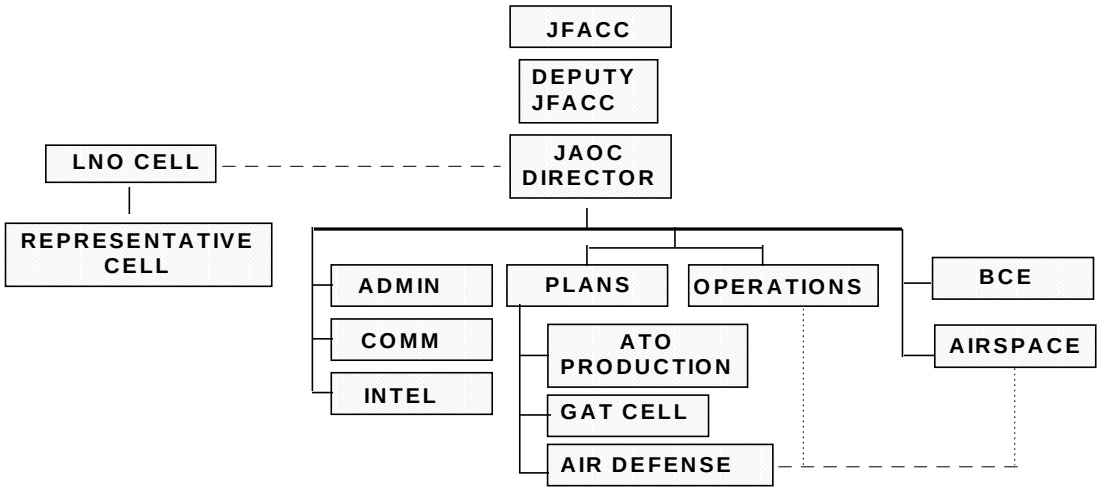


Figure 4-2. JFACC Organization

- Targeting and tasking for joint air operations:

  - The ATO cycle (refer to Figure 4-3) begins approximately three days before expected mission date with air planners reviewing JTF objectives and targeting requirements to develop a preliminary target list

  - After input from weaponeers and other sources, a shell of the main mission planning document, the air tasking order (ATO) is generated. The ATO is then passed to flight and support planners to add in specific unit and resource data. The final ATO is published approximately one day before expected mission execution. After any last-minute revisions are made, the ATO is executed, combat assessment is performed, and the cycle begins again.

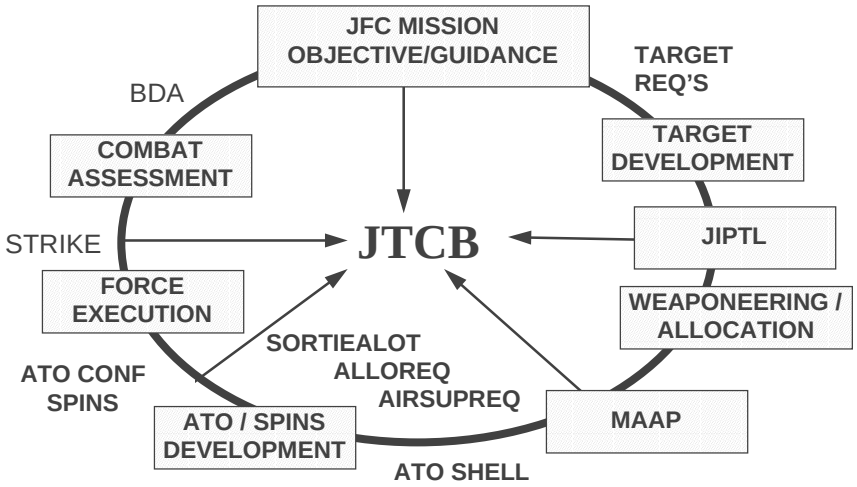


Figure 4-3. Air Tasking Order (ATO) Planning Cycle

- Aerospace roles and missions. Early in the ATO cycle, planners consider which aerospace roles and missions are required to meet a given tasking. In most instances, an ATO will incorporate a majority of the roles/missions listed here:
  - Aerospace Control (Counter-Air and Counter Space)
  - Force Application (Strategic Attack, Interdiction and Close Air Support)
  - Force Enhancement (Airlift, Air Refueling, Spacelift, Electronic Combat, Surveillance/Reconnaissance, Special Operations)
  - Force Support (Base Operations and Base Defense, Logistics, Combat Support, and On-Orbit Support)

- METOC Support Requirements for the joint targeting and tasking cycle

  - Close coordination between the ATO planners and the METOC cell is extremely important. Planners routinely ask for METOC input throughout the ATO cycle because it directly influences the number and type of aircraft and type of weapons that may be used. Thus, METOC staff normally need to prepare forecast products for each ATO package covering conditions expected at 72, 48, 24, 12 hrs before mission execution. Some forecasts out to 120 hours may be required

    > Since the ATO cycle is ~96 hrs in duration (from initial planning to ATO execution), there is more than one ATO being developed at any given time. It is important that METOC support units keep close track of both the briefed weather and developing weather conditions for each active ATO package

  - Most ATO forecast products are comprised of routine aviation weather data: plain language forecast, winds aloft, hazards, cloud decks, etc. Specific missions may also require special METOC products, such as EOTDA or IREPS output. METOC sensitivities for USAF operations are outlined in Appendix C

- To maximize effectiveness, Navy personnel on the JFACC METOC staff should have aircraft carrier experience

4.2.2 JFLCC (Joint Force Land Component Commander).

- *Structure*. JFLCC SWO and supporting forecasters/briefers as required to perform assigned tasks and responsibilities. ARFOR- and MARFOR-assigned roles will require representation for their specific needs.

- *Relationship*
  - Army Land Component Commander (LCC): SWO works for G-2, close coordination with G-3
  - Marine LCC: SWO works for G-2, , close coordination with G-3

- *Assets.* Generally organic to LCC commander's unit, augmented as needed (EAC, Corps, Division, or Brigade SWOs and their weather teams)

- *Roles and Responsibilities*
  - Detailed METOC support to the JFLCC/ARFOR/MARFOR combatant command staff
  - IPB and Intelligence Collection missions
  - Climatology studies for operations time-frame
  - Establish LCC data collection plan
  - Coordinate with the JMO and components as needed
  - Weather inputs to Effective Downwind Messages (EDM)/Chemical Downwind Message (CDM)
  - Metwatch all areas of interest, including APODs, SPODs, and areas requiring Fire Support Coordination Measures

- *JFLCC METOC Support Requirements*. JFLCC operations will vary based on the JTF mission, forces, and duration of the military operation. JFLCC support will center on meeting the planning and mission execution requirements of the JFLCC staff, ARFOR, MARFOR, and when required, SOF. Support may also be required to the Joint Tactical Operations Center (JTOC). Weather impacts provided to Army commanders are typically in "stoplight" format: green--favorable / minimal operational restrictions; amber--marginal / moderate operational restrictions; red--unfavorable / severe weather impacts to operations.

  - Long-range forecasts for the JOA and the adjoining Threat Force occupied areas (30, 15, and 7 days) based on climatology and long range trends
  - Execution forecasts for the JOA (3-5 days, 48-hour, 24-hour)
  - Forecasts as needed for Air and Sea Point of Departures (APODs/SPODs), supply routes, and staging areas
  - Briefings

- METOC requirements for Intelligence Preparation of the Battlefield (IPB):

Level	Forecast Time Interest
EAC	Beyond 96 hours
Corps	Up to 96 hours
Division	Up to 72 hours
Brigade	Up to 24 hours
Battalion	Up to 12 hours

- Typical ground force operations and operational thresholds. Specific mission requirements and weapon systems will most likely require modification of these values. Not all criteria impacting operations are listed; a more complete list is given in Appendix C and in Army Field Manuals 34-81 and 34-81-1.

Airborne	Cig/Vis: 1250-2500'/4000-4800m , Wind 10-13 kts
Air Assault	Cig/Vis 500-1000'/800-4800m
Attack Helo	Cig/Vis 150-300'/1600-4000m
Armor/Trafficability	Wet/Snow Covered Ground, Cold Temperatures
Artillery	Cig/Vis /1000-2000'/1600-3200m
Infantry/Personnel	Mod Rain/Snow, HI 90-105, ECT 15-25
Air Defense	Cig/Vis 500-1000'/3200-4800 m
CAS (A-10)	Cig/Vis 1000-1500/4000-4800m
Recce (High Alt)	Cloud Cover 2-4 eighths, Vis 4000-4800m
Recce (Low Alt)	Cig/Vis 1000-2500'/4000-8000m
UAV	Depends on platform: Low Cig/vis, Icing, Wind
Chemical/Smoke	Light Neutral Stability, Wind 4-10 kts

4.2.3 JFMCC (Joint Force Maritime Component Commander).

- *Structure*. Numbered Fleet or Battlegroup Oceanographer. The JFMCC METOC cell is typically embarked in the NAVFOR's flagship, though it may be ashore, if the JFMCC is ashore.

- *Relationship*. In a large JTF, a SOF METOC liaison officer or senior NCO may be assigned, reporting to Maritime Component Commander (MCC) N-3

- *Assets*
  - Carrier (CV) and large-deck amphibious (LHD/LHA/LPH) OA divisions or command ship OA division
  - Mobile Environmental Teams
  - Marine Theater Support from NAVMETOCCEN (Norfolk, Pearl Harbor, Rota)

- *Roles and Responsibilities*
  - OPTASK METOC (optional DMS message)
    > Combination of Annex H (METOC Operations) and a Letter of Instruction, detailing METOC relationships within the Battle Group and reoccurring procedures and requirements while the Battle Group is operating
    > Usually updated by the Battle Group before deployment

- Coordinate with the JMO and components as needed

- *JFMCC METOC Cell Support Requirements.* The Cell will direct support to subordinate warfare commanders. Typically forecasts will be generated at the lowest level possible within the battle group. All or some forecasts may be generated onboard the METOC capable unit.
  - Briefings
  - Maritime data collection
  - Specific forecasts as required for various naval force missions:
    > Undersea Warfare
    > Surface Warfare
    > Air Warfare
    > Amphibious Warfare
    > Mine Warfare
    > Special Warfare
    > Command & Control Warfare
    > Information Warfare
    > TLAM go/no-go, strike warfare and target weather

  - Critical METOC thresholds for maritime missions are determined by the NAVFOR Commander. Reference Pub 1 (RP-1), "Environmental Effects on Naval Weapons Systems and Naval Warfare," contains suggestions of limits for maritime operations; a few possible thresholds are listed in Appendix C. Items to be considered:
    > Surf conditions (denoted with the Modified Surf Index, MSI)
    > Sea State (SS) impacts on flight ops, mobility, replenishment at sea, airborne & shipborne MCM, and Explosive Ordinance Disposal (EOD) Ops
    > Ceiling and visibility impacts on shore and shipboard flight operations and target and strike weather (for aircraft and Tomahawk missions)
    > Radar performance (refractivity profile)
    > Sonar performance (sound speed profile)
    > Electro-optical systems performance
    > Sensible weather (temperature, visibility, precip, altimeter setting, etc.)

4.2.4 JSOTF/JFSOCC (Joint Special Operations Task Force/Joint Force Special Operations Component Commander).

- *Structure*
  - Term JSOTF is generic and does not apply to any specific organization, unit or level of command
  - May be small and temporary or large and permanent depending on mission
  - May be deployed as a joint organization or formed around an existing service force structure with an augmented staff
  - May consist of elements of the theater Special Operations Command (SOC) or may deploy as a complete package from outside of theater at direction of NCA

- JSOTF normally subordinate to Theater SOC, but other command arrangements are possible

- *Relationship*. A METOC liaison officer or senior NCO should be assigned to the HQ JTF to keep the JMO aware of impending SOF missions, requirements, and ensure effective coordination with the JSOTF METOC cell (see Figure 4-4).

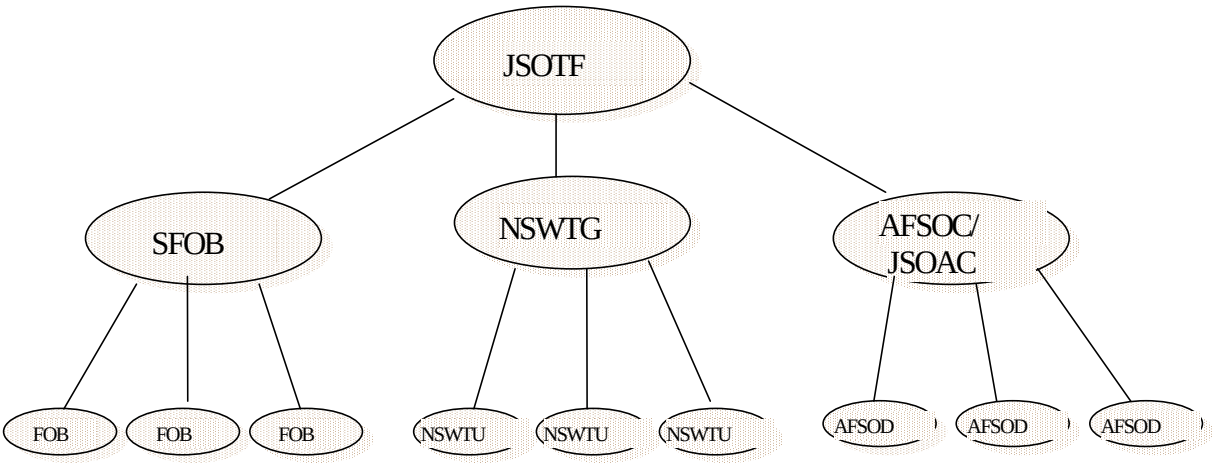


Figure 4-4. JSOTF Command Arrangement

- *Assets*. Special Operations Weather Teams (SOWT) deployed at forward operating bases and other SOF command elements

- *Roles and Responsibilities*. SOF-unique support
  - Mission-specific requirements
  - Products tailored from large to small operating team missions

- *JSOTF METOC Cell Support Requirements*. Support varies depending on scope and extent of the assigned mission(s); the JSOTF must have highly flexible support providers.

  - Basic METOC support package includes 2 officers, 4 enlisted forecasters
  - Basic forecast and observing data provided by JTF JMO, then is tailored and distributed to SOF component teams
    > JSOTF SMO works closely with JMO to meet SOF mission requirements
    > JSOTF SMO and tactical SOF METOC teams may be supported directly by the SOFWOC, the Navy's Warfighting Support Center (WSC), and AFCCC as required. Support will be coordinated and deconflicted with the JTF JMO, designated JMFU, and applicable Major Forecast Center (OPSEC permitting)
  - JSOTF METOC team composed of personnel with proper mix of Army, Navy, and Air Force SOF support experience to effectively exploit the environment for the assigned mission
  - Possible METOC support requirements for JSOTF headquarters:
    > Limited weather observations

  - > Briefing support to headquarters
  - > Forecasting support - planning forecasts, point and target forecasts, route forecasts, mission control forecasts, EO forecasts, surf and oceanographic forecasts, solar and lunar data
- METOC support to an Air Force Special Operations Base. Same as tactical AFFOR support. Up to 7 man team provides:
  - > Limited weather observations
  - > Briefing support
  - > Forecast support (TAFs, mission planning forecasts, route forecasts, EO forecasts, flight weather briefings)
- METOC support to an Army Special Operations Base. Up to 7 man team provides:
  - > Limited weather observations
  - > Briefing support
  - > Forecasting support (point and target forecasts, some EO forecasts, Army flight operations support)
- Other Special Operations Forces METOC support: selected SOF weather teams may deploy to take and disseminate weather observations as determined necessary by the JSOTF CC and JSOTF JMO

Chapter 5 - The Senior METOC Officer

This chapter describes, in general, the job requirements for a Senior METOC Officer (SMO) at a Unified Command. Paragraph 5.2.3 describes actions the SMO should consider during Crisis Action Planning (CAP) and operation execution, including actions to support a Joint Task Force (JTF) operating in the Area of Responsibility (AOR).

5.1 Job Background

5.1.1 Billet Requirements.

Need Top Secret (TS) clearance. Additionally, some Unified Commands require Specialized Compartmentalized Information (SCI) clearance as well. Intermediate/Senior Service School (ISS/SSS) is highly desired and required for some joint billets. Service school is Phase I of Joint Professional Military Education (JPME); Armed Forces Staff College (AFSC) is Phase II of JPME. Military officers (04 and above) need JPME Phase I (Service school by correspondence is accepted) and JPME Phase II, and the required tour length (36 months, day for day, unless SECDEF waiver) to obtain Joint Specialty Officer (JSO) designation. Joint officers typically attend JPME Phase II (three months in Norfolk VA) before beginning joint duties, or sometime during the first 12-18 months they're assigned to their Unified Command (mission requirements permitting).

5.1.2 Structure.

The METOC Branch at each Unified Command has a small number of personnel (actual number assigned varies) to provide all METOC support to the CINC and the staff. At some Unified Commands there is no METOC officer directly assigned; support may be provided by liaison officer(s) from another METOC agency, or alternatively, support may be provided by a METOC officer at a designated component. This support ranges from providing daily METOC update briefings and climatology, to developing annexes to OPLANs and OPORDs, to designing and implementing the entire METOC support force for a theater contingency or large-scale (multi-service or multi-national) exercise.

5.1.3 Relationship.

The SMO in-theater works for the CINC, normally through the Operations Director (J3). SMOs should liaison with the CINC’s component commands’ staff weather and oceanography officers.

5.1.4 Assets.

Each combatant command has components which provide forces to joint operations; most components will have a staff weather officer or oceanographer who becomes the Joint Task Force Joint METOC Officer (JMO) or component METOC officer (see Chapter 3 and applicable Service chapters). Forces needed, which are not available in-theater, can be

requested through the Joint Staff from another combatant command. U.S. Joint Forces Command has approximately 80 percent of the Armed Forces and is usually a supporting CINC. The SMO has global and in-theater METOC resources (see Chapter 1).

5.2 Job Requirements

5.2.1 SMO Routine Duties and Responsibilities.

- *"Job Description"*

  - Provide or arrange for all METOC support to the CINC and his staff (includes daily briefings, environmental impacts to operations, climatological support, specialized forecasts, METOC-based research, and METOC expertise in Command projects and programs)

  - Assist the JMO and service components in the development and operation of JTF METOC operations in your CINC's AOR. Coordinate and validate personnel, equipment, data, and product requirements for exercises and operations

  - Coordinate and assign METOC tasks to Service component METOC assets to fulfill operational needs within the CINC's AOR

  - Liaison with the Joint Staff, other CINCs, and the Services on joint support issues, including doctrine, tactics, techniques, and procedures (TTP), communications, and ongoing operations

  - Augment the CINC’s Joint Operations Center (JOC) as required

  - Provide/arrange theater SOC/JSOTF METOC augmentation and support

  - Assess potential METOC impacts to and / or support the Command's Advanced Concept Technology Demonstrations (ACTDs)

  - CINC's Integrated Priority List (IPL). Coordinate with the appropriate staff action officer to learn the process. The CINC IPL is a valuable tool for METOC officers to annually list their unfilled METOC requirements or to ask for resources to satisfy the operational mission. Component METOC officers should coordinate their inputs, through their component staff, to the SMO. The SMO can facilitate this recommendation at the Unified Command level by promoting entry onto the Unified Command IPL

- Helpful hints

  - Upon reporting, review current Joint Strategic Capabilities Plan List (JSCP) for OPLANs and CONPLANs required for your CINC. Maintain file/knowledge of all

current Annex Hotel for OPLANs, CONPLANs, Functional Plans, OPORDs, and any applicable standard operating procedures (SOPs)

- Review/understand the Deliberate Planning and Crisis Action Planning processes as the planning processes apply to your CINC. Use Joint Staff Officer's Guide, Joint Pub 5-0, and your CINC's instructions. Know your responsibilities to the CINC when a crisis response cell (CRC) or Crisis Action Team (CAT) is stood up

- Know your manning reserves and augmentation personnel. Obtain/review copy of your Joint Table of Distribution (JTD) and Joint Table of Mobilization Distribution (JTMD)

- Know your available communications and systems; *e.g.*, GCCS, SIPRNET, NIPRNET, GBS, AFWIN, AWDS, and SAFWIN. Liaison with your J6 and component command METOC Officers to understand available communication paths, compatibility of component communications, and viable methods to interface component METOC forces in joint operations. Learn the various communication pathways to obtain METOC data via homepage or bulletin boards within your division and at the command center. Learn to display METOC products in GCCS

- Have a basic understanding of the effects on military operations of space weather and the space weather support infrastructure

- Review/learn the climatology of your area of responsibility (AOR). Develop and maintain climatology for your OPLANs and CONPLANs. Maintain climatology reference publications for AOR. Use AFCCC, Navy METOC Det Asheville, Commander, Naval METOC Command (CNMOC), and NAVOCEANO as necessary

- Review/learn METOC software applications available from all Services. Obtain the necessary hardware to support the various software applications. Some of the software you may need at the CINC level are Joint METOC Viewer (JMV), CD-ROM library from Asheville and NAVOCEANO, a solar/lunar program (*e.g.*, NiteLight), Night Vision Goggles (NVG) data, Joint METOC Viewer, MRCAT, SatTrack (Satellite Tracking Program), a tropical storm tracking program, and the Geophysics Fleet Mission Program Library (GFMPL). AFCCC has a publication catalog and CNMOC publishes a list of available software

- Review the universal list of METOC equipment. Refer to the Office of the Federal Coordinator for Meteorology (OFCM) weather equipment manual. Know what is available for an operation and what Service needs to be tasked to provide

- Have a broad knowledge of Time Phased Force and Deployment Data (TPFDD)/List (TPFDL) and some of the key personnel/equipment Unit Type Codes (UTCs) by service. See Appendix A for further discussion of Service

TPFDD information. Liaison with your J3/J4/J5 to learn how your CINC validates/ manages TPFDD and TPFDL. Liaison with USTRANSCOM to get the schedule of upcoming scheduling conferences and attend one if possible

- Review Joint Universal Lessons Learned (JULLS) and After Action Reports (AARs). (A good starting place is the Joint Center for Lessons Learned (JCLL)). Know your CINC's internal process for submitting and reviewing JULLS and AARs. Submit and review JULLS after each operation/exercise if appropriate. Contact Joint Staff for any JULLS that have been tasked out. Distribute METOC AARs to components for distribution to tactical units

- Know foreign METOC Services/organizations, including NATO, that have roles in your AOR

- Long Term Projects. On a very broad scope, learn about the METOC-related issues at the Office of the Secretary of Defense (OSD), Joint Staff and Service Headquarters

  > OSD: Joint METOC data standardization, GCCS, support during Weapons of Mass Destruction (WMD) incidents
  > Joint Staff: joint METOC communications architecture, METOC Roadmap to Joint Vision 2010 (and JV 2020), GCCS METOC issues
  > DISA: GCCS, GBS
  > NAVAF: XOW/NO96 initiative to coordinate AF/Navy issues
  > N096/SPAWARS: NITES, Joint METOC Segment to GCCS, Joint METOC Viewer, NPOESS and METMF®, METOC UAV
  > AF XOW/AFWA: SIPRNET connectivity, New Tactical Forecast System (N-TFS), CAFWSP
  > USSOCOM: SOF METOC, Remote Miniature Weather Station (RMWS) and CINCSOC METOC billets
  > USEUCOM: WMD support, SOCEUR SWO function

5.2.2 Publication List.

- *Must-read list:*

  - Joint Strategic Capabilities Plan (JSCP)
  - CJCSI 3810.01A, "Joint Meteorology and Oceanography Operations"
  - Joint Pub 3-59
  - The Joint Staff Officer's Guide 1997 (Purple Book)
  - Joint Task Force HQ Mission Training Plan (MTP) (Joint Staff Pub)
  - Office of the Federal Coordinator for Meteorology (OFCM) Federal Directory of Mobile Meteorological Equipment and Capabilities
  - JOPES (CJCS Instructions, Joint Staff J5)
  - Army FM 34-81-1 Battlefield Weather Effects
  - Staff instructions

- *Recommended list:*

  - NATO Pubs: Allied Weather Publication (AWP) 1 (Maritime MET Procedures and Services), AWP 2, and various Partnership for Peace weather effects manuals (Multinational Weather Manual, MWM), as appropriate
  - Unified Command Plan (UCP)
  - Joint Pub 0-2, "Unified Actions Armed Forces"
  - Joint Pub 1-02, "DOD Dictionary of Military and Associated Terms"
  - Joint Pub 2.0, "Joint Doctrine for Intelligence Support to Operations"
  - Joint Pub 3.0, "Doctrine for Joint Operations"
  - Joint Pub 5.0, "Doctrine for Planning Joint Operations" and other joint pubs as necessary

5.2.3 Operations and Exercises.

The supported CINC and supporting CINC Senior METOC Officers (SMOs) must be closely involved in a successful operation or exercise.

5.2.3.1 SMO Checklist.

During exercise and/or Crisis Action Planning, the SMO may need to accomplish some or all of the actions delineated below. Once the Joint Task Force forces and structure are announced and a JMO assigned, the JMO should consider the JMO actions in Chapter 6, and the SMO assumes a monitoring and assistance role. Tasks that may need to be completed:

- Initial actions:
  - Answer climatology input requests (may be first clue to pending operation)
  - Determine force structure (CJTF, JFACC, NAVFOR, MARFOR, AFFOR, ARFOR, JSOTF)
    - > Additional METOC resources may be requested in two ways:
      - ◊ Request support from the supported CINC's components, who provide the requested support from their resources or ask for assistance from their Service
      - ◊ Request support from a supporting CINC (often US Joint Forces Command). The supported CINC's J-1 can facilitate the request process: if the event is a JCS pre-approved Significant Military Exercise Brief (SMEB), the request can go directly to the supporting CINC. If the event is a contingency or non-SMEB, the request must be coordinated with the Joint Staff
  - Coordinate climatology/real time METOC data requirements with regional and strategic-level METOC Forecast Centers (MFCs). Consider data availability, accuracy, and limitations; consider formation/designation of a Joint METOC Forecast Unit (JMFU)
  - Coordinate/tailor METOC support product requirements for the CINC

- Assign/coordinate METOC tasks as appropriate to component SWO(s) to ensure unity of effort
- Provide input to CINC staff estimates, including Intelligence, Operations, Logistics, and C4, as well as Course of Action (COA) development and analysis
- Begin building CINC OPORD Annex H, and inputs to Annex B (Intelligence), Annex C (Ops), Annex K (Communications), Annex M (Geospatial Information and Services (GI&S)), and Annex N (Space)
- Manage special METOC needs at the national / theater level: national assets, MM5 model runs from AFWA, space environment support from the 55th Space Weather Squadron, NOGAPS/COAMPS from FNMOC, and National Weather Service or foreign weather service support applied to the operation/exercise

- After JTF formation:
  - When identified, liaison is required with the JTF JMO. Parallel or collaborative planning may be required. Once completed, provide your CINC OPORD Annex H and input to other annexes to the JMO. Coordinate and assist the JMO in the following areas as required: organization, personnel augmentation, identification and location of component SWOs, theater and joint area of operations communications, equipment, logistics, data requirements, products and timelines
  - Coordinate climatology/real time METOC data requirements with regional and strategic-level METOC Forecast Centers (MFCs), the JMO, and component SWOs
  - Coordinate with JMO on Allied METOC support
  - Develop, in conjunction with the JMO, the METOC CONOPS and Letter of Instruction (LOI) specific to the operation, describing general guidance such as JMFU designation, communication plans, equipment requirements, and theater observation collection plan. The CONOPS may be included in the JTF's Annex H
  - Monitor deployment status of Service component METOC assets, and subsequently, METOC operations in the Joint Operations Area (JOA)
  - Maintain awareness of operations under other staff proponency

Chapter 6 - The Joint Task Force METOC Officer

6.1 Structure

The JMO is the senior METOC officer assigned to the Joint Force Commander's staff. The CINC Senior METOC Officer (SMO) could also be the JMO, if the CINC deploys forward.

6.1.1 SMO / JMO Relationship.

The JMO is typically a member of the JTF J3 organization, however, the JMO may also be found in the J2 shop. During the execution phase, the JMO should be collocated with the Joint Operations Center (JOC), usually under the J3. The relationship between SMO and JMO is one of close coordination--it is not a senior-subordinate relationship. Each is a member of his respective staff (whether pre-existing or ad-hoc) and, as such, reports within the respective organization. The SMO is the expert on how the CINC prefers METOC support within the AOR and should ensure that these preferences are communicated to the Joint Force Commander (JFC) and his staff. If a JFC has not been named, the SMO should perform JMO checklist tasks. When the JFC is named, his Staff METOC Officer assumes JMO responsibilities. At this time the SMO and JMO checklists must be exchanged with a shift of responsibilities to the JFC's METOC Officer. A close relationship should continue as staff planning at both the CINC and JFC levels continues until the OPORD/OPLAN is complete. The SMO, with established resources and organizational ties, provides a significant wealth of knowledge, experience and support, which the JMO should draw upon as the plan shifts into execution.

6.1.2 Assets.

The JMO coordinates with the SMO for augmenting personnel and equipment and for METOC Forecast Center (MFC) support to the operation.

6.2 Roles and Responsibilities

The JMO acts for the JFC to direct and coordinate METOC activities under the JFC's operational control.

6.2.1 JMO Considerations and Actions in Planning and Executing Support to a JTF.

6.2.1.1 Support JTF Crisis Action Planning (CAP) for a joint operation.

A crisis situation is developing. The JMO starts with Phase I or II and progresses through five phases of Crisis Action Planning (see Chapter 2).

- Contribute to the Joint Task Force's overall mission analysis

- Provide past, present, and future states of the space, air, and ocean environments to the JTF. Consider:
  > Past states: climatology of the region. Consider topography and general weather, climatic controls, special meteorological phenomena, tropical weather, and statistical climatology; solar, lunar, and light level data; tidal data; bathymetry; currents and oceanography; ionospheric / geomagnetic impacts
  > Present state: observations. Data sources include Forward Area Limited Observation Program (FALOP), land and ship reports, upper air soundings, satellite earth sensors, weather radars, lightning detection systems, profilers, solar telescopes, ionosphere sensors, buoys, and aircraft
  > Future state--forecasts. Global, regional, and tactical level forecasts can come from METOC Forecast Centers (MFCs), regional METOC centers, tactical level units, and indigenous sources
- Provide input to J-2's Intelligence Estimate and Intelligence Preparation of the Battlefield (IPB), as well as Joint Planning Group (JPG), J-3 Operations, J-4 Logistics, and J-6 (Communications) estimates, as appropriate
- Provide impact of METOC conditions on the Courses of Actions (COA)
- Provide input to Commander's Estimate of the Situation (CES)
- Develop Annex H (see Appendix B) and provide METOC input and/or requirements for Annex B (Intelligence), Annex C (Operations), Annex D (Logistics), Annex J (Command and Control), Annex K (Communications), Annex N (Space), and the Basic Plan, as required

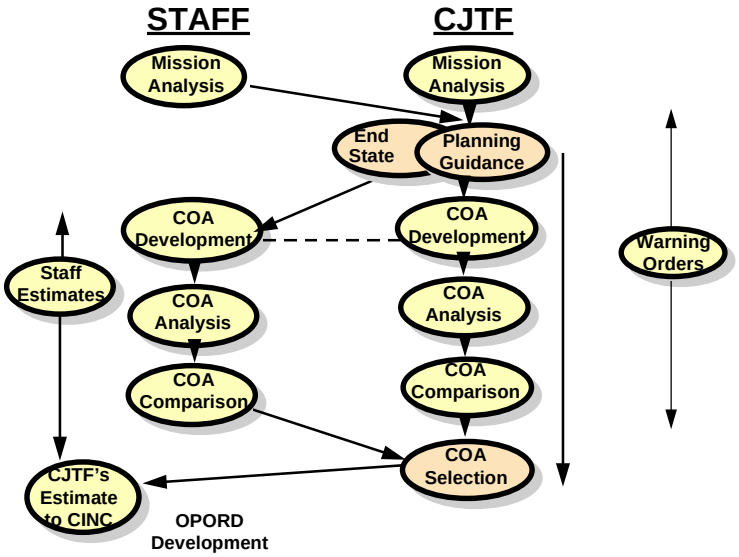


Figure 6-1. JTF Operation Planning Process

6.2.1.2 Plan and Integrate METOC Operations into the Joint Operation.

JTF mission analysis and staff and commander's estimates are complete. The establishing authority has directed Phase V (Execution Planning of CAP). The NCA selects the COA and the CJCS has conveyed the decision to the CINC. The CJTF has directed the JTF staff, components, and commands to conduct detailed planning to convert the COA into an

OPLAN and supporting plan. The CJTF's intent and concept of the operation identifies requirements for planning METOC operations, preparatory to completion of the plan.

- Review CINC's apportionment of METOC assets and resources
- Identify force, equipment, communications, and data requirements for METOC support, including augmentation for the JTF headquarters (JTF HQ)
  - Provide input to the Time-Phased Force Deployment Data (TPFDD)
  - Monitor deployment of METOC resources (personnel, equipment, communications)
  - Identify METOC shortfalls through the JFC to the CINC
    - > Manning
    - > Communications
    - > Information requirements
    - > Service requirements beyond the capabilities of assigned METOC assets
- Develop operational support plans and procedures that support the concept of operations documented in Annex H
  - As required, establish and tailor joint force METOC forecast activities to CONOPS and composition of assigned forces
  - Consider use of MFCs, component and tactical level assets and capabilities, and capabilities at rear operating areas
  - Consider designation or composition of a Joint METOC Forecast Unit (JMFU)
  - Establish product requirements (content and scheduling) and coordinate support services for JTF HQ (Chapter 3) and JTF components (Chapter 4)
- Direct/coordinate initial activities of METOC assets in Joint Operations Area (JOA) (see paragraph 6.2.1.3 below)
  - Begin critical METOC functions to support JTF operations: data sensing and collection, analysis, forecasting, tailored application of products to enhance JTF decision-making processes, dissemination, and evaluation (see Joint Publication 3-59 Chapter 4)
- Sustain METOC operations in the JOA
  - Ensure compatibility, consistency, and timeliness of information exchange among METOC assets and resources
  - Identify transportation and logistic requirements for METOC support

6.2.1.3 Control and Execute METOC Operations.

The NCA and supported CINC have issued execution orders for JTF operations, which will include METOC operations. Sufficient elements of the joint force have deployed to begin operations, or the whole joint force has deployed. Operations have begun per CJTF's concept and are continuing.

- Monitor METOC operations in support of the JTF
  - Collect information from all sources. Keyed to:
    - > Previously determined information plan - requirements, sources, and timing
    - > CJTF's critical information requirements (CCIRs)
    - > Maintain awareness of operations under other staff proponency

  - Monitor deployment and employment status of Service component METOC assets
    > Recommend changes to the Time-Phased Force and Deployment List (TPFDL) for METOC assets, as required
- Monitor METOC support contributions to operations directed at enemy centers of gravity. Include:
  - Task organization of the JMFU (if one is designated), and Service component assets
  - METOC Forecast Centers
  - Joint Force METOC forecast activity, if established
  - Past, present, and future states of space, air, and ocean environments, utilizing all-source observations and forecasts (land, upper air, ship, buoy, ionospheric, lightning, aircraft, unmanned aerial and underwater vehicles, satellite)

6.2.1.4 Assess Effectiveness of METOC Operations

- Assess information architecture:
  - METOC information systems; access to operational information and force status
  - Assess information exchange processes and reporting requirements
- Evaluate organization of METOC operations
  - Simple, clear, responsive command lines, IAW CJTF intent
  - Unity of effort - JMO guidance
  - Apportionment of METOC assets
- Assess support missions assigned to METOC assets
  - Missions appropriate for tasked components/units
  - Missions integrated with operational missions (*e.g.*, appropriate support provided throughout the ATO cycle)
  - Missions supported by sufficient JTF resources
- Deconflict METOC operations with 'conventional' missions. Consider:
  - METOC reporting requirements
  - Command, Control, Communications, and Computers (C4) interoperability
  - Frequency allocation
  - Reconnaissance/intelligence collection efforts
  - Surface and airspace deconfliction
  - Coordination of logistic support

6.2.1.5 Prepare Plans and Orders Related to Ongoing METOC Operations.

- Maintain current estimate of METOC operations (paragraphs 6.2.1.3 and 6.2.1.4)
- Assess progress of current METOC operations and their effect on JTF operations
  - Relate information to attainment of desired conditions
    > Current operations
    > Future operations
    > Campaign endstate and/or termination conditions
  - Relate to decision points for current or future operations
- Develop/refine friendly COA(s) with regard to METOC operations

  - Consider continuing METOC operations IAW current apportionment, guidance, and prioritization
  - Develop branches and sequels to METOC operations (*i.e.*, changes based on the evolving situation or additional requirements)
- Develop enemy COA(s) that impact or affect METOC operations, or current and future environmental or civil conditions
  - Evaluate current, apparent operations/conditions
  - Develop branches to current, apparent operations/conditions
- Analyze friendly COAs
  - Analyze wargames against enemy COAs or current and future environmental or civil conditions
  - Analyze all feasible alternatives, using best information available
- Compare friendly COAs
  - Determine the COA that best achieves objectives against most probable and/or most dangerous enemy COA, or against most likely or most dangerous/complex environmental or civil conditions
  - Determine feasible alternatives, using best information available, as well as advantages and disadvantages of each
- Prepare discussion and/or recommendations to current estimates
- Coordinate and update changes to Annexes B, C, D, H, K, and N, as appropriate

6.2.1.6 Direct and Lead Subordinate Operational METOC Operations.

- Approve plan and order related to METOC operations
- Synchronize actions IAW established timelines and conditions
- Coordinate actions and/or operations, where lines of authority and responsibility overlap and/or conflict
  - Advise components/units of adjacent or related actions/operations
  - Direct supporting operations, as required
  - Resolve conflicts
- Adjust control measures, as required, or relay component adjustments to adjacent, supported, or supporting units
- Decide on operational actions/direction
- Change, recommend change, or continue METOC operations and priorities
  - Seek CJTF/supervisors guidance if a change appears necessary
  - Ensure change remains supportive of current mission and intent, based on continuing estimate of the situation
  - Coordinate and conduct appropriate planning for change
  - Write plan and/or order for change
- Approve and issue plan and/or order

6.2.1.7 Acquire and Communicate Operational Information About METOC Operations.

- Display and brief information as required
- Inform supervisors, decision makers, other JTF staff, and staff counterparts, based on:
  - CCIRs (Commander’s Critical Information Requirements

  - Planned hierarchy of significant information
  - Information that could affect a commander's decision
  - Understanding of information requirements of commanders and other staff
- Report - formal (required / periodic) and informal (hasty / as required)
- Develop general military information--briefings, reports, analyses, *etc.*
- Monitor COMSEC, COMPUSEC, SIGSEC related to METOC operations
- Conduct public affairs operations related to METOC operations

6.3 Advice to the JMO

Keyword: Coordinate!

- Call the SMO for review of developments and the commander's intent. Get turnover of any climatology or METOC staff planning to date. Discuss possible JTF Service (AFFOR, ARFOR, NAVFOR, JSOTF and MARFOR) structure. Continue to coordinate with the SMO throughout the operation.

- Call the JTF Service and functional component METOC officers. Discuss initial METOC CONOPS and establish lines of communication. Solicit input for their concept of operations. Continue to coordinate throughout the operation. Update the components as often as necessary, depending on the situation. Identify any of their unit shortfalls and required products and services as early on as possible.

- Get involved in the JTF planning process, described in Chapter 2. The SMO may have already gathered and provided much of the information required during this planning process. The formats for Intelligence Estimate, Commander's Estimate, and OPORD annexes (contained in Appendix B) are the same for the CINC planning process as for the JTF staff.

- Review the CINC's OPLAN/OPORD, with particular attention to Annex H (METOC Operations), Annex B (Intelligence), Annex C (Operations), Annex K (Command, Control and Communications Systems), and Annex N (Space).

- Determine what products are required from centralized or theater METOC Forecast Centers (MFCs). Coordinate with SMO if necessary to discuss theater strategy and use of global and in-theater METOC resources.

- Develop or modify the JTF OPORD (same annexes as listed above) as time and situation allow. Develop a JTF METOC concept of operations and issue a METOC Letter of Instruction (LOI), if necessary.

- Develop a JTF METOC information management plan:
  - Determine required customer/component/JTF staff information
  - Briefings to JTF commander and staff, JFACC, JTCB, J3/5
  - Collect weather impact sensitivities from components

- Clarify roles in strategic, operational, and tactical level forecasting
  - > Ensure components focus on tactical level forecasting (*e.g.*, bombs on target, DZ/LZ forecasts, AR forecasts) and provide significant impacts to the JFC and/or JMO as required. Determine who issues advisories and weather warnings (*e.g.*, locally-issued advisories for airfields versus area weather warnings)
  - > Detail/refine JTF HQ METOC-produced bulletins/forecasts (*e.g.*, the JOAF), to include information for components without organic weather support. Consider use of existing bulletins for designation as the JOAF.
  - > Determine METOC information required to satisfy requirements for, or data required from:
    - ◊ Observations and soundings
    - ◊ TAFs and other forecasts
    - ◊ Ocean, space, and atmospheric model output
    - ◊ Radar and METSAT imagery
    - ◊ Climatology and oceanographic data
    - ◊ Hydrologic data
    - ◊ Non-METOC and/or non-traditional sources (seismic, volcanic, etc.)
    - ◊ Coordinate/direct FALOP and ARTYMET reports
    - ◊ Weather Recce missions
    - ◊ Establish indigenous weather reporting networks
    - ◊ SOF special reconnaissance missions
    - ◊ Trafficability forecasts
    - ◊ FALOP
    - ◊ Determine the source of this information (national, regional, and indigenous centers; JTF assets; Recce flights; TARWI/PIREPs). Determine who or what group or component will put out the JOAF and other forecasts (Air Refueling, Landing Zone, Drop Zone, *etc*.).
- Coordinate use of bulletin boards, broadcasts/intercept (HF, Goldwing, Fleet Multichannel, Metassi, GBS), homepages, WAN/LAN, AWN, MIST, DMS, NIPRNET/SIPRNET, *etc*.)

- Review JTF HQ joint manning documents, update and modify as necessary, ensuring that METOC personnel required to support the HQ are reflected in the TPFDD. Consider composition, skills, experience levels, and service mix of JTF HQ METOC personnel.

- Obtain SIPRNET/NIPRNET access identification numbers and passwords into MFCs, if necessary.

- Identify METOC communications requirements, coordinate with the J6 (through J-2/3 if appropriate). This includes communications at the JTF HQ (telephones, comm. circuits, *etc*.) and for connection to the components. (Note: *This complements your information management plan).*

- From components, determine requirements for MANOP headers (FOXX** XXXX). Coordinate to have DMS messages entered directly into the AWN/MIST as required. Work through appropriate Service channels to relay requests for MANOP headers to AFWA or FLENUMMETOC DET Tinker, as appropriate.

- From components, determine requirements for KQ identifiers to include data types for the KQs (SA, UJ, SD, *etc*.). Note: Obtain the KQ identifiers from AFWA or FLENUMMETOC DET Tinker, as appropriate.

- Encourage coordination among component staff weather officers and oceanographers. Also coordinate for strategic airlift and tanker mission METOC support with deployed air mobility elements or the Air Mobility Command functional manager, and with the appropriate numbered Fleet METOC officer and Military Sealift Command for METOC issues regarding strategic sealift

- Ensure customers/components have plans to accommodate natural disasters (*e.g.*, hurricanes, volcano eruptions, *etc*.).

- Be aware of possible challenges resulting from the various Service cultures:
  - Communications:
    > Navy widely uses SIPRNET, the USAF/Army use NIPRNET, particularly for peacetime/garrison operations
    > Type of coordination: USAF/Army use emails and formal memos, while the Navy tends to use messaging (DMS) via classified routing (typically available on ships)
    > USAF/Army typically issue detailed instructions in Letters of Instruction (LOIs), because each deployment's missions vary and must be synchronized; the Navy's mission and operations are largely the same each time out, with much less detailed guidance promulgated
  - Planning cycles may differ:
    > USAF/Army plan exercises and set requirements often with a 1-2 year leadtime, using Initial, Mid, and Final Planning Conferences; Navy METOC often takes a look at what the Fleet is doing, and develops supporting requirements at the last minute
    > Air operations: the USAF likes the Joint Force Air Component Commander (JFACC) concept, and uses the Air Tasking Order (ATO) to centralize air operations planning. AF weather must look out 3-5 days to support the ATO cycle. Navy carrier operators (who want to reserve part of the air assets for Fleet defense, as do the Marines for Air-Ground Task Force defense) typically require much shorter-term outlooks
  - Philosophies on JMFU operations may differ between Services
    > Is one even required? New AF philosophy--minimize footprint and use regional hubs and reachback capabilities to issue theater forecasts. Navy uses regional centers more as a place to host deployed ships' products centrally

  - > "Virtual" JMFU--Navy METOC centers responsive to changing information requirements / database management for deployed ships; USAF regional hubs' responsiveness variable
- Remember coordination is the name of the game, even when the rank structure within the JTF METOC structure is "out of whack"
  - > Can happen that the JMO will be junior in rank to senior weather officers on component staffs. This is more likely when II or III MEF form the core of a JTF, with a Numbered Air Force (NAF) and a Navy fleet serving as AFFOR and NAVFOR

Chapter 7 - U.S. Navy METOC

This chapter describes U.S. Navy organizational structure, command relationships, and support capabilities and requirements, including typical Navy METOC and communications equipment.

7.1 Naval Forces (NAVFOR)

Navy METOC is designed to support forces afloat worldwide and their associated Navy air, surface, subsurface, special warfare, and amphibious forces. To do this, Navy forward deploys meteorology and oceanography personnel aboard large deck aviation capable units: Aircraft Carrier (CV), Nuclear Aircraft Carrier (CVN), Amphibious Assault Ships (LHA, LHD, LPD), and Command Ships (LCC, MCS, AGF). These units have a fully capable METOC office and are supported from the regional offices (maritime theater centers), the large production centers (FNMOC, NAVOCEANO, AFWA), and any other available sources (foreign facsimile, force weather). These ships provide METOC support to associated forces deployed or operating in company. Additionally, the Navy provides mobile environmental teams (MET) to smaller Navy surface ships and in support of joint operations ashore. METs provide a full range of tactical support and are scaled (staffed) on a mission basis. Navy METOC shore activities provide support to various CINCs as requested.

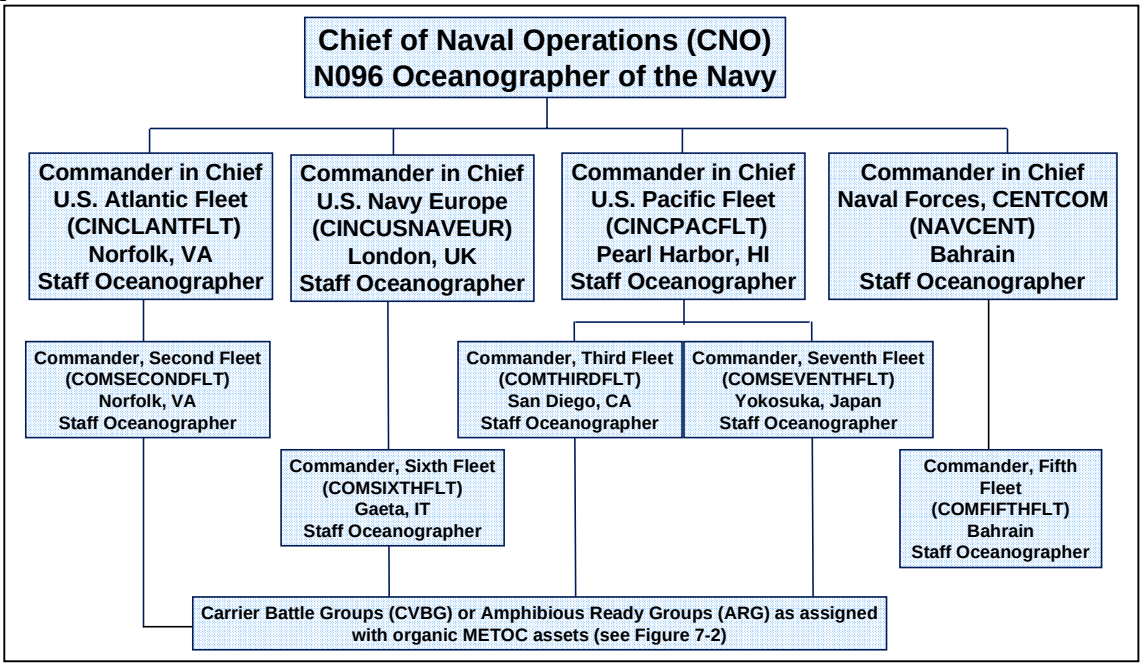


Figure 7-1. Navy Afloat METOC Support Structure

- Skill issues for Navy METOC personnel:
  - Oceanography Officer designator is 1800 and 6460 for Limited Duty Officers (LDOs). Typically senior O-3s and above have attended Naval Postgraduate

School and hold a Master of Science degree in Meteorology and Oceanography or Geospatial Information Services (GIS)
- NEC 7412 indicates a graduate of Aerographer's Mate C School (forecaster)
- NEC 7412 is required for advancement to Chief; therefore, all E-7s and above have been to forecasting school
- There is no NEC assigned to weather observers; however, all Aerographer's Mates attend AG-A School (observer)

7.1.1 Navy Employment Concepts.

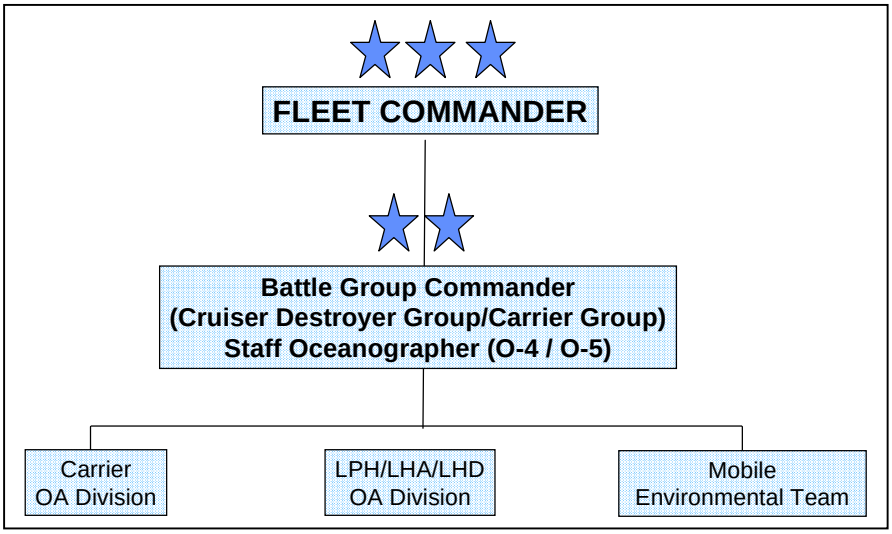


Figure 7-2. Navy Battle Group Organization

- Shipboard weather offices conduct:
  - Sea and surf conditions, current and forecast
  - Local area severe weather warnings/advisories
  - Continuous surface weather observation program
  - Upper atmospheric soundings
  - Terminal Aerodrome Forecasts for the ship's flight deck and the local area along track
  - Climatological, astronomical, and tidal data
  - Pilot to METRO Services (PMSV) on authorized radio frequencies
  - Aviation weather briefs as required by OPNAVINST 3710.7
  - Electro-Optic Tactical Decision Aids (EOTDAs) for mission planning and weapons system optimization
  - Electro-magnetic effects products such as Integrated Refractive Effects Prediction System (IREPS) or Advanced Refractive Environmental Prediction System (AREPS) for mission planning and optimization of Electronic Warfare Support (ES), Electronic Attack (EA) and Electronic Protection (EP)
  - Target area, en route, mission, and staff weather briefings
  - Acoustic propagation and non-acoustic forecasts to support undersea warfare (USW)
  - Tailored support to submarines included in or operating with the battle group

- Amphibious ships (or carriers when amphibious ship's weather office is not available) provide amphibious objective area forecasts that include flight weather, surf conditions, and refractive conditions for the littoral area where amphibious operations will be conducted

- OA Division:
  - Division Officer (1 x O-3/O-4)
  - Leading Chief (1 x E-7/E-8)
  - Forecasters (2-3 x E-6)
  - Enlisted Operators/Techs (7-10)
  - Equipment/software: Navy OA divisions use the Navy Integrated Tactical Environmental Subsystem (NITES), the SMQ-11 satellite receiver, Mini Rawinsonde System (MRS), HF radio receivers, modem dial-up on the "plain old telephone system" (POTS) or International Marine Satellite (INMARSAT) for the Naval Oceanographic Data Dissemination System (NODDS), and the Geophysics Fleet Mission Program Library (GFMPL) on desk top/lap top computer systems. Equipment and software descriptions are at paragraph 2.2.

- Mobile Environmental Team:
  - Afloat or ashore
  - Officer and/or enlisted - typically 1-3 members
  - METOC communications limited at times. Will usually have NIPRNET/SIPRNET capability
  - HF receiver (fax and/or RATT)
  - 75 wpm AWN receive only
  - AUTODIN (or Defense Messaging System (DMS), when available)
  - Limited number of satellite receivers/INMARSAT sets
  - Lap tops with GFMPL and NODDS

7.2 Navy METOC Equipment and Key Software

- *Hardware*

  - Navy Integrated Tactical Environmental Subsystem (NITES) is a UNIX workstation based system that is connected to SIPRNET via ship's router and SHF satellite communications. NITES provides a modular, interactive METOC analysis and forecasting system to receive, process, display, and disseminate METOC data.

    > NITES is installed at primary afloat sites, including 30 capital ships, which have an OA (Operations Aerographer, *i.e.*, METOC) division embarked. Receives and processes onboard METOC sensor data (winds, temps, vis, etc.), AWN/MIST data, and AN/SMQ-11 imagery (including Defense Meteorological Satellite Program (DMSP), geostationary satellite, and TIROS data). The NITES/SMQ-11 interface is also used to display WEFAX products. Details on the software suite in NITES are contained in the user manual.

  - > NITES is also installed at some Navy METOC shore commands to provide the link to move METOC information from NITES to the Global Command and Control System - Maritime (GCCS-M) system. NITES is connected via a gateway to the ship's tactical LAN and via ship's communications to the SHF tactical IP network for SIPRNET connectivity.

- Mini Rawinsonde System (MRS) is installed in ships and carried by METs.

- Navy ships outfitted with older equipment may use dial-up modems on plain old telephone system (POTS), to access International Marine Satellite (INMARSAT) imagery or the Naval Oceanographic Data Dissemination System (NODDS)

- MOSS (Mobile Oceanographic Support System) and the Interim MOSS (IMOSS), installed on desktop/laptop computers, are used by Mobile Environmental Teams when deployed at sea and ashore. Generally includes communications software to connect to INTERNET/SIPRNET. Also contains GFMPL and EOTDA software.

- Expendable Bathythermograph Recorder (XBT) installed in ships and carried by METs.

- HF radio receivers for fax and/or RATT installed in ships.

- The Navy relies quite heavily on AUTODIN/Defense Messaging System (DMS) communications. Most ships with a METOC Division use SIPRNET, e-mail, IRC chat and Joint METOC Viewer (JMV) for data acquisition.

- *Software*

  - Laptop/desktop computers
    - > Communications software
    - > JMV. Joint METOC Viewer downloads "thumbnails" that include gridded METOC data fields, permitting the user to view data fields of choice
    - > Unclassified Geophysical Fleet Mission Program Library (GFMPL) and Secret GFMPL (SFMPL)
    - > Electro-optical decision aid software (Target Acquisition Weather Software (TAWS))
    - > HF Prophet
    - > IREPS/AREPS (Advanced Refractive Environmental Prediction System)
  - Commercial web browsers

7.3 Navy METOC Communications and Computers

- *Information Systems*

  - *Global Command and Control System - Maritime (GCCS-M) and the Joint Maritime Communications Strategy (JMCOMS).* The Navy, through architectural

initiatives such as the Joint Maritime Command Information System (JMCIS) and Joint Maritime Communications Strategy (JMCOMS), is standardizing its C4I applications and services within the Defense Information Infrastructure (DII) Common Operating Environment (COE). JMCIS is the maritime Command and Control (C2) program that supports U.S. Navy and Coast Guard operational units. JMCOMS supports the transfer of C2 information in a manner transparent to the user.

The Navy has identified seven information functional categories that encompass a number of operational needs: (1) plan operations, (2) manage readiness, (3) manage the battlespace, (4) fuse intelligence/sensor information, (5) correlate information, (6) command forces, and (7) support C4I system operations. In order to satisfy these functional needs the Navy has established a number of system requirements for JMCOMS. Although not listed here, these requirements are allocated to the various applications, the DII COE and communications. GCCS-M uses plug-and-play software to define functionality and to provide access to common services. Plug-and-play components enable the user, according to his/her privileges, to access the following:

> Core Systems Services
> Warfare Applications
> Undersea Warfare Systems
> Briefing Support
> Logistics Support
> Training
> USMC Support
> Joint Intelligence
> Communications interface
> METOC
> Utilities/Tools
> Status of Forces
> Cryptologic Support
> Messaging
> LAN/WAN
> Tactical/Track Management
> NATO Support
> Imagery
> Employment scheduling
> Remote Access
> Systems and Resource Management

- *GCCS-M*. The Navy has transitioned to the Global Command and Control System – Maritime. The GCCS-M software has a METOC segment known as NITES II. The NITES II METOC segment enables the GCCS-M user to ingest gridded field, observational, and imagery data. Gridded fields (available via JMV 3.0 and FLENUMMETOCCEN) are displayed as contours (standard and color filled) and wind barbs. A threshold feature enables GCCS-M users to view areas of potential hazards (high winds and seas), plus imagery and METOC status boards (stop light displays). The user can display bathythermograph, radiosonde, and surface observations, as well as atmospheric refractivity and acoustic conditions.

- *CTAPS/JDISS*. Command ships and selected aircraft carriers are capable of supporting the CJTF and functional component commanders. These ships routinely host the Contingency Tactical Air Control System Automated Planning System (CTAPS). Existing GCCS workstations can easily be configured for joint staffs by

installing additional segments for joint planning. These ships also host the Joint Deployable Intelligence Support System (JDISS).

- *Satellite Communications Systems.* Naval forces located at sustaining bases and command centers ashore, use the DII DISN for information push and pull. The DISN provides a seamless web of high capacity communications networks, computer databases, applications, and other information processing and transport. Naval forces not at sustaining bases and command centers transfer information via the Copernicus Architecture pillars known as TADIXS and BCIXS. The Tactical Data Information Exchange System (TADIXS) and Battlecube Information Exchange System (BCIXS) rely upon RF media. This requires the efficient utilization and networking of communications resources at all available frequency bands (*i.e.*, ELF, VLF/LF, HF/VHF, UHF, HF, EHF). Commercial SATCOM systems used by the Navy includes the GTE SpaceNet, International Maritime Satellite System (INMARSAT), and Challenge Athena.

Table 7-1. Military SATCOM Attributes

Attribute	**UHF**	**SHF**	**EHF**
Service	Ship-to-Shore Shore-to-Ship Ship-to-Ship	Ship-to-Shore Shore-to-Shore Shore-to-Ship	Ship-to-Shore Ship-to-Ship Shore-to-Ship
Probability of Intercept	High	Low	Low
Threat Protection	None	Limited Anti-Jam (AJ)	High AJ and Scintillation Protection
Missions	Tactical	Tactical/Strategic	Tactical/Strategic
Platforms Connectivity	Surface Ships, Submarines, Airborne Terminals	Major Combatants and Selected Surface Ships, Airborne Terminals	Major Combatants and Selected Surface Ships, Submarines, and Airborne Terminals
Frequency Band	0.3 to 3.0 GHz	3 to 30 GHz	30 to 300 GHZ
Interoperability	Joint/Allied/Non-DOD	Joint/Allied	Joint
Operations Supported	Netted (multi-user), Half-duplex Services, Broadcast	Netted, Point-to-Point, Full-duplex, Broadcast	Netted, Point-to-Point, Half-duplex, Full-duplex, Broadcast
EMP Hardened	No	Selected Terminals	Yes
Polar Coverage	5 kHz chnls only	None	Potential/Not implemented
Ongoing Performance Upgrade	DAMA, Auto-DAMA, Quad-DAMA	DAMA Mode, Broadcast, Mode, Improved AJ	MDR Mode (increase from 2.4 to 1544 KBPS planned)

7.4 Navy METOC Data

7.4.1 Navy METOC Data Sources.

The following represent the most significant sources of METOC data within the Navy tactical structure: Battleforce Surface Ships, Carrier Air Wing, Maritime Patrol Aircraft, and Submarines. METOC observations taken by these units consist of surface weather, upper air, pilot reports (PIREPs), and bathythermograph data.

- *Battle Force Surface Ships.* All Battle Force/Group surface combatants (aircraft carriers, cruisers, destroyers, frigates, amphibious, mine warfare, and logistics support ships) provide METOC surface weather observations every six hours while at sea. These reports are submitted on the synoptic hours of 0000Z, 0600Z, 1200Z, and 1800Z. If visibility is less than 1 NM, winds exceed 35 knots, or the seas exceed 12 feet, the reporting rate increases to every three hours until the condition(s) improve. All ships at sea are required to take regular observations, but where ships are steaming in company or in close proximity the Officer in Tactical Command (OTC) may designate one ship to report for the group.

  - All anti-submarine warfare (ASW) ships (cruisers, destroyers, and frigates) collect bathythermograph (BT) data by dropping an expendable temperature sensor into the sea. The collection rate of BT data is driven by operational requirements.

  - Upper-air observations are regularly collected by those Navy vessels with a permanently assigned METOC division (OA Division) or embarked Mobile Environmental Team (MET). Upper-air observations are taken at the synoptic times of 0000Z and 1200Z, as operations permit.

- *Carrier Air Wing.* Aircrews provide meteorological observations, pilot reports (PIREPs), as specified by their mission, or when required in areas of sparse data (*e.g.*, oceanic, target weather). PIREPs are submitted via radio or upon return from the flight to the carrier weather office (or shore-based weather office, if the aircraft recover ashore).

- *Maritime Patrol Aircraft.* Aircrews provide meteorological observations as specified by their mission, or when required in areas of sparse data (*e.g.*, oceanic). Aircraft observations are transmitted when radio contact is made, or are delivered, along with observations of unexpected en route weather, to the NAVMETOCCOM activity at the air station at which the aircraft lands. Sonobuoy-equipped aircraft take airborne expendable bathythermograph (AXBT) observations in open ocean areas where depths exceed 100 fathoms. A minimum of one BT observation is taken during each anti-submarine warfare (ASW) flight that uses sonobuoys. Collected data is submitted to the NAVMETOC activity at the air station at which the aircraft lands.

- *Unmanned Aerial Vehicles (UAVs) and Unmanned Underwater Vehicles (UUVs).* UAVs and UUVs are an increasingly important source of weather and oceanographic

information in the battlespace near strategic and tactical locations. METOC data are made available via the C2 systems used for piloting and reconnaissance imagery.

- *Submarines.* Submarines are exempted from these requirements only when operational requirements preclude the taking of observations. They are capable of collecting surface weather and bathythermograph observations and can be tasked with this mission.

- *Aegis cruisers.* Selected Aegis cruisers will have a new capability, in which the phased array radar on an Aegis cruiser acts as a Doppler weather radar. The radar, which normally provides early warning detection and tracking of contacts and targets, intermittently switches to weather mode; the radar picture is output to a separate display system. In high threat environments, the Aegis' weather radar capability will likely be switched off, to enable continuous air and surface threat coverage.

- *Communication Procedures*. Navy METOC data are classified at the same level as the platform mission (often to protect operating location). METOC observations collected by the Navy are forwarded to the Collective Address Designator (CAD) message address, "OCEANO WEST" and “OCEANO EAST”. This CAD distributes these observations to the NAVPACMETOCCEN Pearl Harbor HI, NAVLANTMETOCCEN Norfolk VA, FLENUMMETOCCEN Monterey CA, NAVOCEANO Stennis Space Center MS, and AFWA Offutt AFB NE for use in their forecast models and for further distribution to all Navy fleet units requiring observation data.

- *Other Sources of Data*

  - Fleet Multichannel Broadcast - (channel 8/15) 300 bps AWN / MIST data broadcast tailored by the Theater METOC Center for their AOR
  - HF Facsimile broadcast - tailored by the Theater METOC center on demand
  - NODDS
  - SEALS - Surf observations, beach survey data
  - Drifting buoys - automated weather observations, ocean temps at surface and at depths, sea height and period
  - Deployed Mobile Environmental Teams with MRS
  - PIREPs
  - Special Weather Intelligence (SWI)
  - Internet commercial activities (e.g., *USA Today*, Accuweather, weather.com, Intellicast)

7.4.2 Navy METOC Data Products.

7.4.2.1 Navy METOC Centralized Products.

7.4.2.1.1 Naval Oceanographic Office (NAVOCEANO, NAVO) and the Warfighting Support Center (WSC).

- *Organization.* Navy-controlled, named organization assigned to the Commander, Naval Meteorology and Oceanography Command (CNMOC).

- *Mission.* Primary oceanographic production center for the Navy. Operational support includes near real-time oceanographic products, detailed front and eddy analysis/guidance to Naval Regional Oceanography and Command centers worldwide in support of Fleet Operations.

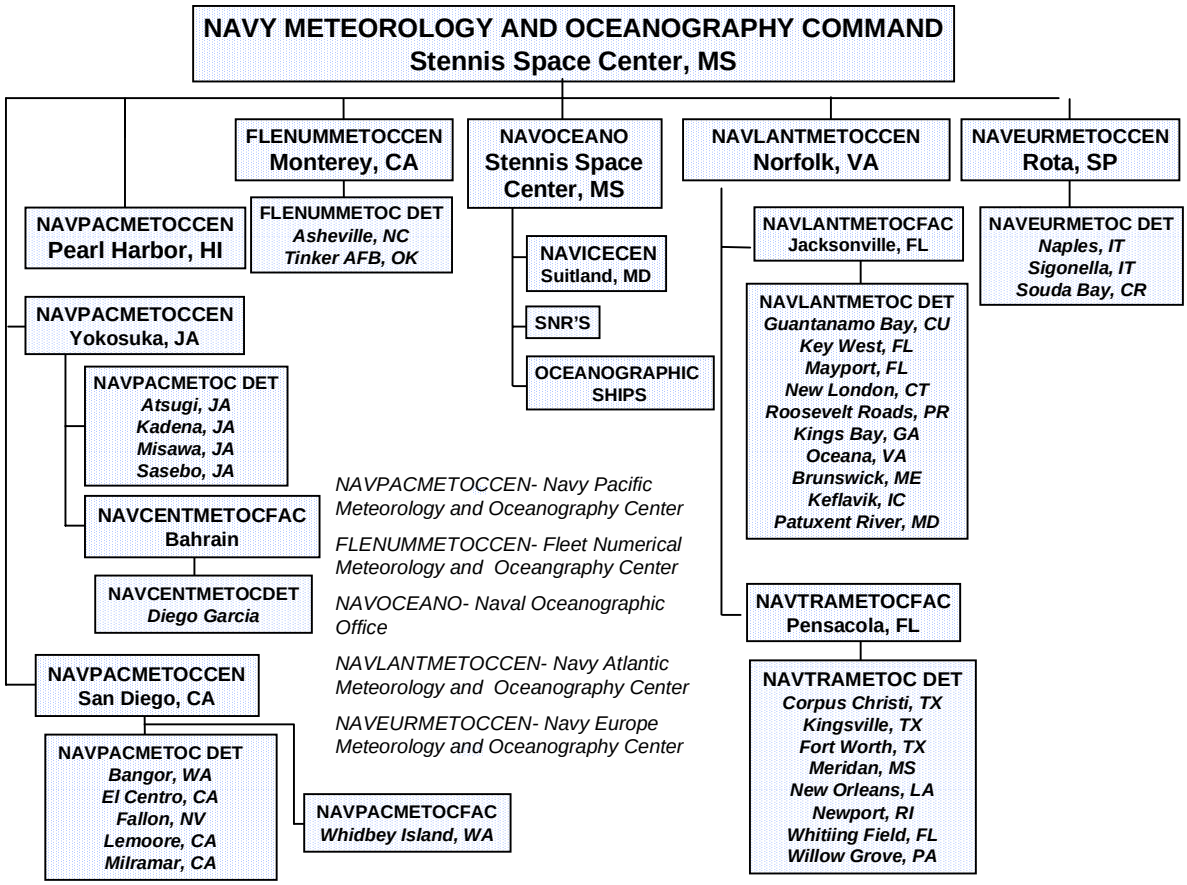


Figure 7-3. Navy METOC Organization

- *Products and Services*

  - Analyzed imagery of littoral areas
    > Images obtained from LANDSAT, USGS, aerial, SPOT, or National Technical Means (NTM)

> Images analyzed to extract oceanographic parameters
> Time series correlated with seasons, tidal cycles, and atmospheric forcing
> Analysis information fused with oceanographic database
> Analysis displayed as image overlay, graphic, or short text write-up
> Image is geo-rectified and latitude-longitude scale is applied
> METOC information displayed on such charts includes:
  ◊ Any detected obstructions, reefs, or shoals
  ◊ Estimate of nearshore currents during ebb and flood tides
  ◊ Turbidity plumes
  ◊ Location of any sewage outfalls
  ◊ Typically expected sea surface temperatures
  ◊ Any available data on water clarity
  ◊ Hazardous biological marine life
> Annotated imagery typically produced on 1:50000 or 1:25000 scale
> Image can be transmitted via JDISS, classified email, SIPRNET, FTP, or classified PC bulletin board system
> Full resolution file size 100-300 MB, although screen capture and compression techniques (with decrease in clarity) reduce size to 1 MB or less
> NAVOCEANO can produce 3 ft by 4 ft product on high quality printer

- Special Tactical Oceanographic Information Chart (STOIC)
  - 1:25000 scale 8 nm x 8 nm special purpose chart depicting nearshore hydrographic conditions with oceanographic data tailored for mine warfare, amphibious operations, or special operations (*e.g.*, tides, currents, bottom sediments) displayed along the chart border
  - Produced for fleet operations, exercises or mission planning purposes
  - Available hard copy or on the SIPRNET
  - Land portion of chart may consist of an image, when appropriate.

- Environmental Support Packages (ESP)
  - Describes nearshore oceanographic conditions by providing available, evaluated data on nearshore hydrography, tides, currents, marine life, water clarity, etc.
  - Can complement annotated imagery, or be a stand-alone product
  - OESs are communication efficient and can be produced for short-fused requests while imagery is enroute

- Special Support. Examples of WSC-CSB support includes:
  - Detailed analysis of water density and currents at a specific location
  - Analysis of the suitability of beach landing zones
  - Summary of oceanographic conditions in support of new technology deployments
  - Users should submit requests via AUTODIN/DMS message
  - Call POCs for product availability

- Product Strengths and Limitations
  - Strengths:

> Oceanographic products based upon imagery significantly increases the warfighters' battlespace awareness
> Analysis of oceanographic features based upon remote sensing is frequently the only way to qualitatively or quantitatively describe specific near-shore oceanographic conditions for a beach or harbor
> Recent remote sensing data updates oceanographic surveys taken years or decades ago

- Limitations:
  > Much of METOC data directly derived from remote sensing is qualitative
  > NRL and Navy TENCAP are engaged in quantitative analysis of such parameters; when quantitative analysis techniques are validated, they will be considered operational
  > High resolution imagery equates to small areas
    ◊ LANDSAT and SPOT products typically cover an area no larger than 40 nm by 50 nm.
    ◊ Images based on NTM imagery describe smaller areas.
    ◊ STOIC chart normally describes an area 8 nm by 8 nm.

- Product Dissemination
  - Some image products are available from the NAVOCEANO SIPRNET homepage or can be uploaded
  - Overnight mail (when time allows)
  - Shipped via regional METOC center for further transfer (overseas/afloat units)
  - Sent via JDISS, SOCRATES, classified PC-PC BBS, or AUTODIN (products requiring quicker transmission)
  - Will work with customer and regional METOC center to determine best method

- Request Procedures
  - Submit routine requests to the regional METOC centers by record message (preferred) or via telephone (info NAVOCEANO Stennis Space Center MS//N22//)
  - Submit short fused requests to NAVOCEANO (info the appropriate regional METOC center)
  - Requests requiring higher levels of classification may be received via "backchannel" traffic
  - Requests should contain the following information:
    > Command requesting the product
    > Name of exercise or operation
    > Location of request (be as specific as possible; a latitude-longitude box is preferred)
    > Forces being supported (*e.g.*, amphibious, SOF, mine, etc.). Include description of intended use of the product to ensure product is tailored to the specific operation
    > Required date to receive product.
    > Desired transmission method of product (*i.e.*, JDISS, mail, etc.).

> Name and telephone number for a POC.

- Points of Contact:. All phone numbers are commercial (601) 688-XXXX; DSN prefix 485
  - Requests for products, or status of requests:
    > Customer Rep: X4369/ X5216.
    > Products Home Page: 199.208.205.50/products.html
  - Warfighting Support Center:
    > Director: X5152, X4555.
    > Deputy Director: X5152, X4135.
  - After hours (24 hours/day operations):
    > NAVOCEANO CDO: X5176.

7.4.2.1.2 Fleet Numerical Meteorology and Oceanography Center (FLENUMMETOCCEN, FNMOC).

- *Organization.* Navy-controlled, named organization assigned to the Commander, Naval Meteorology and Oceanography Command.

- *Mission*. Produces the Department of Defense automated numerical meteorological and oceanographic guidance, manned 24 hours/day.

- *Products and Services.* FNMOC and the National Center for Environmental Prediction (NCEP) are the only production centers (*i.e.*, run models to produce global METOC forecasts) in the USA and act as mutual backup. As well as running the Navy's own suite of models, FNMOC also provides selected NCEP products along with those produced by two other global production centers; the European Center (ECMWF) and the Japanese Center (JMA). FNMOC has a suite of "state of the art" oceanographic and meteorological models. Products are in the form of satellite images, satellite derived data (special sensor microwave imager or SSMI), and numerical fields, which users can display using JMV or NITES, or as input into GFMPL or JMCIS to run tactical decision aids (TDAs). A standard list of products is updated twice daily with special high resolution products and Data Request Products (DRPs) available on request.

- *Standard Products*

  - Navy Operational Global Atmospheric Prediction System (NOGAPS)
    > NOGAPS 4.0 utilizes 159 spectral waves (82 km resolution) in the horizontal and 24 vertical atmospheric levels in sigma coordinates
    > Multi-Variate Optimal Interpolation (MVOI) scheme is run twice daily producing global prognostic fields through 120 hours
    > Cressman (moisture) analysis of dew point depression including synthetic moisture soundings consistent with SSM/I precipitable water samples
    > Cumulus parameterization is a relaxed Arakawa-Schubert routine

  - > Model tends to develop systems faster and retain energy longer, however, explosive deepening systems continue to be lagged
  - > Increased skill in detecting tropical low formation verified

- Coupled Ocean / Atmosphere Mesoscale Prediction System (COAMPS)
  - > Incorporates non-hydrostatic physics, explicit moisture and improved data assimilation
  - > Globally relocatable
  - > Supports nested grids at resolutions of less than 10 km
  - > Can be run stand-alone basis or fully coupled
  - > Provides for a fully interactive two-way coupling between the ocean and atmosphere
  - > Typically run at FNMOC, with capabilities being fielded at the regional centers

- Third-Generation Wave Model (WAM)
  - > Replaces Global Spectral Ocean Wave Model
  - > Based on wind stresses from either NOGAPS or NORAPS
  - > Produces wave forecasts out to 72 hours
  - > Run on a global 1.0 degree spherical grid with 15 degree angular resolution for directional spectra, using a 20 minute propagation and source term time step
  - > Wave heights exhibit smaller mean errors, RMS errors, and scatter index indices than those predicted by the GSOWM

- Thermodynamic Ocean Prediction System (TOPS 4.0)
  - > Predicts response of upper thermal structure of ocean to local atmospheric forcing and provides surface currents for Search and Rescue applications
  - > Synoptic mixed-layer model consisting of conservation equations for temperature, salinity, and momentum in the upper ocean
  - > Forced by heat flux and wind stress predicted by NOGAPS
  - > Includes horizontal advection of temperature and salinity due to wind drift and geostrophic components of the current

- Optimal Thermal Interpolation System (OTIS 4.0)
  - > Produces SSTs on a global basis and a surface to bottom analysis of temperature and salinity in two western boundary current regions
  - > Optimum interpolation data assimilation scheme which incorporates real-time observational data and makes use of bogus front and eddy features provided by NAVOCEANO
  - > Noted improvements in representation of warm and cold eddies and front and eddy interaction events
  - > Grid mesh of 0.2 deg. latitude by 0.2 deg. longitude
  - > In Atlantic, western boundary region includes entire coastal and littoral environments with bogus routine providing the Florida Loop Current, Gulf Stream, North Atlantic Current, and the Shelf-Slope frontal system

> In Pacific, model includes Sea of Okhotsk and area east of Kamchatka, with bogus providing Kuroshio, Oyashio, Soya, Kuril, and east Kamchatka Currents

- Polar Ice Prediction System (PIPS)
  > Dynamic/thermodynamic sea ice model based on formulation of Hibler and Semtner
  > Consists of conservation equations for ice momentum, concentration, and thickness which are coupled with ice rheology and ice-strength formulation
  > Covers central Arctic basin and most of the marginal seas
  > Driven by NOGAPS heat fluxes and surface wind stresses
  > Model run once per day, providing 120 hour forecasts of ice drift, concentration, and thickness
  > Model updated weekly by NAVICECEN analysis of satellite-based ice concentration

- Special Products. Special high resolution forecast fields can be produced on request.

- Data Request Products. FNMOC services a limited number of Data Request Products including:
  > Bathythermograph Data Extract (BTXT)
  > Environmental Lines (ENVR)
  > General Environmental Message (GEM)
  > Point Data Extract (PNTDT)
  > Search and Rescue (NSAR)
  > Refractive Information By Station (RIBS)
  > Spout Data (SPOUT)
  > Ballistic Wind and Density (BALW)
  > Grid Data Extract (OMDAT or FEXT)
  > Sound Focusing (SNDFO)
  > Climatological Bathythermograph Extract (JJPRO)

- *Product Dissemination*
  - Standard products available via NODDS.
  - Joint METOC Viewer available on SIPRNET / NIPRNET.
  - A selection of products is available via JDISS, SIPRNET, and NIPRNET.

- *Request Procedures*
  - Standard products: JMV products available directly from FNMOC on SIPRNET / NIPRNET; NODDS products available directly from FNMOC by modem / NIPRNET

  - Special products:
    > Special areas can be produced within 7-10 days
    > Early liaison essential to meet customer needs

> Send request via letter or message to FNMOC (ATTN: OPS Officer)
> Send short notice requests to Fleet Liaison Officer via telephone (DSN 878-2255, COMM 408-656-2255) or e-mail (fnopsspt@fnmoc.navy.mil)

- Data Request Products
  > Send requests for SARs via telephone to Command Duty Officer (DSN 878-4325; Comm (408) 656-4325)
  > All other DRPs should be requested by AUTODIN message to the regional METOC center which will format and forward it to FNMOC

- Points of Contact
  > Products on SIPRNET, NIPRNET, JDISS
    ◊ DSN 878-4219
    ◊ SIPRNET homepage: http://www.fnmoc.smil.mil
    ◊ Unclass email: webmaster@fnoc.navy.mil
    ◊ NIPRNET Home Page: http://www.fnmoc.navy.mil
  > Products on JMV/NODDS
    ◊ Bill Ensley DSN 878-4376
  > Technical details about ocean models
    ◊ Mike Clancy DSN 878-4414
  > Technical details about atmospheric models
    ◊ Charlie Mauck DSN 878-4374
  > Data Request Products. CDO: DSN 878-4302/4326, Comm 408-656-4302/4326, cdo@fnoc.navy.mil

7.4.2.1.3 Fleet Numerical Meteorology and Oceanography (FLENUMMETOC) Detachment (Det) Asheville.

- *Organization.* Fourth echelon activity reporting to FLENUMMETOCCEN, within the organizational structure of the Commander, Naval Meteorology and Oceanography Command. The detachment works as part of a team with the AF Combat Climatology Center (AFCCC).

- *Mission.* Provide climate services to support global naval operations.

- *Products and Services.* FLENUMMETOCCEN DET Asheville relies upon the personnel resources and expertise of NCDC in climate analysis, archiving, and database management to perform a majority of their functions. Functions consist of quality control efforts, database maintenance, and archiving of meteorological data submitted by Navy and Marine Corps units; the development of a standard inventory of baseline, climatic reference products; and the production/development of specially tailored climatological summaries, tabulations, studies and/or data based on customer requirements. Products include:

  - CD-ROM Based Climatology Products

> International Station Meteorological Climate Summary
> Marine Climatic Atlas of the World
> Global Upper Air Climatic Atlas, Vol. I & II
> Global Tropical and Extratropical Cyclone Climatic Atlas
> Global Historical Fields

- Planned Releases
  > Station Climatic Daily Data Summary
  > Global Sea Ice Climatic Atlas
  > Marine Climatic Atlas of the World

- General Climate Reference Paper Publications
  > Worldwide Airfield Summaries
  > Marine Climatic Atlas of the World

- Summary of Synoptic Meteorological Observations
  > East African and Selected Island Coastal Marine Areas
  > Southwest Asian Coastal Marine Areas
  > Southeast Asian Coastal Marine Areas
  > Indonesian Coastal Marine Areas
  > Australian Coastal Marine Areas
  > Chinese-Philippine Coastal Marine Areas
  > Hawaiian and Selected North Pacific Island Coastal Marine Areas
  > Japanese and Korean Coastal Marine Areas
  > Siberian Coastal Marine Areas
  > Alaskan and British Columbian Coastal Areas
  > North American Coastal Marine Areas
  > Caribbean and Nearby Island Coastal Marine Areas
  > South American Coastal Marine Areas
  > West African and Selected Island Coastal Marine Areas
  > Mediterranean Marine Areas
  > West European Coastal Marine Areas
  > Selected South Pacific Island Marine Areas
  > Central American Coastal Marine Areas West Coast

- U.S. Navy Regional Climatic Studies

- Sea Ice Climatic Atlases

- Summary of Meteorological Observations, Surface
  > Station climatic summary
  > Percentage of flying class by hour-month
  > Sky cover vs. hour-month
  > Daily extreme precipitation vs. year-month

> Daily extreme precipitation vs. day
> Total precipitation vs. year-month
> Daily snowfall vs. month
> Extreme snowfall vs. month
> Daily snow depth vs. month
> Extreme snow depth vs. year-month
> Weather conditions vs. hour-month
> Wind direction vs. weather conditions by month
> Daily maximum temperature vs. month
> Extreme maximum temperature vs. year-month
> Daily minimum temperature vs. month
> Extreme minimum temperature vs. year-month
> Daily mean temperature vs. month
> Daily average/extreme temperature by month
> Mean temperature and standard deviation vs. month
> Mean temperature vs. year-month
> Dry vs. wet bulb by month
> Temperature vs. wind direction by month
> Heating degree days vs. year-month
> Cooling degree days vs. year-month
> Mean dewpoint and standard deviation vs. month
> Relative humidity vs. hour-month
> Temperature thresholds and moisture statistics
> Wind direction vs. speed by hour-month
> 24 hour peak gusts by year-month
> Mean sea level pressure and standard deviation vs. month
> Mean station pressure and standard deviation vs. month
> Ceiling vs. visibility by hour-month

- *Request Procedures.* Requests should contain the following information:
  - Date of request
  - Date product is required
  - Requesting command
  - Requester POC/rank/grade/title and name
  - Commercial telephone number, fax number, and E-mail address
  - Required data and/or product
  - Required data elements
  - Period of interest (year, month, day, hour)
  - Geographic area requirement(s) (Latitude/Longitude or point)
  - Station requirement(s) [Name (WMO# if known)]
  - Requested reply communications (*i.e.*, mail, message, fax, etc.)
  - Output (paper or digital)
  - Media/data format: floppy disk, CD-ROM, exabyte tape, FTP, other; ASCII, binary, GIF, etc.
  - Amplifying information and/or pertinent remarks

- *Points of Contact:*
  FLENUMMETOCCEN DET Asheville
  Federal Building, Room 563
  151 Patton Avenue
  Asheville, NC 28801-5014
  Telephone: (704) 252-7865, DSN 271-4852/4232
  STU-III: (704) 271-4874
  Facsimile: (704) 271-4672
  Message: FLENUMMETOCCEN DET ASHEVILLE NC//00//
  E-mail: navy@ncdc.noaa.gov

7.4.2.1.4 U.S. Naval Observatory (USNO).

- *Organization.* Navy-controlled organization assigned to the Oceanographer of the Navy (N096)

- *Mission.* Determine the positions and motions of celestial bodies, the motion of the Earth, and precise time; provide astronomical and timing data required by the Navy and other DoD components for navigation, precise positioning, and command, control, and communications

- *Products and Services*. USNO provides a wide range of practical astronomical data and timing products. The products are available as hardcopy publications, stand-alone computer applications, and data services accessible via the Internet and other sources

- *Standard Products*

  - Practical astronomical data
    > STELLA: stand-alone PC software available directly from USNO; provides basic almanac data for navigational bodies, full sight planning and reduction, times of twilight, sunrise, sunset, moonrise, and moonset for fixed sites or vessel underway, and moon illumination
    > Nautical Almanac: annual hardcopy publication distributed by the Defense Supply Center Richmond (DSCR) provides basic almanac data for use in marine navigation and other applications
    > Air Almanac: annual hardcopy publication distributed by DSCR provides basic almanac data for use in air navigation and other applications
    > Data services and astronomical information available on the USNO Astronomical Applications website, http://aa.usno.navy.mil/AA/
    > Information on astronomical standards and astronomical reference frames available at the Astrometry Department website, http://aa.usno.navy.mil/ad/

- Precise time--dissemination of USNO master clock time
  - > Two-Way Satellite Time Transfer (TWSTT): USNO time can be transferred to users via geostationary communications satellites to an accuracy of 1 nanosecond
  - > Global Positioning System: UNSO time can be acquired from GPS satellites. Precise Positioning Service (PPS) GPS timing receivers can receive time to an accuracy of about 30 nanoseconds and Standard Positioning Service (SPS) GPS timing receivers can receive time to an accuracy of about 200 nanoseconds, provided the receivers have been calibrated and certified at USNO
  - > Network Time Protocol (NTP): USNO time can be acquired via the NIPRNET and SIPRNET to an accuracy of about 10 milliseconds
  - > Time via telephone modem: USNO time can be acquired via telephone modem to an accuracy of about 1/100 of a second
  - > Telephone time voice announcer: USNO time can be acquired via telephone time announcer to an accuracy of about 1/10 of a second
  - > GPS Timing Receiver Calibration Service. The USNO will calibrate GPS timing receivers (for a fee) to remove biases and put them on time with the USNO Master Clock.
  - > USNO Master Clock time data and personnel contact information is available on the Time Service website, http://tycho.usno.navy.mil

- Earth orientation
  - > International Earth Rotation Service (IERS) Bulletin A: reports of the latest determinations and predictions for polar motion, UT1-UTC, and nutation offsets at daily intervals are distributed twice weekly by email; subscription form is available at http://maia.usno.navy.mil/
  - > Earth orientation files: updated daily and available by anonymous ftp; full descriptions available at http://maia.usno.navy.mil
  - > Leap seconds: announcements made in IERS Bulletin C, available at http://maia.usno.navy.mil
  - > DUT1: these course values for (UT1-UTC) are transmitted with timing signals and announced in IERS Bulletin D, available at http://maia.usno.navy.mil

- *Point of contact:*
  Scientific Director
  DSN: 762-1513
  Secure: DSN 762-1513
  Facsimile: DSN 762-1461
  Email: johnston.kenneth@usno.navy.mil
  Address: US Naval Observatory
  3450 Massachusetts Ave., NW
  Washington DC 20392-5420
  PLAD: NAVOBSY WASHINGTON DC//SD//

7.4.2.2 Navy METOC Theater Products.

- Navy METOC Regional Centers, Facilities, and Detachments shown in Figure 25 can provide some or all of the following products:
  - Prog blends - charts and messages/bulletins that merge the various models to determine the best regional forecast

- Sea height analysis and forecasts - sea height analysis based on ship observations and buoy information; high sea forecast areas are derived from projected tracks of low pressure systems, tropical systems, and/or significant wind gradients
- OPAREA forecasts - forecasts for designated fleet operating areas, including synoptic weather and 24-hour forecasts
- WEAX - enroute forecasts to ships operating at sea
- OTSR (Optimum Track Ship Routing) - keeps ships out of destructive weather that would adversely impact their operations
- Tropical weather forecasting
- Satellite imagery
- Oceanographic analysis and support
- JOAFs or point forecasts until the JTF HQ METOC cell is established.
- Mobile Environmental Team (MET) deployment
- Quality control and overview of Navy afloat or JOAF forecasts
- GCCS data - NITES can provide METOC overlays to include various warnings such as high wind and sea, tropical, special weather advisories, Gulf Stream and ice edge data for specific areas of interest (*e.g.*, Joint Operational Area)

7.5 Key Naval METOC Centers and Facilities:

- *Commander, Naval Meteorology and Oceanography Center (CNMOC)—Stennis Space Center MS*
  NIPRNET: http://www.cnmoc.navy.mil; SIPRNET: http://www.cnmoc.navy.smil.mil
  DSN 485-4582 / comm. (228) 688-4582

- *Naval Oceanographic Office (NAVO)—Stennis Space Center MS*
  NIPRNET: http://www.navo.navy.mil; SIPRNET: http://www.navo.navy.smil.mil
  (199.208.205.50/index.html)
  DSN 485-4357 / comm. (228) 688-4357

- *Fleet Numerical Meteorology and Oceanography Center (FNMOC), Monterey CA*
  NIPRNET: http://www.fnmoc.navy.mil; SIPRNET: http://www.fnmoc.navy.smil.mil
  DSN 878-4302/4325 / comm. (831) 656-4302/4325

- *Naval Pacific Meteorology and Oceanography Center (NPMOC) and Joint Typhoon Warning Center (JTWC), Pearl Harbor HI*
  NIPRNET: http://www.npmoc.navy.mil; SIPRNET: http://www.npmoc.navy.smil.mil
  NPMOC DSN 471-0004/4599; JTWC DSN 474-2320

- *Naval Pacific Meteorology and Oceanography Center (NPMOC-SD), San Diego CA*
  NIPRNET: http://www.npmoc-sd.navy.mil; SIPRNET: http://www.npmoc-sd.navy.smil.mil
  DSN 735-2218 / comm. (619) 545-2218

- *Naval Pacific Meteorology and Oceanography Center - West (NPMOC-W), Yokosuka JA*
  NIPRNET: http://www.yoko.npmoc.nav.mil
  SIPRNET: http://www.yoko.npmoc.navy.smil.mil
  Outside Pacific: DSN 315-243-5595/7798; within Pacific: DSN 243-5595/7798
  Comm 011-81-311-743-5595/7798

- *Naval Atlantic Meteorology and Oceanography Center (NLMOC), Norfolk VA*
  NIPRNET: http://www.nlmoc.navy.mil
  SIPRNET: http://www.nlmoc.navy.smil.mil (206.36.246.98)
  DSN 564-7583/7750 / comm. (757) 444-7583/7750

- *Naval European Meteorology and Oceanography Center (NEMOC), Rota SP*
  NIPRNET: http://www.nemoc.navy.mil; SIPRNET: http://www.nemoc.navy.smil.mil (199.10.143.131)
  From CONUS: DSN 314-727-2410 / comm. 011-34-956-82-2410
  In Europe: DSN 727-2410 / comm. 34-956-82-2410

- *Naval Central Meteorology and Oceanography Center (NCMOC), Bahrain*
  NIPRNET: http://www.ncmoc.navy.mil; SIPRNET: http://www.ncmoc.navy.smil.mil
  DSN 318-439-4083 / local 724-083 / comm. 973-72-4083

Chapter 8 - U.S. Air Force METOC

This chapter describes U.S. Air Force organizational structure, command relationships, and support capabilities and requirements, including typical USAF METOC and communications equipment.

8.1 Air Force Forces (AFFOR)

8.1.1 Air Force Weather Support to Joint and Air Force Organizations.

Air Force Weather (AFW) personnel provide weather support to unified commands, major commands (MAJCOMs), joint task forces (JTFs), numbered air forces (NAFs), operational flying units (wings/squadrons), and air expeditionary forces (AEFs).

- Unified commands have a Senior METOC Officer (SMO), who may be an Air Force or Navy officer; some have a small staff (*e.g.*, CENTCOM). When designated, a JTF will have a Joint METOC Officer (JMO) and a mix of officer and enlisted personnel.

- Staff support to MAJCOMs is through Directors of Weather (typically designated DOW or XOW), usually an O-6 with a staff of weather officers and senior NCOs. A NAF typically has a Staff Weather Officer (SWO) and a small staff that is assigned to an attached Operational Weather Squadron (OWS).

- Air Force weather support to flying operations is provided at three levels: strategic, operational, and tactical, corresponding to the levels of war. This weather support is provided by strategic level production centers (*e.g.*, AFWA, AFCCC), operational level squadrons (the OWSs), and tactical level combat weather teams (CWTs) assigned to flying wings, squadrons, and AEFs. For Global Power missions, the lead weather support provider is the ACC Weather Support Unit (WSU) at Langley AFB.

- When a NAF is tasked to deploy the Air Force component (AFFOR) and/or the Air Operations Center (AOC), the AFFOR Commander and his staff will be supported by a SWO (and possibly additional weather officers/NCOs). The AOC will have dedicated weather support consisting of a mix of officer and enlisted personnel. (The number of personnel and the capability deployed is determined by the size and scope of the planned operation.)

- When a JTF is formed, USAF weather personnel may be tasked to deploy and form or augment a Joint METOC Forecast Unit (JMFU). Air Force weather personnel may also be tasked to deploy a small cell (officer and enlisted) to support the Joint Task Force Commander (JFC), the Joint Force Air Component Commander (JFACC), the Joint AOC (JAOC), and the deployed (joint) staff.

- Deployed weather teams supporting flying units, AOCs, and/or staffs, reach back to the OWS responsible for their Area of Responsibility (AOR) for theater/operational level

weather products. The OWS Combat Operations cell may act as the JMFU. (See paragraph 3.3.2: AFW reengineering and use of "reachback" makes use of a Joint METOC Forecast Capability (JMFC), rather than utilizing a forward-deployed, operational level production facility (the JMFU).

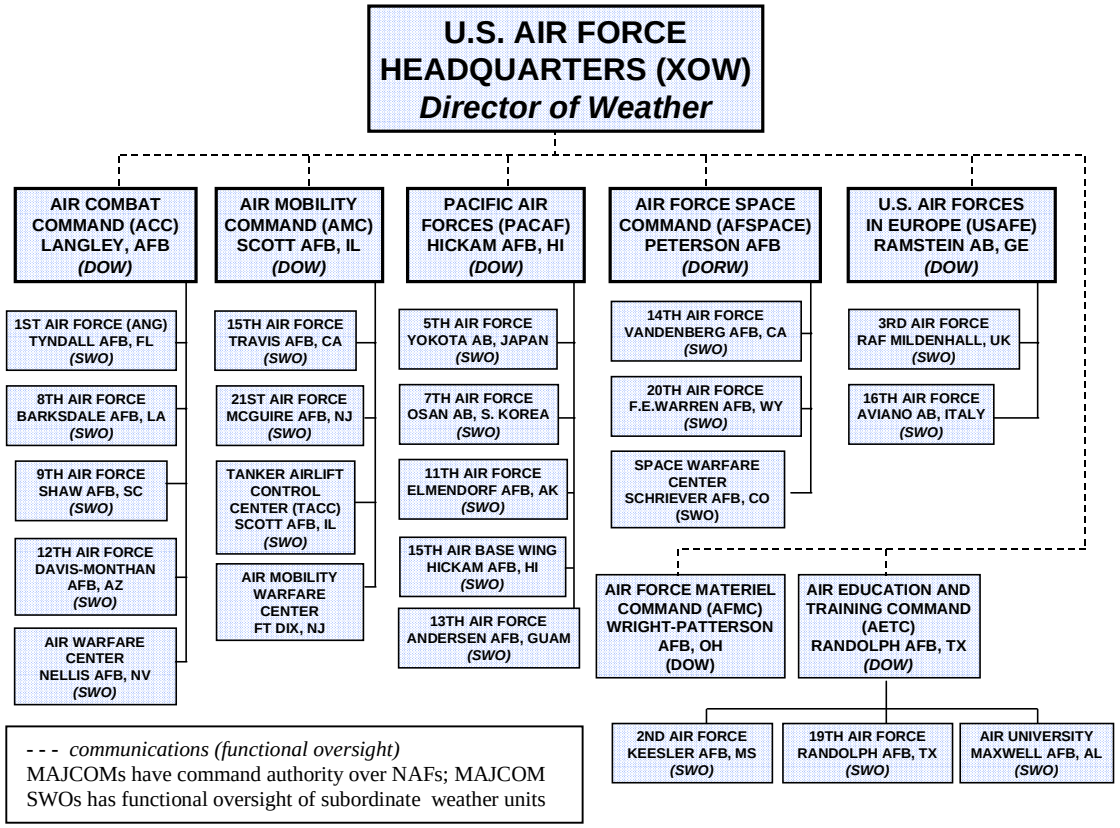


Figure 8-1. Weather Support to Air Force

8.1.2 Air Force "Air Expeditionary Force" (AEF).

8.1.2.1 Commander, Air Force Forces (COMAFFOR).

A Commander, Air Force Forces (COMAFFOR) is designated for any operation conducted by deployed USAF forces. USAF elements deployed in an expeditionary role are designated as an Aerospace Expeditionary Task Force (ASETF). The ASETF is the designated USAF organization to fulfill the JTC's and JFACC's campaign objectives. (Usually, the COMAFFOR will also serve as the JFACC.) The command element includes the ASETF commander (the COMAFFOR), staff, and a command and control function (the AOC). The NAF is the senior warfighting echelon of the USAF; when participating in a joint operation, the tasked NAF(s) will present USAF forces to the JFC within the framework of an ASETF.

8.1.2.2 Aerospace Expeditionary Force (AEF).

An AEF is an organizational structure composed of force packages of capabilities to provide warfighting CINCs with rapid, responsive aerospace power. The force packages (including their support and C2 elements) are tailored to meet specific needs across the spectrum of response options and deploy within an ASETF as aerospace expeditionary wings (AEWs), groups (AEGs), or squadrons (AESs).

- An AEF, by itself, is not a deployable or employable entity. An AEF is composed of a lead wing and several other sister wings and squadrons assigned to a regularly scheduled, 15-month rotation (Figure 8-2), tailored to meet theater-specific needs across the spectrum of military operations. Rotation includes 10 USAF units programmed out 3-5 years, to deploy to support operations such as Operations Northern and Southern Watch, plus two units on alert status for 90-day periods, prepared to deploy as directed in response to new crises.

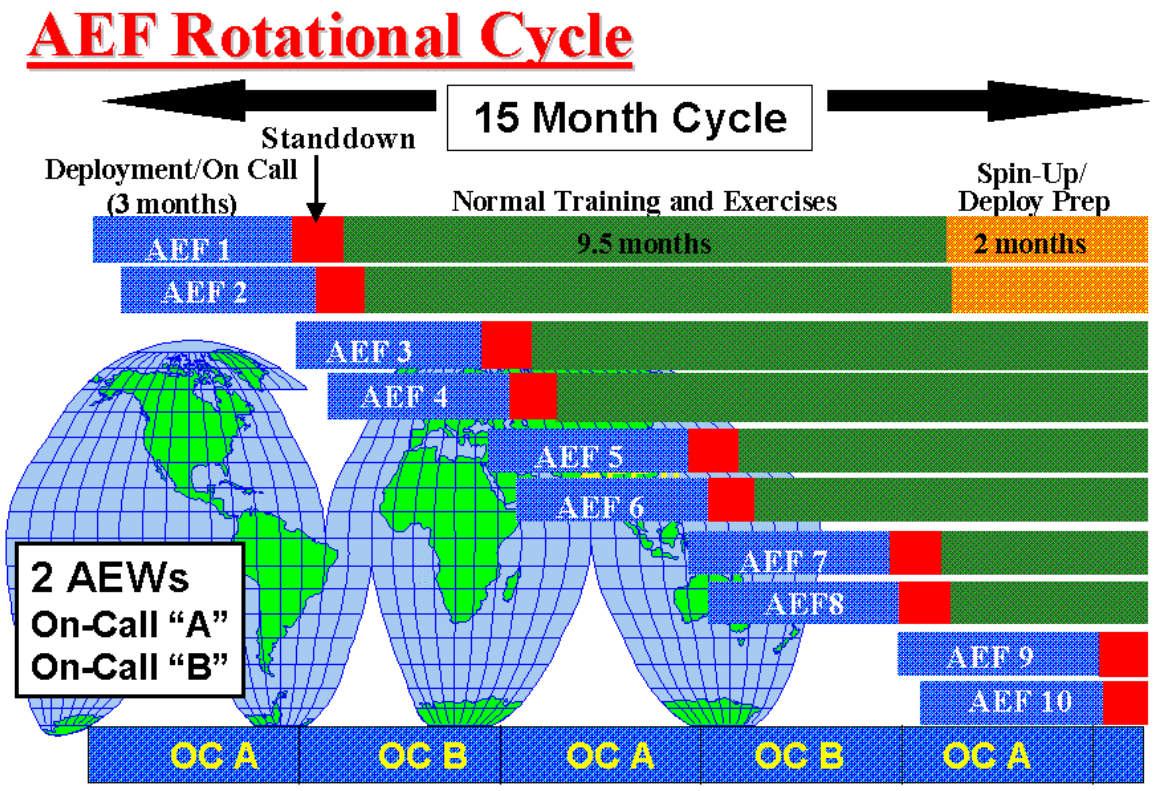


Figure 8-2. Air Force Air Expeditionary Force (AEF) Timeline

- Once deployed, an AEF is composed of one or more Air Expeditionary Wings (and/or Groups), with the AEW (or AEG) commander(s) reporting to the COMAFFOR. An AEW contains an Expeditionary Operations Group (EOG), in which the airfield AF weather unit (the Combat Weather Team, CWT) is embedded within the Expeditionary Operations Support Squadron (Figure 8-3).

8.1.2.3 Expeditionary Weather Forces.

8.1.2.3.1 Expeditionary Weather Force Structure.

The expeditionary weather force structure is based on the three levels of warfare--strategic, operational, and tactical--and is supported by specific organizations.

- Strategic level. Strategic weather centers (*e.g.*, Air Force Weather Agency (AFWA), AF Combat Climatology Center (AFCCC), 55 Space Weather Squadron (SWXS)) produce climatological, space weather, and strategic level forecast products (including numerical weather prediction) emphasizing the global/hemispheric and longer temporal domains.

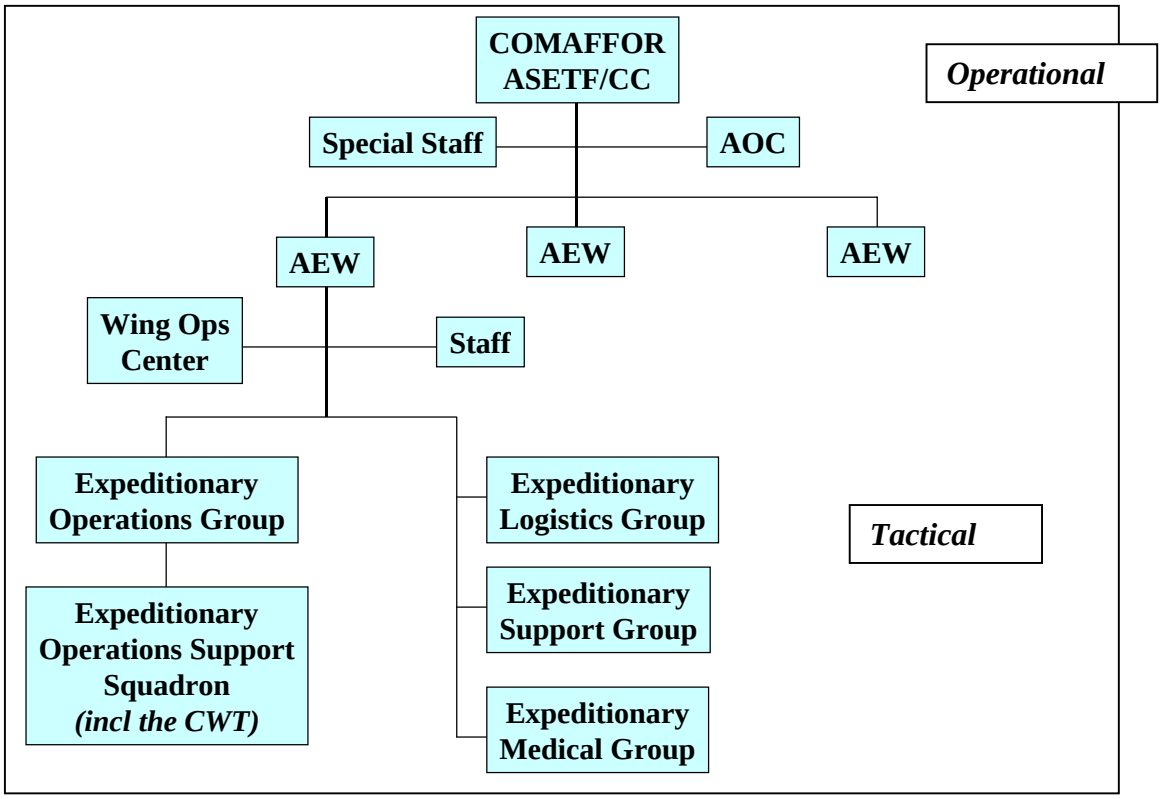


Figure 8-3. Notional Command Structure for an Aerospace Expeditionary Task Force

- Operational/theater level. The OWS is the main provider of data, products, and services for the theater. Typically aligned with a NAF Air Operations Center, the OWS continuously monitors, evaluates, and assesses current conditions and predicts future weather events, tailoring strategic level products from the strategic centers. Part of the OWS may deploy with the AFFOR, AOC, and/or JFACC, as required, to influence and support weaponeering, targeting cells, campaign planning, and combat operations. The OWS issues terminal aerodrome forecasts (TAFs) and resource protection products (watches/warnings) previously issued by CWTs

- Tactical level. The Combat Weather Team (CWT), collocated with the Air Force's basic warfighting unit--the squadron--concentrates on specialized weather support to the mission execution functions. Meteorologists and technicians at the CWT are experts on AEF weapon systems and tactics; they develop specific AEF mission execution weather information based on fine scale, operational level weather information provided by the OWS.

8.1.2.3.2 Categories of AEF Weather Forces.

AEF weather forces are built around three basic categories: lead weather element, weapon system experts, and expeditionary airfield support. These three elements join at the fixed and/or "warm" base to form and AEF Weather Flight within the AEF structure. This AEF weather flight is part of the deployed expeditionary operational support squadron (OSS).

- Lead weather element. The senior weather officer, who normally supports the lead-flying unit, deploys to support the AEF Senior Leadership Command Echelon (AEF Commander and staff). The lead weather force will usually include the expeditionary airfield support if the AEF command element deploys to a "warm" or bare base.

- Weapon system specialists. These personnel, subject matter experts on weather effects on weapon systems and mission capabilities, are organized, trained, equipped, and structured to support air superiority (OCA/DCA), precision attack with guided munitions (PGMs), suppression of enemy air defenses (SEAD), close air support/counter armor (CAS/CA), and global attack (GA) missions.

- Expeditionary airfield support. Comprised primarily of NCOs, these forecasters' duties involve direct support to airfield operations, including taking observations, coordinating with the OWS for TAF and resource protection support, and coordinating with host nation weather services, as required. The deployed template for AFFOR airfield support consists of one officer and two NCOs for 24-hour leadership, three NCOs for 24/7 airfield observing and CWT operations, and one additional NCO per assigned flying squadron. If a flying squadron requires electro-optical (EO) and/or Night Vision Goggle (NVG) support, an additional NCO is added (*e.g.*, two NCOs per F-15E squadron rather than one).

8.1.2.3.3 AEF Weather Unit Locations.

An AEF may deploy to multiple beddown sites, but always remains under the control of the overall AEF commander.

- AEF forces deploy to either Main Operating Bases (MOBs; *e.g.*, Incirlik AB) or Collocated Operating Bases (COBs). MOBs usually have existing weather functions in-place, reducing deploying CWT requirements. COBs usually have no indigenous forecasting or observing equipment available.

- Operating locations should have KQ identifiers, acquired by the JMO from the appropriate USAF or Navy agency and included in the governing Letter of Instruction (LOI)

- Dispersed operating locations means coordination is required to ensure consistency between forecasts (CWTs, JFACC/SWO, the Joint Operations Area Forecast (JOAF), and JMFU or OWS products, as applicable)

- Host nation support. Deploying AFFOR wings generally do not use host nation METOC personnel because of their lack of expertise in supporting US military operations. Also, the sensitivity of many tactical missions precludes using non-US government METOC personnel. METOC planners should not assume host nation assets will be used, even if available, until their mission support capabilities are confirmed. In many cases, the host nation will provide airfield observations for their airfields, which serves as the official airfield observation.

8.1.3 Global Power Missions.

Global Power missions are those flown by bombers and tankers from CONUS to a target overseas, returning to home base or a staging location. Coordination between involved agencies--the local weather unit, the theater JMFU or tasked OWS, and the ACC WSU--is a must, to ensure required forecasts (mission planning, mission control, mission execution) are consistent. The lead weather unit is the ACC WSU. Additional information about coordinating other types of forecasts is contained in paragraph 8.1.5.2.

8.1.4 AFFOR Structure and Support for Strategic Airlift.

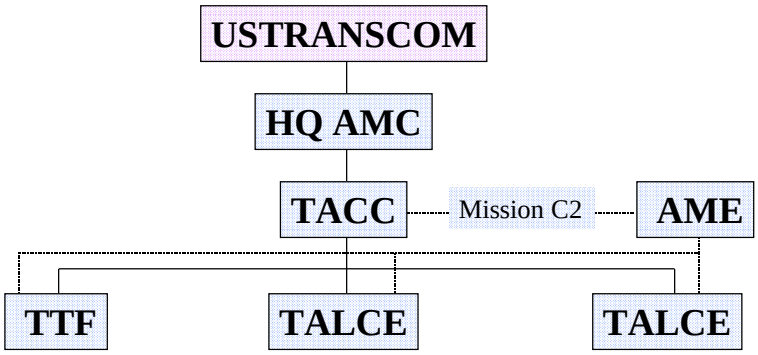


Figure 8-4. AFFOR Strategic Airlift Command Structure

- Air Mobility Command (HQ AMC/DOWX, DSN 576-5082) plans and coordinates weather support for AMC operations, establishes policies and procedures on weather readiness issues, and provides weather support to all strategic airlift operations via the following weather organizations and teams:

- Tanker Airlift Control Global Mobility Weather Flight (TACC/WXM, DSN: 576-4794/96, COM: 1-800-AIR-MOBL) provides weather support to AMC strategic airlift

operations from Scott AFB, IL. Provides centralized strategic air refueling forecasts for over-water refueling routes. The TACC's unclassified website is available at http://tacc.scott.af.mil/directorates/xow/wxhome.asp.

- Air Mobility Element (AME) provides the strategic air mobility C2 element. Monitors and coordinates USTRANSCOM-assigned strategic air mobility operations supporting a theater or AOR. In-theater focal point for strategic airlift. Works closely with the Airlift Coordination Cell to interface strategic airlift with theater airlift. Monitors and coordinates AMC deployed forces (TTF, TALCE) that support a theater commander.

- Tanker Airlift Control Element (TALCE) is a deployed AMC organization established at fixed, en route, and deployed locations that remains under AMC operational control (OPCON). The TALCE provides support to missions transiting locations where command and control, mission reporting, or required support functions are nonexistent. A typical TALCE is composed of an operational center and functional area mission support elements such as weather, aerial port, intelligence and logistics. When existing weather support is available at a deployed location, additional weather personnel may not be included with the TALCE. When included in the TALCE, combat weather teams (CWT) provide “first-in” weather support providing forecasting, observing and flight weather briefing services. Once a sustaining force is established, weather support responsibilities will shift from the TALCE to the sustaining force. The number of personnel assigned to the TALCE CWT is a function of: (1) the capabilities of the existing weather support infrastructure at the deployed location, (2) rate of strategic airflow and (3) duration of the mission. A typical TALCE CWT may have one officer and three dual-qualified forecasters, and may be tailored as required.

- A Tanker Task Force (TTF) will consist of two or more KC-10 or KC-135 aircraft to provide air refueling support to fighter deployments, air mobility operations, intercontinental bomber operations, theater employment missions, or training and exercise requirements. The TTF CWT provides forecasting and observing services along with staff weather support while remaining under AMC operational control (OPCON) when deployed outside the CINC's AOR. The number of personnel assigned to the TTF CWT is a function of: (1) existing weather support at the deployed location, (2) aircraft sortie rates, and (3) duration of the mission. A typical TTF CWT may consist of one officer and three dual-qualified forecasters, and may be tailored as required. The TTF normally changes operational control (OPCON) to the theater when deployed within the CINC's AOR.

8.1.5 Air Force Weather Employment Concepts.

8.1.5.1 Forecast Process.

- Air Force Weather's core competencies--collect, analyze, predict, tailor, and disseminate—provide the foundation for AFW's "forecast funnel" process

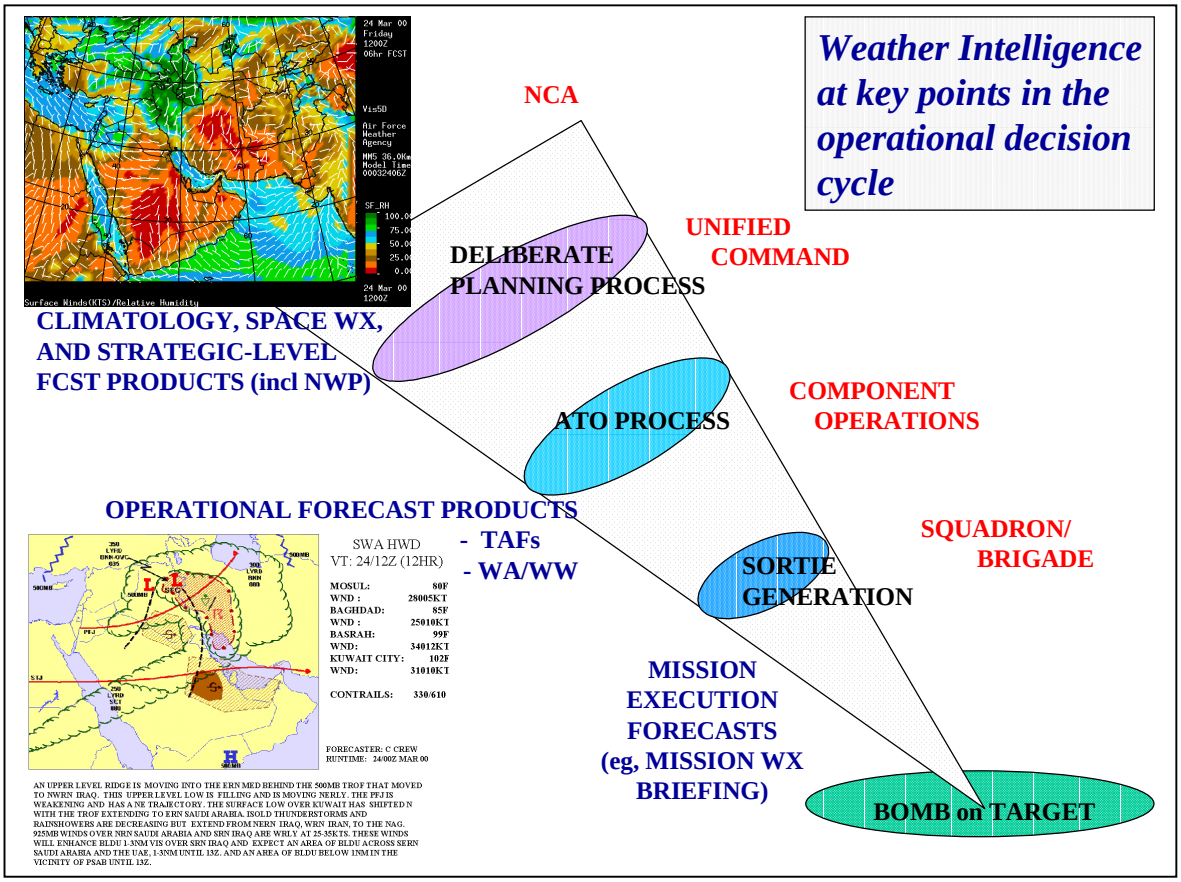


Figure 8-5. The Air Force Weather "funnel" forecast process

- Air Force Weather has aligned organizations to "funnel" the forecast process

  - Strategic centers (Air Force Weather Agency, AF Combat Climatology Center) provide strategic-level space and terrestrial weather support
    - > Products focused on global/hemispheric or long periods of time
    - > NWP model output, climatology, METSAT, mission forecasts, space environment data, and mission forecasts

  - Operational Weather Squadrons provide operational or theater-level terrestrial and space weather support
    - > Fine-scale weather forecast products within their Area of Responsibility
      - ◊ Products geared to the synoptic and mesoscale
    - > Produce Terminal Aerodrome Forecasts, weather warnings, regional visualizations

- Weather Flights (Combat Weather Teams) at base level provide tactical-level terrestrial and space weather support. CWTs are experts on how weather and the space environment impact missions and weapon systems
  > Provide direct support to the customer's mission
  > Collocated with warfighters, operators, and trainers
  > Provide mission execution forecasts (*e.g.*, flight weather briefings)

8.1.5.2 Coordinated Weather Support.

Air Force Weather offers guidance to coordinate weather support to missions involving more than one unit. Generally, the lead weather unit will be the one supporting the mission's command and control element (*i.e.*, the unit closest to the commander's go/no go decision). The lead weather unit is responsible for coordinating with all weather units supporting the operation to ensure a common and consistent forecast is used (reference AFI 15-126 and AFMAN 15-126).

Table 8-1. Determining Lead Air Force Weather Units for Multi-Unit Missions

Rule/Type of Mission	Designated Lead Weather Unit
1 / Joint missions	Joint METOC Officer defines wx support in an Annex H, Letter of Instruction (LOI), or message[1]
2 / Global Power	Wx unit supporting the ACC C2 element
3 / Coronet	Wx unit supporting the ACC C2 element
4 / Global Reach	Wx unit supporting the TACC C2 element
5 / Air refueling	Wx unit supporting the lead receiving aircraft unit
6 / JA/ATTs & DZ	Wx unit supporting the lead airlift aircraft unit
7 / LZ and land maneuver	Wx unit supporting the lead Army unit
8 / Deployed or transient	Wx unit assigned to support the unit at home station
Special Operations	Lead wx unit depends on nature of the operation[2]

Notes:
1. If the lead wx unit or a coordination process is not defined, use the guidance in Rules 2-9 to determine the lead weather unit.
2. Rules for missions with Special Operations Forces (SOF):
   a. When SOF operate with conventional forces under a CINC's control, the lead weather unit is determined using rules 1-8. SOF should use the Mission Control Forecast (MCF) and appropriate OWS products.
   b. SOF operating solely within SOF channels, will use their standard theater support.

8.2 Air Force METOC Equipment and Key Software

8.2.1 Hardware.

A deployed, fixed-site airfield requires systems that provide the capability to take 24-hour airfield observations, access a full suite of centrally produced weather forecast products, and generate mission execution forecasts. Equipment requirements are determined by the Air Force component theater weather planner and tasked to appropriate MAJCOMs. Descriptions and additional hardware are also detailed in Joint Publication 3-59.

- Tactical meteorological (TACMET) systems for airfield observations include:
  - AN/GMQ-33, Cloud Height Set. Self-contained, portable unit that determines and displays the base height of cloud layers directly overhead by the use of a laser
  - AN/TMQ-34, Meteorological Measuring Set. Portable, hand-held multi-sensor system that measures and displays standard elements of surface weather observations
  - AN/TMQ-36, Tactical Wind Measurement System. Self-contained, portable unit that provides measurement of wind speed and direction
  - Manual Observing System (MOS Kit). Collection of individual, hand held instruments for measuring standard elements of surface weather observations
  - AN/UMQ-12, MARWIN Tactical Upper Air Measuring Set. Automatic tracking ruggedized portable unit that provides upper air wind direction and speed, temperature, and relative humidity to an altitude of 30 km.

- Forecast support hardware includes:
  - New Tactical Forecast System (N-TFS). Upgraded computers and software in man-portable containers that will be the primary deployable METOC data handling system
  - AN/GRQ-27 Quick Reaction Communications Terminal III (QRCT III). Computer-based tactical weather communication system designed to provide support to Air Force and Army units. System includes HF radio and facsimile receiver for transmitting/ receiving teletype and graphics in either nonsecure or secure mode. Some Air National Guard (ANG) units still use QRCT/Goldwing systems
  - Weather facsimile and teletype systems. Commercial, off-the-shelf facsimile receiver/recorders to display teletype observations, weather map products, and imagery from weather satellites and worldwide HF broadcasts. Fielded systems include Alden 9315TRT, TRTR, and TRT-S
  - METSAT receivers. Various systems to ingest direct broadcast METOC imagery and derived data from DMSP, GOES, NOAA, METEOSAT, GMS, and other satellite systems. Fielded systems include the WRAASE receiver and the Small Tactical Terminal (STT)
  - AN/TMQ-43 Small Tactical Terminal (STT). The STT comes in three configurations: basic STT, enhanced STT, and JTFST (Joint Task Force Satellite Terminal). The STT is a small, deployable, computer-based satellite imagery

reception and analysis system, which can receive data from DMSP as well as civil polar orbiting and geostationary weather satellites
- Electronic SWO Kit (ESK). A laptop computer loaded with software (*e.g.*, Joint METOC Viewer) to access METOC dial-in databases and SIPRNET/NIPRNET (SAFWIN/AFWIN)
- Tactical Wx Radar (TWR). Deployable Doppler and non-Doppler weather radars for use at fixed sites. Examples include ITWR--Kavouras Doppler; TWR--Raytheon Doppler; and, Ellison, a highly-transportable non-Doppler radar
- Very Small Aperture Terminal (VSAT) and Tactical VSAT (T-VSAT). Provides in-garrison or deployed users the ability to receive critical weather information in a timely manner. AFWA produces or provides a wide range of weather products and sends them to a teleport facility for upload to the VSAT system. (Products are from multiple sources, including AFWA, the Navy and other US government sources (civil and military), commercial vendors, and allied weather agencies, and are available for subscription or one-time request.)

8.2.2 Software.

Deploying units also require software for remote data access and specialized customer support.

- AFWIN (Air Force Weather Information Network), SAFWIN (Secure AFWIN). Provides access to METOC products at AFWA (Offutt AFB) via NIPRNET/SIPRNET
- JMV (Joint METOC Viewer). Runs as a helper application for your web browser (NIPRNET or SIPRNET). Displays, in graphical format, the output of FNMOC's numerical meteorological and oceanographic models, as well as real-time, worldwide observations. JMV allows the user to create weather charts, overlaid images, looping fields, and briefing images. Available from FNMOC (NIPRNET or SIPRNET sites)
- Electro-optical tactical decision aid software. Target Acquisition Weather Software (TAWS) and Night Vision Goggle Operations Weather Software (NOWS) help develop weather impacts to missions employing IR-, TV-, and laser-guided weapons
  - TAWS is an EO weather decision aid that provides the operator several types of performance predictions for mission planning. TAWS computes lock-on and detection ranges based on pilot, targeteer, and weather forecaster inputs. Pilots enter the time and mission profile data, targeteers input target information (*e.g.*, composition, backgrounds, and dimensions), and the forecaster enters the atmospheric data
  - NOWS is an NVG weather decision aid that provides the operator several types of performance predictions for mission planning. NOWS computes illumination levels and detection ranges based on natural (moon and stars) and man-made illumination sources, as well as weather effects
- Internet software (Netscape Communicator, Microsoft Internet Explorer) to access other METOC data sources (NOAA, universities, commercial activities, *etc*.)
- Solar/lunar calculation support programs or websites

8.3 Air Force METOC Communications and Computers

Air Force METOC communication and computer systems are in accordance with C4I plans and instructions.

- *Tactical AFFOR Communications.* Information passed over tactical AFFOR communications systems feeds fixed base weather stations and various C4I systems that contain METOC data (TBMCS, AFMSS, GCCS). Data transfer can be accomplished through:
  - Hardwire data lines (dedicated or commercial)
  - SATCOM (T-VSAT, GBS, reachback, INMARSAT)
  - High Frequency broadcasts (HFRB, QRCT III)
  - SIPRNET/NIPRNET access

- *Strategic AFFOR Communications*
  - Since an AME is normally collocated with the AOC, communication capabilities are comparable to the AOCs
  - As a first in force, TALCE weather personnel deploy with very limited communication capabilities
    > Data/voice SATCOM is normally the primary and sometimes the only means of communication
    > When available, INMARSAT is used as a backup
    > May deploy with HF (QRCT) capabilities when an HF net is established
    > Dedicated hard lines (DSN or Commercial) are rarely available

  - A TTF will normally have dedicated circuits along with data/voice SATCOM capabilities

8.4 Air Force METOC Data

8.4.1 Air Force METOC Data Sources.

- There are several sources of METOC data within the Air Force tactical structure:

  - Fixed-site airfield observations
  - Mobile/remote weather teams
  - Aircrew debriefings and pilot reports
  - Radar (primarily tactical)
  - Satellite (METSAT)
  - Upper air observations (MARWIN)

- Deployed CWTs may or may not be tasked to take/disseminate surface and/or airfield observations. In some cases, the host nation takes the official airfield observation, and the host nation must make these observations available for dissemination via the Automated Weather Network (AWN). CWTs pass information to the responsible

OWS and may disseminate select information into the AWN, or post appropriate information on NIPRNET/SIPRNET homepages.

- METOC personnel can obtain pilot reports of weather conditions through aircrew debriefings. This information is used to verify mission forecasts and refine forecast products.

- The unclassified AWN is the main communication path for all Air Force collected METOC observations and forecasts. Also, an increasing amount of Air Force METOC data is being disseminated through NIPRNET/SIPRNET dial-in / homepage services.

- Special Weather Intelligence (SWI) Data. SWI is weather reports for locations that are not available in global broadcasts or through mutual exchange agreements. These data can be current observations, forecasts, PIREPS, SIGMETS, and other formatted METOC information. SWI is currently provided via various national and theater intelligence data systems. These data are and can be of particular value to operations centers for mission planning, en-route updates, and near real-time awareness of target area/mission weather during execution. Further information on types of data and available of connectivity to sources may be obtained by contacting a combatant command's Senior METOC Officer.

8.4.2 Air Force METOC Data Products

8.4.2.1 Air Force METOC Strategic Support

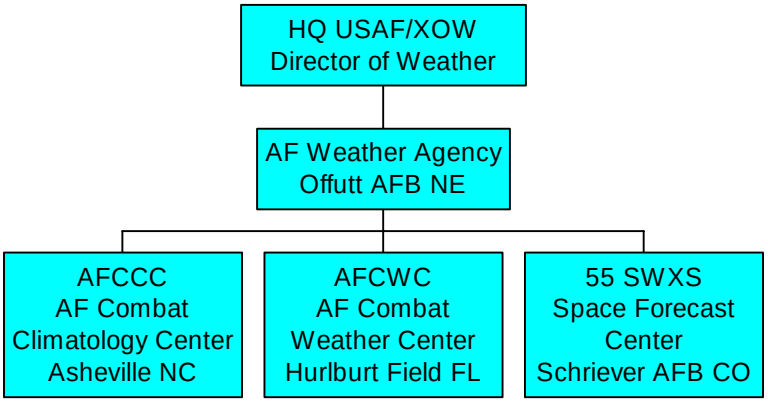


Figure 8-6. Air Force Weather Organization.

8.4.2.1.1 Air Force Weather Agency (AFWA).

- *Organization.* The Air Force Weather Agency is a Field Operating Agency (FOA) under the HQ USAF Director of Weather (HQ USAF/XOW), located at Offutt AFB, NE. AFWA resulted from the merger of Air Force Global Weather Central and Air Weather Service.

- *Mission.* Provide mission-tailored, worldwide decision assistance for warfighters, the National Command Authorities, and Air Force Precedence 1-1 programs controlled by the Secretary of the Air Force. Tailor products to meet a customer's critical weather thresholds and format (alphanumeric, vector graphic, TIFs/GIFs, raster scan, etc) according to customer's requirements. Provide aviation/maneuver parameters and applications to worldwide DOD agencies. DOD center of excellence for satellite meteorology.

- *Products and Services.* Most routine AFWA products are listed and described in the AFWIN or SAFWIN catalog of products. If what you want is not listed in the catalog or available from other agencies linked from (S) AFWIN, call the Operations Control Center Team Chief (OCCTC) at DSN 271-2586. AFWA may have added the product since the last update of the list, or may be able to provide the product via a Support Assistance Request (SAR). AFI 15-118, Requesting Specialized Weather Support, provides SAR procedures. The following is a general listing of the types of products available from AFWA.

  - Visualized products (GIF type images):
    > Up to 10-day theater outlook, based on customer thresholds for ceiling, visibility, and significant weather
    > Wind-chill and heat index forecasts
    > Standard level (surface to 200mb) forecasts
    > Icing and turbulence forecasts
    > Precipitation forecasts (amount, type)
    > Severe thunderstorm indices (*e.g.*, CAPE, Total Totals, etc.)
    > Low level wind shear forecasts
    > Surface temperature forecasts
    > Surface temperature change forecasts
    > Forecast Skew-Ts (for select locations)
    > Forecast relative humidity and wind cross sections (for select locations)
    > Surface wind vector/magnitude (for select theaters)
    > Contrail forecasts (for low, non, and high by-pass engine types)
    > Medium range forecast products (1000-500 mb thickness and 500mb heights/isotachs)
    > Jet stream forecasts
    > Absolute humidity

  - Satellite Products: visual, infrared, and some multi-spectral from GOES, DMSP, NOAA, GMS, and METEOSAT platforms. Availability varies with the theater in question. Products include 1.5 and 3 nautical mile resolution, with city overlays, geography, and SSMI/MSI derived areas of fog, thunderstorms, and surface wind speeds.

  - Charts and/or alphanumeric bulletins:
    > Point analyses

> Surface analyses/forecasts
> Surface pressure centers, fronts, and sensible weather analyses/ forecasts
> Upper air analyses/forecasts
> Satellite imagery/DMSP special sensor information
> Nephanalyses/cloud forecasts (bases/tops, total cloud amounts, and cloud layers)
> Ceiling, visibility, and precipitation forecasts
> AGROMET (precip/evapotranspiration/soil moisture) analysis estimates
> Snow and ice analyses
> Terminal aerodrome forecasts
> Meteograms (worldwide, based on the MM5 and MRF models)
> Synoptic discussion bulletins
> Effective downwind/trajectory messages
> Tropical storm positions/intensities
> Drop zone forecasts*
> Air refueling route forecasts*
> Low-level route forecasts
> Reconnaissance mission forecasts*
> Joint Operational Area Forecasts/Mission Planning Forecasts*
> En route hazards (*i.e.* turbulence, icing, and/or thunderstorms) information/forecasts
> Severe/advisory weather information
> Contrail forecasts (for low, non, and hi by-pass engine types)
> Anomalous propagation bulletins
> National Weather Service analyses/forecast products
> National Weather Service model output
> National Weather Service radar summaries

* Available via SAR

- *Product Dissemination*
  - Classified/unclassified
  - Dedicated/common user circuits
  - SIPRNET/NIPRNET access
  - FTP to servers/BBSs

- *Request Procedures.* Send requests for "normal" operational support to:

  Normal (CONUS) duty hours:
  AFWA/XOOR DSN (312) 271-1631/3/4
  106 Peacekeeper Drive, Ste. 2N3 comm. (402) 294-1631/3/4
  Offutt AFB NE 68113-4039 unclass fax: DSN (312) 271-1637
  Email: afwasar@afwa.af.mil; can also use "first_name.last_name@afwa.af.mil" if an individual's first and last names are known
  Secure email: xoor@safwin.offutt.af.smil.mil

For urgent, short notice requests, call the OCCTC:
AFWA 24-hour Point of Contact:
Ops Control Center Team Chief: DSN (312) 271-2586 / comm. (402) 294-2586
Secure voice: DSN (312) 271-6558 / comm. (402) 294-6558
Unclass fax: DSN (312) 271-5872 / comm. (402) 294-5872
Secure fax: DSN (312) 272-5426 / comm. (402) 232-5426
Email: afwaops@afwa.af.mil

Contingency requests for the AFWA Special Support Operations Branch (SSOB):
SSOB Branch Chief: DSN (312) 271-3072 / comm. (402) 294-3072
Unclass voice: DSN (312) 272-8139/271-6558 / comm. (402) 232-8139/294-6558
Secure voice: DSN (312) 272-8139/271-6558 / comm. (402) 232-8139/294-6558
Unclass fax: DSN (312) 271-6557 / comm. (402) 294-6557
Secure fax: DSN (312) 272-5426 / comm. (402) 232-5426
Email: sofwoc@afwa.af.mil
Secure email: sofwoc@afwa.af.smil.mil

Each Unified Command may have additional guidance and procedures for requesting joint METOC products and services in its AOR (*e.g.*, in Annex H of the CINC's OPLANs or OPORDs). It is important that Joint METOC Officers (JMOs) and deploying METOC personnel understand these Unified Command specific requirements by contacting the CINC SMO.

Web access
SIPRNET homepage: http://safwin.offutt.af.smil.mil
NIPRNET homepages:
AFWIN: http://www.afwin.afwa.af.mil (password required)
AFWA (FOA information): http://wwwmil.offutt.af.mil/afwa/

8.4.2.1.2 Air Force Combat Climatology Center (AFCCC).

- *Organization.* AFCCC, formerly known as the USAF Environmental Technical Applications Center (USAFETAC), is assigned to AFWA, a field operating agency (FOA) under the Air Force Directorate of Weather (HQ USAF/XOW). AFCCC is collocated with NOAA's National Climatic Data Center in the Federal Climate Complex in Asheville, NC.

- *Mission.* AFCCC develops and produces climatological and operational weather impact information by using international climatic databases to prepare environmental analyses to support:
  - Planning and execution of worldwide military operations of the Air Force, Army, Navy, Marine Corps, unified commands, and allied nations
  - Weather-sensitive, SECAF-controlled National Programs
  - Engineering design, testing, and employment of weapon systems

- *Products and Services*. See AFCCC/TN-95/005, Ch.2 for more details.
  - Aerial spray analyses
  - Bibliographies
  - Climatic summaries
  - Climatic briefs
  - Crosswind summaries
  - Precipitation summaries
  - Cloud data summaries
  - Tailored exercise support
  - Illumination data.
  - Low-level route climatology
  - Post-event analyses
  - Pressure reduction ratios
  - Simulation support
  - Refractive index analyses
  - Vector wind models
  - Graphical visualizations
  - Wind duration analyses
  - Technical publications
  - Atmospheric profiles
  - Atmospheric stability summaries
  - Modeled ceiling/visibility
  - Temperature/dew point summaries
  - Heating/cooling deg day summaries
  - Modeled diurnal curves
  - Electro-optical climatologies
  - Heating and cooling data
  - Lightning climatology
  - Mission success indicators
  - Pavement temperature summaries
  - Rainrate analyses
  - Range reference atmospheres
  - Raytrace diagnostic models
  - Upper air climatologies
  - Temperature duration summaries
  - Journal accession lists
  - Operational climatic data summaries
  - Wet-bulb globe temperature climatologies
  - Surface observation climatic summaries
  - Wind-stratified conditional climatologies
  - Daily temperature/precipitation summaries
  - Cloud-free/visible clear line-of-sight (CFLOS/VCLOS) probabilities
  - Point/small area; large/intermediate area; & regional descriptive climatologies
  - Engineering design and construction data
  - Environmental simulation (includes ceiling/visibility observations & forecasts and CFLOS)
  - Space Environmental Support System (SESS) climatology
  - Uniform Gridded Data Field (UGDF) historical data grids
  - Online climatology data and gridded climatology services (see Advanced Climate Modeling and Environmental Simulations (ACMES) on the unclassified and classified AFCCC homepages
    > NIPRNET address: http://www.afccc.af.mil (password required)
    > AFW Technical Library: http://www.afccc.af.mil/afwtl/afwtl.html
    > SIPRNET address: http://afccc.asheville.af.smil.mil/index.html
    > JWICS address: http://afccc.ic.gov

- *Request Procedures*
  - Unified Commands, Air Force, Army, and other government agencies:
    Send requests directly to:
    AFCCC/DOO
    151 Patton Ave, Room 120
    Asheville, NC 28801-5002
    Unclass fax: DSN 673-9024
    Email: afcccdoo@afccc.af.mil
    Phone: DSN 673-9004
    STU III: DSN 673-9003
    Commercial: (828) 271-4291
    24-hr beeper: DSN 673-9022
    Secure fax: DSN 673-9020

www: use the Support Assistance Request (SAR) form available at AFCCC's NIPRNET and SIPRNET homepages

- Navy and Marine Corps:
  > Routine requests to the nearest Naval Meteorology and Oceanography Center (IAW NAVOCEANCOMINST 3140.1 series).
  > Urgent requests to:
  Fleet Numerical Meteorology and Oceanography Center
  Detachment (FNMOD)
  Note: Send info copy to AFCCC/DO,
  151 Patton Avenue Room 120, Asheville, NC 28801-5002
  Phone: (704) 271-4232 STU-III: (704) 271-4852
  Fax: (704) 271-4672

- Requests for Tech Library (AFWTL) support:
  Phone: DSN 673-9019
  Commercial: (828) 271-4277
  Email: afwtl@afccc.af.mil or online (address above)

8.4.2.1.3 55 Space Weather Squadron (55 SWXS).

- *Operations and Products.* 55 SWXS, at Schriever AFB CO, provides space weather support to DOD forces world-wide. 55 SWXS maintains a 3-person, 24-hour crew that continuously monitors the space weather environment for conditions that could affect military operations. 55 SWXS provides a variety of products to help users plan for and minimize space weather effects. The mission of the 55 SWXS is transferring to HQ AFWA during the years 2000-2001.

- *Data Sources.*

  - 55 SWXS operates a network of six solar observatories, spread out around the world to watch for solar flares. It is the only network of its kind in the world that provides continuous, real-time reporting of solar events.
  - A global network of ionospheric sensors constantly measures conditions in the ionosphere.
  - Sensors on board DOD and commercial satellites monitor conditions in space.
  - A network of ground-based magnetometers determines space weather activity in the ionosphere and magnetosphere

- *Products*

  - 55 SWXS (and HQ AFWA) provide analyses, forecasts, and warnings of space weather phenomena that may impact DoD or enemy operations. These products are disseminated to customers worldwide. The products identify the state of the space weather environment and focus on phenomena that may affect communications, satellite operations, space tracking, navigation, and intelligence collection

- Space weather products in support of communications include analyses and forecasts of ionospheric conditions that affect high frequency (HF) communications and ultra high frequency (UHF) satellite communications (SATCOM). Product contents include, but are not limited to, predictions of usable frequencies for point-to-point HF communications and predictions of space weather-caused disruptions to UHF SATCOM

- Space weather products in support of satellite operations include analyses and forecasts of ionospheric and magnetospheric conditions that may affect the ability of a satellite to perform as expected. Product contents include analyses and predictions of energetic electrically-charged particles fluences and fluxes (the number of charged particles bombarding a satellite). In those cases that anomalous behavior within a satellite is reported by satellite controllers, space weather products also include assessments of whether or not the space weather environment was disturbed enough to cause the anomalous behavior

- Space weather products in support of space tracking include analyses and forecasts of ionospheric conditions that may affect the ability of ground-based space tracking radars to perform as expected. Product contents include, but are not limited to, correction factors required to account for the ionospheric-induced errors in tracking radars

- Space weather products in support of navigation include analyses of ionospheric conditions that may reduce the positional accuracy of single-frequency Global Positioning System (GPS) applications. Product contents include geographic maps that depict locations where single-frequency GPS accuracy is most likely to be affected by large ionospheric-induced positional errors

- Space weather products in support of intelligence collection include a variety of classified products to assist customers in identifying when, how, and how much space weather is affecting both friendly and adversary operations

- *Product availability*
  - Space weather products are available on AFWIN (password required; click a region, then go to "Space Weather") and SIPRNET (www.55swxs.spacecom.smil.mil/index.html)

8.4.2.2 Air Force METOC Theater (Operational) Products.

Each Operational Weather Squadron (OWS) supports its theater by providing regional and theater weather guidance for the planning and execution of Air Force and Army operations in their supported CINC's AOR. The OWS Combat Operations Flight (which can deploy forward, if required) provides decision assistance to USAF and Army C2 activities at the operational level. Each OWS also manages the weather observing collection strategy for its region. To contact the theater hubs, see the organizational listing below (paragraph

8.5.2). Combat Weather Teams (CWTs) use OWS guidance and products to develop mission-specific planning and execution forecasts, maintaining a constant meteorological watch (metwatch) for briefed missions.

- *Operational Weather Squadrons* provide 24/7, operational-level aerospace weather support to operational units assigned within and/or deployed into its AOR. Products include Terminal Aerodrome Forecasts (TAFs), visualization forecast products for the theater that support CWT mission execution forecasts (*e.g.*, air refueling, drop zone, low-level routes), tactical decision aid forecasts, and weather watches and warnings for resource protection

- The Combat Operations Flight is the primary forecast center for day-to-day operations in the AOR--as such, they produce theater guidance, discussions, analysis, TAFs, and resource protection products, and are poised to provide additional forecast support during transition to deployed operations. Each OWS can provide these additional products:

  - Regional/theater forecast discussion bulletin
  - Horizontal weather depiction
  - Surface weather analysis
  - Military Weather Advisory (MWA)
  - Flight Hazards Advisory
  - Flight weather briefing
  - Pilot-to-Metro Service (PMSV) radio
  - Metwatch

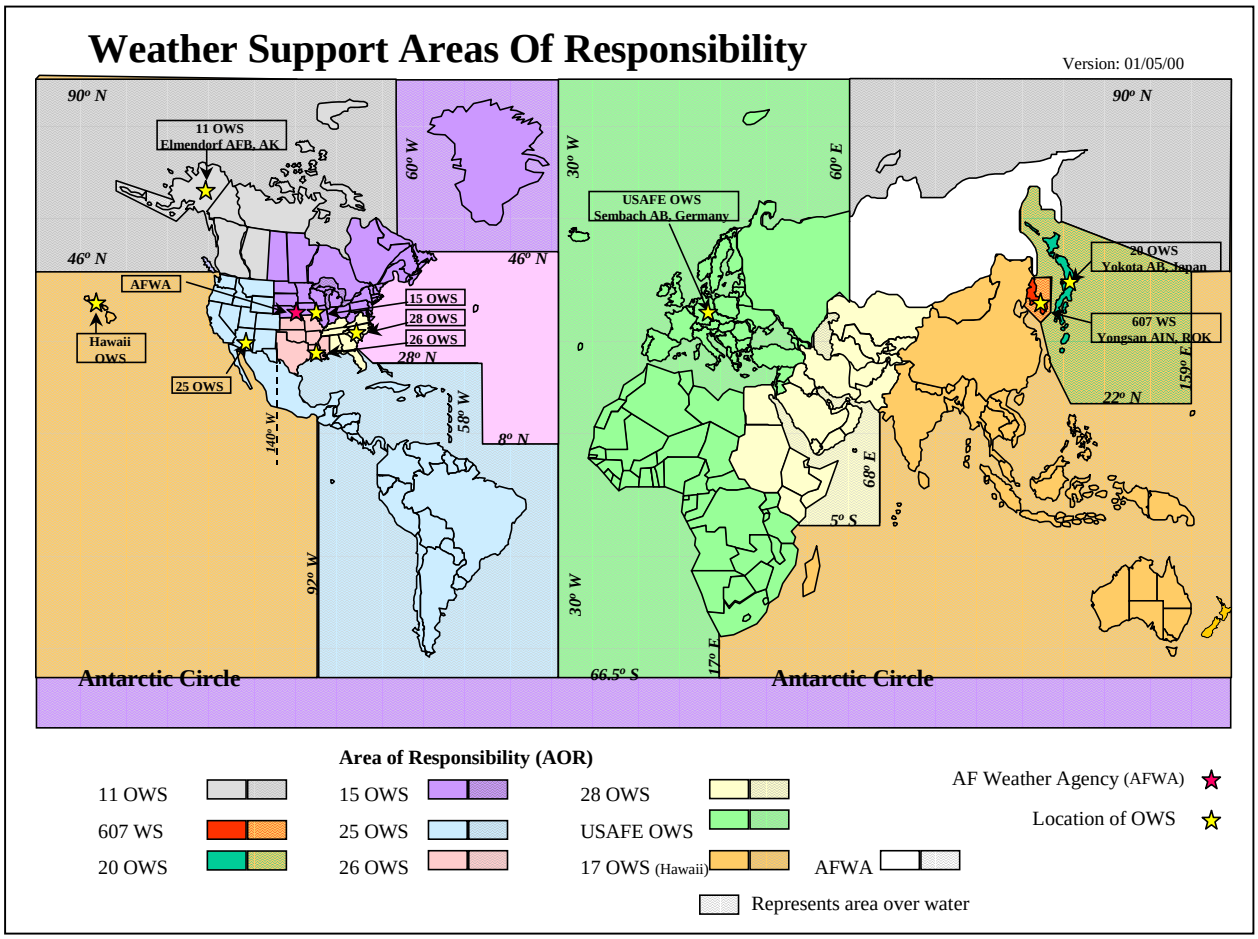


Figure 8-7. Air Force Operational Weather Squadron Areas of Responsibility

8.4.2.3 Air Force Mission Execution (Tactical) Products.

Combat Weather Teams supported by their respective OWS use OWS guidance and products, plus their access to highly perishable, real-time weather observational data, to develop mission-specific planning and execution forecasts, and to maintain a constant metwatch for those missions. The CWT's primary role is to develop accurate weather products to enhance mission planning and execution; secondarily, they may provide surface and upper air observations (as required) at their location to implement the collection strategy coordinated with the OWS. The CWT is capable of providing the following products:

- Mission planning forecast
- Mission execution forecast (launch, enroute, target, and recovery)
- Surface observations (as required)
- Upper air observations (as tasked)
- Supervisor of Flying (SOF) support
- Flight/staff weather briefings
- Metwatch

- PMSV. The CWT provides PMSV for all local missions; the OWS provides PMSV service to transient aircrews. The CWT may supplement this support if the OWS PMSV cannot be accessed

8.5 Key Air Force METOC Organizations

The *Air Force Observer* magazine publishes an annual Almanac that provides phone and fax numbers and email addresses for most Air Force weather organizations. Contact AFWA Public Affairs (DSN 272-8166 / comm. (402) 232-8166, observer@afwa.af.mil, or look on the AFWA/PA homepage, http://wwwmil.offutt.af.mil/afwa/) for a copy of the latest issue.

8.5.1 USAF Strategic Weather Centers.

- *Air Force Weather Agency (AFWA)—Offutt AFB NE*
  NIPRNET: http://wwwmil.offutt.af.mil/afwa
  DSN (312) 271-2586 / comm. (312) 294-2586; secure (312) 272-6558
  AF Weather Information Network:
  NIPRNET: http://www.afwin.afwa.af.mil (password required)
  SIPRNET: http://safwin.offutt.af.smil.mil

- *AF Combat Climatology Center (AFCCC)—Asheville NC*
  NIPRNET: http://www.afccc.af.mil (password required)
  SIPRNET: http://afccc.asheville.af.smil.mil/index.html
  DSN 673-9004 / comm. (828) 271-4291; secure 673-9003

- *55 Space Weather Squadron (55 SWXS)—Schriever AFB CO*
  NIPRNET: http://afwin.afwa.af.mil (password req'd; click a region, then "Space Weather")
  SIPRNET: http://www.55swxs.spacecom.smil.mil/index.htm
  DSN 560-6312 / comm. (719) 567-6312

- Tanker Airlift Control Center (TACC)--Scott AFB IL
  NIPRNET: http://tacc.scott.af.mil/directorates/xow/wxhome.asp
  DSN 576-4794/96 / comm. 1-800-AIR-MOBL

8.5.2 USAF Operational Weather Squadrons and Regional Support.

- *ACC Weather Support Unit—Langley AFB VA*
  NIPRNET: http://www.acc.af.mil/weather
  DSN 574-2007/2008 / comm. (757) 764-2007/2008
  Email aos.aow@langley.af.mil; accaow@langley.af.smil.mil
  SIPRNET: http://wwwacc2.langley.af.smil.mil/xo/ (link to Weather PPT presentation)

- *Korean Operational Weather Squadron (607 WS)—Yongsan KO*
  NIPRNET: http://607ws.yongsan.af.mil

DSN 315-725-6155/6158 / comm. 011-822-7915-6155/6156; secure 315-725-3517/6509
Email 607ws@emh2.korea.army.mil

- *Alaskan Operational Weather Squadron (11 OWS)—Elmendorf AFB AK*
  NIPRNET: http://weather.elmendorf.af.mil
  DSN 317-552-2719 / comm. 907-552-2719; secure 317-552-1022
  Email dugan.philip@hqexch1.elmendorf.af.mil (webmaster)

- *USAFE Operational Weather Squadron (European hub)—Sembach AB GE*
  NIPRNET: http://131.54.133.238/index.html or http://ows.sembach.af.mil
  SIPRNET: http://204.21.12.42
  DSN 314-496-6114/6116 / comm. 011-49-06302-67-6116; secure 314-496-6151/6190
  Email ows.ops@sembach.af.mil; usafe.ows@ramstein.af.smil.mil

- *Davis-Monthan Operational Weather Squadron (SOUTHCOM hub—25 OWS)—DM AFB AZ*
  NIPRNET: http://25ows.dm.af.mil (password required);
  SIPRNET: http://204.20.143.163
  DSN 228-2027/2149 / comm. (312) 228-2027/2149
  Email Robert.Hamilton@dm.af.mil

- *Shaw Operational Weather Squadron (SWA hub – 28 OWS)—Shaw AFB SC*
  NIPRNET: http://131.46.188.21 or http://28ows.shaw.af.mil;
  SIPRNET: http://204.20.12.198
  DSN 965-0588 / comm. (803) 895-0588; secure 965-0565
  Email shaw.ows.swa@shaw.af.mil; shaw.ows.swa@rmh.shaw.af.smil.mil

- *Barksdale Operational Weather Squadron (26 OWS)—Barksdale AFB LA*
  NIPRNET: http://26ows.barksdale.af.mil
  DSN 781-0209/4004 / comm. (318) 456-0209/4004

- *Scott Operational Weather Squadron (15 OWS)—Scott AFB IL*
  NIPRNET: http://15ows.scott.af.mil;
  TACC is at http://tacc.scott.af.mil/directorates/xow/wxhome.asp
  DSN 576-4794 / comm. (618) 256-4794

- *Japan Operational Weather Squadron (20 OWS)--Yokota AB JA:* IOC Apr 01
  Yokota Base Weather DSN (315) 225-9005
  NIPRNET: http://www.yokota.af.mil/weather/index.htm

- *Hickam Operational Weather Squadron (17 OWS):* IOC Jan 01
  Hickam Base Weather DSN (315) 449-6262
  NIPRNET: http://www.hickam.af.mil/Weather/index.htmll

8.5.3 Key USAF METOC Staff Organizations.

- *Air Combat Command (ACC/XOW)—Langley AFB VA*
  NIPRNET: http://xo.acc.af.mil/xow
  DSN 574-8452/8456 / comm. (757) 764-8452/8456; secure 574-3603

- *US Air Forces Europe (USAFE/DOW)—Ramstein AB GE*
  NIPRNET: http://www.usafe.af.mil/direct/do/dow-miss.htm
  DSN 314-480-7001/7564 / comm. (49) 6371-47-7001/7564

- *Pacific Air Forces (PACAF/DOW)—Hickam AFB HI*
  NIPRNET: http://www2.cidss.af.mil/dow/dow_menu/index_dow.html
  DSN 449-6174/8481 or 448-1533/2033

- *Air Mobility Command (AMC/DOW)—Scott AFB IL*
  NIPRNET: http://www.amc.af.mil/do/dow/dow.htm
  DSN 576-4337 / comm. (618) 256-4337

- *Air Force Combat Weather Center (AFCWC)—Hurlburt Field FL*
  NIPRNET: http://www.hurlburt.af.mil/afcwc
  DSN 641-5700 / comm. (850) 881-5700

- *AF Space Command (AFSPC/DORW)—Peterson AFB CO*
  NIPRNET: http://midway.spacecom.af.mil/weather/index.htm
  SIPRNET: http://www.vandenberg.af.smil.mil/recent.html
  DSN 692-3143 / comm. (719) 554-3143

- *AF Special Operations Command (AFSOC/DOOW)—Hurlburt Field FL*
  DSN 579-5640 / comm. (904) 884-5640

- *Weather Support Systems Cadre (WSSC) East—Robins AFB GA*
  NIPRNET: http://wssc.robins.af.mil
  DSN 468-5934 / comm. (912) 926-5934 / (800) 344-5625

- *Weather Support Systems Cadre (WSSC) West—Tinker AFB OK*
  NIPRNET: http://bncc.tinker.af.mil/wssc31/Wssc.htm
  DSN 844-2246/2247 / comm. (405) 734-2246/2247

- *USAFE Weather Support Systems Cadre (WSSC)--Sembach AB GE*
  Contact the USAFE WSSC by calling or emailing the USAFE OWS at Sembach

Chapter 9 - U.S. Army METOC

This chapter describes U.S. Army organizational structure, command relationships, and support capabilities and requirements, including typical Army METOC and communications equipment.

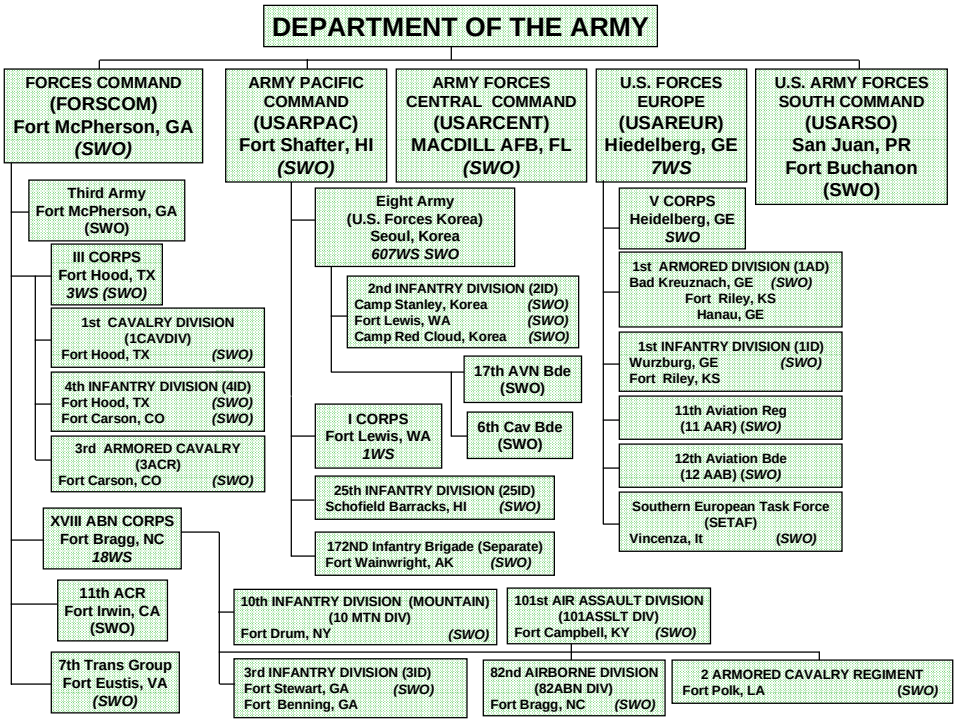


Figure 9-1. Weather Support to Army Operational Forces

9.1 Army Forces (ARFOR)

- Figure 9-1 depicts weather support to Army operational forces. Combat weather teams (CWTs) provide in-garrison and deployed support.

- The U.S. Air Force provides weather support to the Army, per the agreement document in the National Security Act of 1947.

- FM 34-81/AFJPAM 15-127 details ARFOR organizational structure, command relationships, and basic weather support responsibilities and capabilities. AR 115-10/AFJI 15-157 identifies specific service logistics support responsibilities to Army-support weather teams.

- AFI 15-126 details observing and forecasting roles and responsibilities for all Air Force Weather Strategic Centers, Operational Weather Squadrons, and Combat

Weather Teams. Combat Weather Teams are at the center of operational weather support to Army forces.

- Army artillery units have organic ARTYMET teams, which can provide periodic upper air observations. These units are normally at division-level artillery units or higher but can be requested through the Army component.

- An Air Force Specialty Code (AFSC) indicates overall enlisted or officer weather skill level. Weather officer AFSCs are 15W4 and 15W3. 15W4 is usually an O4-O5 with at least 12 years of experience. 15W3 is O2-O3 with 1 to 11 years of experience. 1W071A is usually an E6-E8 forecaster with 6 to 20 years of experience. The "A" suffix indicates a graduate of forecaster school. 1W051A represents E4-E5 forecasters with 3 to 10 years of experience. Army CWTs will typically be manned with 15W3s, 1W071As, and 1W051As.

9.1.1 Army Employment Concepts.

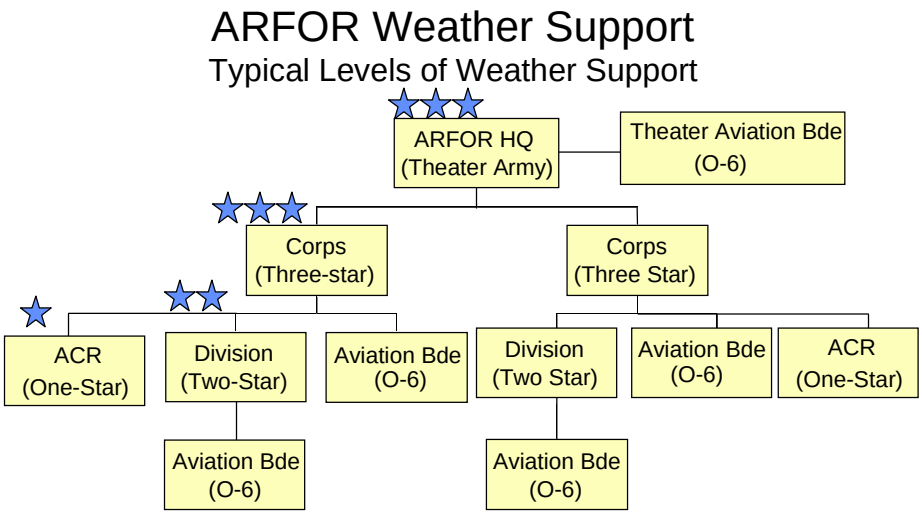


Figure 9-2. ARFOR Organization

- Corps Weather Support: 12 personnel (2 officers, 10 enlisted), broken out as follows:
  - Staff Weather Officer (SWO) (15W3/4)
  - Assistant SWO (15W3)
  - 24 hour Operations (6 x 1W071A/51A)
  - 24-hour Deep Operations Cell Support (2 x 1W071A/51A)
  - 24 hour OBS Augmentation (location TBD) (2 x 1W071A/51A)
  - Subordinate Aviation Brigade (1 officer, 8 enlisted--see below)

  - Typical Equipment: AN/GMQ-33, AN/TMQ-34, Multiple Subscriber Equipment (MSE) telephones, Alden 9315 TRTs, Maneuver Control System (MCS) terminal access, New Tactical Forecast System (N-TFS), AN/TMQ-43 (Small Tactical Terminal or STT), and AN/TMQ-40 (Integrated Meteorological System or IMETS; see Chapter 8 or Joint Pub 3-59 for equipment descriptions)

- Divisional Weather Support: 8 personnel (2 officers, 6 enlisted), broken out as follows:
  - Staff Weather Officer (SWO) (15W3/4)
  - Assistant SWO (15W3)
  - Operations (4 x 1W071/51A)
  - Operations/Observing Augmentation (2 x 1W071A/51A)
  - Subordinate Aviation Brigade (1 officer, 8 enlisted--see below)
  - Typical Equipment: AN/GMQ-33, AN/TMQ-34, MSE telephones, Alden 9315 TRTs, MCS, N-TFS, STT, and IMETS (see Chapter X.X for equipment descriptions).

- Corps and Division Aviation Brigade Weather Support: 9 personnel (1 officer, 8 enlisted), broken out as follows:
  - SWO (15W3/1W071A)
  - 24 hour Operations (2 x 1W071A/51A)
  - 24-hour Operations (2 x 1W071A/51A)--could pull out to support 1 BN
  - 24-hour Operations (2 x 1W071A/51A)--could pull out to support 1 BN
  - Landing Zone (LZ) OBS Augmentation (location TBD) (1 x 1W071A/51A)
  - Typical Equipment: AN/GMQ-33, AN/TMQ-34, MSE telephones, Small Tactical Terminal (STT), Tactical Very Small Aperture Terminal (T-VSAT), laser range finder, AN/TMQ-40 IMETS x 3 (1 IMETS-H, 2 x IMETS-L), and vehicles, weapons and Common Table of Allowance – 50 (TA-50) personal issue, tactical equipment and MCS terminal access

9.2 Army METOC Equipment and Key Software

9.2.1 Hardware.

- Air Force provides all tactical meteorological (TACMET) sensing equipment.
- The Army provides Table of Organization and Equipment (TOE) equipment (including vehicles, protective masks, and weapons) and TA-50 (personal equipment).
- Integrated Meteorological System (IMETS, AN/TMQ-40). Army-fielded system consists of weather analysis and forecast system, plus tactical decision aids for the commander. Designed to automate decision aid processes and provide information into existing Army command and control systems
- Air Force-provided Tactical VSAT, a deployable communications system, to provide the means to gather weather data for the IMETS
- New Tactical Forecast System (N-TFS)
- Small Tactical Terminal (STT)

9.2.2 Software.

- IWEDA (Integrated Weather Effects Decision Aids). Set of software decision aids for support to Army tactical units. IWEDA produces categories of impacts on friendly and enemy military systems/operations based on weather thresholds.
- Electro-optical decision aid software, including Target Acquisition Weather Software (TAWS) and Night Vision Goggle Operations Weather Software (NOWS). Software provides target acquisition capabilities based on observed or forecast weather parameters, including automated weather data ingest. Can be used to exploit capabilities/limitations of friendly electro-optical weapons systems. Modules include target acquisition ranges for visual & IR systems, thermal crossover times, and target to background contrast information.
- Enhanced MM5 model output from AFWA or an Operational Weather Squadron (OWS), including gridded mesoscale forecast fields for the Area of Operation and Area of Interest, which will populate a database to run IWEDA. As a backup, the Battlefield Forecast Model (BFM), a complex meteorological model that incorporates terrain, battlefield weather observations, and centrally produced boundary conditions ,will produce gridded mesoscale forecast fields out to 6 hours until the enhanced MM5 fields can be ascertained.

9.3 Army METOC Communications and Computers

- GCCS/TACLAN
- NIPRNET/SIPRNET/JWICS
- STACCS (Standard Theater Army Command and Control System). The Army's primary command and control software. Used primarily as an electronic mail system, including file transfer protocol (ftp) capability. The Army’s Global Command and Control System (GCCS-A) will replace this system in the near future.
- Tactical Very Small Aperture Terminal (T-VSAT). An Air Force-provided and maintained, commercial off-the-shelf satellite communications system to receive alphanumeric, graphic, and gridded METOC data transmitted by AFWA and Operational Weather Squadrons (OWSs) via the Air Force Weather VSAT network. Provides for integration into IMETS operations
- NAMIS. A German satellite-based, two-way communications system used to receive alphanumeric and graphic weather data in EUCOM AOR. NAMIS is a NATO system.
- MSE (Multiple Subscriber Equipment). Army multi-channel communications network. Weather teams use it primarily for phone and fax communications.
  - MCS (Maneuver Control System). Sub-component of MSE for command and control. Terminal equipment and software used to connect with other elements of the MSE.
- TROJAN SPIRIT (Special Purpose Integrated Remote Intelligence Terminal). A HMMWV-based processing and dissemination system which uses C-band and Ku-band SATCOM connectivity for worldwide service to deployed and split-based operations. SPIRIT provides all source dissemination capabilities as well as secure voice, fax, and data. IMETS Block II system includes TCP/IP connectivity capability

allowing use of the TROJAN SPIRIT communications path on a non-interference basis. IMETS Block I system upgrade will also add TCP/IP capability.

- GCCS-A (Army Global Command and Control System). Army component of GCCS. Army's tactical link into the SIPRNET.

9.4 Army METOC Data

9.4.1 Army METOC Data Sources.

The US Air Force provides the bulk of weather support required by the Army. This includes direct support to Army garrisons provided by USAF Operational Weather Squadrons (OWSs) in accordance with AFI 15-126, Aerospace Weather Operations. Air Force Army weather support CWTs provide operational weather support to assigned Army customers during exercises, training, contingencies, and war. In addition to the forecasting and observing support provided by Air Force combat weather teams (CWT), the Army has organic resources which provide supplemental reports of METOC conditions. The following represents the most significant sources of weather data within the Army tactical structure: ARTYMET sections, Air Traffic Service (ATS) units, engineer units (FALOP), ground reconnaissance and surveillance elements (FALOP), imagery interpretation elements, brigade and battalion intelligence personnel (FALOP), and aviation squadrons/brigades.

Each Army element possesses a limited measuring capability designed to meet its own immediate needs. Consequently, their weather observing capabilities are supplemental to their primary mission. They should not be viewed as a replacement or substitute for USAF CWT support. USAF weather observation responsibility ends at the division Command Post (CP).

- *Artillery Meteorological Sections.* ARTYMET sections provide meteorological data for artillery firing units. They also provide upper-air observations and artillery limited surface observations (ALSOs) to Air Force CWT.

  - ARTYMET sections are organized to support the ballistic meteorological requirements of artillery units. Each division artillery (DIVARTY) meteorological section and separate brigade meteorological section accompanies its own artillery. Each field artillery brigade has a meteorological team assigned and deployed where it can best support overall meteorological requirements. Other meteorological sections are deployed where they can best acquire the data needed. For instance, the need for fallout meteorological messages requires that one meteorological section be usually designated to produce fallout data.

  - Meteorological sections are located where they can best sound the atmosphere through which weapon trajectories will pass. The section should be well forward and within the general proximity of a compatible communications facility. Considerations in selecting the position for a meteorological section are:

> Prevailing winds
> Location of artillery units
> Communications facilities and capabilities
> Administrative support
> Local security

- ARTYMET sections are equipped to perform electronic and visual upper-air observations employing a balloon-sounding method. Normally, they are equipped with FM radio and Multiple Subscriber Equipment (MSE) communications.

- ARTYMET sections in a corps area communicate with each other and exchange data on the corps ARTYMET net. Artillery obtain meteorological data by monitoring this net at specified times. DIVARTY units may also obtain meteorological data over the DIVARTY combat net radio (CNR) system using the Single-Channel Ground and Airborne radio System (SINGARS), a secure FM radio with data handling capability, and through tactical fire direction computer system (TACFIRE) automatic data processing (ADP) systems.

- ARTYMET sections sound the atmosphere to heights of 98,424 feet (30,000 meters), day or night, and in all types of weather except during severe surface winds. A limiting factor is time required for a sounding balloon to reach a required height. Where high altitude soundings and several types of messages are required, meteorological sections are capable of sounding the atmosphere every 4 hours. A meteorological section in position is capable of producing a ballistic message for light artillery 30 minutes after releasing the balloon. The minimum time required to produce a maximum height fallout message is about 2 hours. If electronic equipment fails, sections have an alternate, but limited, method of measuring upper-air winds by observing pilot balloons (PIBALs). Upper-air densities and temperature are computed by using climatological tables with the current surface values of each element (assuming there is no low cloud cover).

- All ARTYMET sections are trained to produce:
  > Ballistic meteorological messages
  > Computer meteorological messages
  > Fallout messages
  > Upper-air data for transmission to AWN / MIST
  > Target acquisition meteorological messages
  > Limited surface weather observations

- *Air Traffic Service (ATS) Units.* ATS units may have weather observing instruments to measure surface pressure, temperature, and surface wind velocity. In addition, aircrews, flight operations personnel, and control tower operators visually estimate horizontal visibility and obstructions to visibility, as well as observe and report such special phenomena as lightning, thunderstorms, and tornadoes. Control tower operators assigned to ATS units are trained by Air Force weather personnel to take limited weather observations.

- *Engineer Units.* Engineer elements can measure surface pressure, temperature, humidity, and precipitation to determine the effects of weather on the terrain. The engineers can provide stream flow measurements and predictions of river stages and floods.

- *Ground Reconnaissance and Surveillance Elements.* Cavalry units provide the corps and division principal ground reconnaissance capability. Cavalry and maneuver battalions have organic ground reconnaissance capability that may be used to obtain information related to weather, terrain, and overall environmental conditions requested by the G2 or S2. In addition, long-range surveillance units (LRSUs) at division and corps may be required to take weather observations deep across the forward line of own troops based on specific weather requirements meeting the given situation.

- *Imagery Interpretation Elements.* These units can provide information on visibility, cloud cover, trafficability, and flooding.

- *Armored Cavalry Regiment (ACR), Brigade, Battalion, and Squadron Intelligence Personnel.* The Army G2 tasks ACR, brigade, battalion, and squadron intelligence officers to provide weather observations as part of the FALOP. The frequency of observations depends on the intelligence preparation of the battlefield (IPB) process, which identifies critical areas where adverse weather may have a major impact on Army weapons, personnel, and tactics. High priority must be placed on these messages to transmit them immediately to the SWO at the division main CP.

- *Forward Area Limited Observing Program (FALOP).* Doctrinally, the Army is responsible for collecting weather and environmental data forward of the division main CP in support of Army operations. For this reason, a FALOP is required. FALOP is a weather data collection program. The S2 at brigade transmits the FALOP observations promptly to the division. These observations require a high priority to ensure transmission within 15 minutes of the time they are taken. The G2 specifies the FALOP observations that are required and ensures that these observations are passed directly to the USAF CWT, which handles further distribution. The FALOP observations serve as the basis for the G2 and SWO to determine the effects of adverse weather on Army systems, operation, and tactics.

  - The CWT incorporates FALOP with all other sources of information, when they are available, to make a complete weather picture of the battlefield at the time of the observation. In some cases the FALOP may be the only source of observations in forward areas and is the key to forecasts tailored to the user's needs. The collected data in a FALOP weather observation include:

    > Measurement of temperature
    > Wind direction and speed
    > Cloud information

> Visibility estimate
> Type of precipitation and intensity
> Atmospheric pressure
> Road, ground, and water conditions

- The FALOP observations are disseminated through intelligence reporting channels or other communications links. The approximate time needed to take, record, encode, and transmit a single observation is 15 minutes.

- *Aviation Squadrons/Brigades.* Aircrews provide en route pilot reports via radio to ATS units and/or USAF CWTs; or, upon return from the flight, to the USAF CWT operating location for inclusion in their forecast products.

- *USAF Combat Weather Teams (CWT)*

  - The following represent the most significant sources of METOC data provided by USAF CWTs attached to Army organizations:

    > Echelon Above Corps (EAC)
    > Corps
    > Division
    > Aviation Brigades
    > Separate Brigades
    > Armored Cavalry Regiments
    > Ranger Regiment
    > Special Forces Groups and Battalions
    > Special Operations Aviation Regiment

  - CWT composition varies depending on the nature and duration of the Army mission and the theater of operations. CWTs are composed of one or more of the following: Staff Weather Officer, officer and noncommissioned officer forecasters, weather observers, and administrative specialists.

  - METOC data produced or collected by these units include surface weather observations, upper air observation produced by Army units, pilot reports, FALOP produced by Army units, and terminal forecasts.

- *Communications procedures.* Since Army units are mobile, locations must be included as part of the METOC report; consequently, the Army requires these reports to be classified and transmitted over secure communications channels. Within the Army structure, secure METOC communications are passed from IMETS over MCS, MSE, or secure local area networks (LANs) within the battalion or brigade Tactical Operations Center (TOC) or CP. IMETS transmits to the JMO or OWS using SIPRNET through the MSE connection. This echelon will relay the data to the

supporting MFC via available secure means. IMETS also provides connectivity with Army C2 systems.

9.4.2 Army METOC Data Products.

9.4.2.1 Army METOC Centralized Products.

- Army METOC organizations produce no "centralized" products. They receive strategic weather products from AFWA, AFCCC, or FNMOC

9.4.2.2 Army METOC Theater Products.

- METOC theater products are produced by the supporting OWS. METOC theater products typically include graphical products, such as horizontal weather depictions and military weather advisories. These products are produced on a daily basis. Other special METOC theater products needed from an OWS must be well coordinated as part of the typical exercise or crisis planning functions.

- Army units such as I Corps, III Corps, or XVIII ABN Corps may be tasked to form the core of a Joint Task Force. Under this scenario, units such as the 1st Weather Squadron (1 WS), 3rd WS, or 18 WS would likely be tasked to form the JTF Weather Cell and be required to establish requirements for, or produce and/or disseminate, JTF-level weather products to lower echelons in-theater and back to the supporting OWS or Navy METOC Center. In many cases, the supporting OWS or Navy METOC Center will issue the Joint Operational Area Forecast (JOAF), with portions of the JOAF designed to support Army operations.

- Army Tactical Operational Area Forecast (TOAF). The TOAF serves as the foundation for operational support to Army customers; it may be a subset of the JOAF, tailored to fit Army operations. The TOAF is written to address specific regions of operations, such as "Area A" for V Corps and "Area B" for III Corps. Staff Weather Officers (SWOs) at their field locations tailor the TOAF to their supported customers' operational thresholds.

9.4.2.2.1 Army CWT Products.

- Army CWTs produce customer-oriented, mission execution forecasts and briefings used directly by their customer. These can include but are not limited to drop zone forecasts, aircrew briefings, METOC impacts to operations briefings, and chemical downwind messages (CDMs).

  - CDMs are usually produced by the CWT in coordination with their Army unit's Nuclear, Biological, Chemical (NBC) section. AFWA provides the atmospheric data necessary to run dispersion models within the CONUS and OWSs for OCONUS locations. The CWT receives the data via T-VSAT, SIPRNET,

NIPRNET, TROJAN SPIRIT, or other common user communications systems and routes the data to the NBC unit for incorporation into local dispersion models.

9.5 Key Army METOC Organizations

9.5.1 Key Army organizations that may form the core for Joint Task Forces.

- *18th Weather Squadron, Ft Bragg NC*
  NIPRNET: http://www.bragg.army.mil/http://www-18ws/index.htm
  DSN 239-3150/3151 / comm. (910) 432-3150/3151

- *3rd Weather Squadron, Ft Hood TX*
  NIPRNET: http://www.hood-pao.army.mil/3dASOG_3dWS/wthr.htm
  DSN 738-1190/1313 / comm. (254) 288-1190/1313

- *1st Weather Squadron, Ft Lewis WA*
  NIPRNET: http://www.lewis.army.mil/1WS
  DSN 357-7061/5967 / comm. (253) 967-7061/5967

- *U.S. Army Europe (USAREUR)--7th Weather Squadron, Heidelberg GE*
  NIPRNET: http://www.dcsintweb.hqusareur.army.mil/swo
  SIPRNET: http://www.dcsintweb.hqusareur.army.smil.mil/swo
  DSN (314) 370-8653/8583 / comm. +49 6221 57 8583
  Comm 24-hr POC 0171-216-5393

9.5.2 Key Army staff METOC organizations.

- *Forces Command (FORSCOM)--2nd Weather Flight, Ft McPherson GA*
  NIPRNET: http://www.forscom.army.mil/weathr/default.htm
  DSN 367-5403/6570 / comm. (404) 464-5403/6570; secure DSN 367-5403

- *Training and Doctrine Command (TRADOC)--Ft Monroe VA.*
  DSN 680-2319 / comm. (757) 727-2319

- *U.S. Army Central Command (USARCENT)--Ft McPherson GA*
  SIPRNET: http://arcent-86.arcent.army.smil.mil/sub/g2/swo/swo.html
  DSN 367-4084/1686 / comm. (404) 464-4084/1686; secure DSN 367-4898/1686

- *U.S Army Intelligence Center (USAIC)--Ft Huachuca AZ*
  NIPRNET: http://huachuca-dcd.army.mil/WX_SPT/index.htm
  DSN 879-6647 / comm. (602) 538-6647

- *U.S. Army Combined Arms Center (CAC)--Ft Leavenworth KS*
  NIPRNET: http://leav-www.army.mil/weather
  DSN 552-4056 / comm. (913) 684-4056

Chapter 10 - U.S. Marine Corps METOC

This chapter describes U.S. Marine Corps organizational structure, command relationships, capabilities, equipment, and support requirements.

10.1 Marine Corps Forces (MARFOR)

10.1.1 Marine Air Ground Task Force (MAFTF).

- *Structure*. Marine Corps METOC is structured to support the Marine Air Ground Task Force (MAGTF). The MAGTF is a task organization consisting of a Ground Combat Element (GCE), an Aviation Combat Element (ACE), a Combat Service Support Element (CSSE), and a Command Element (CE). A MAGTF will vary in size based on the mission. The Marine Corps has three structured MAGTFs which include a Marine Expeditionary Force (MEF) built around a Division, a Marine Expeditionary Brigade (MEB) built around a reinforced Regiment, and a Marine Expeditionary Unit (MEU) built around a reinforced Battalion.

- *Employment*. Upon the employment of a MAGTF, tactical METOC support will transition from garrison-based to on-scene METOC support as either a Meteorological Mobile Facility (METMF) or a MEF Weather Support Team (MST). These tactical METOC elements will forward deploy by attaching to the GCE, ACE, CSSE, and CE as required.

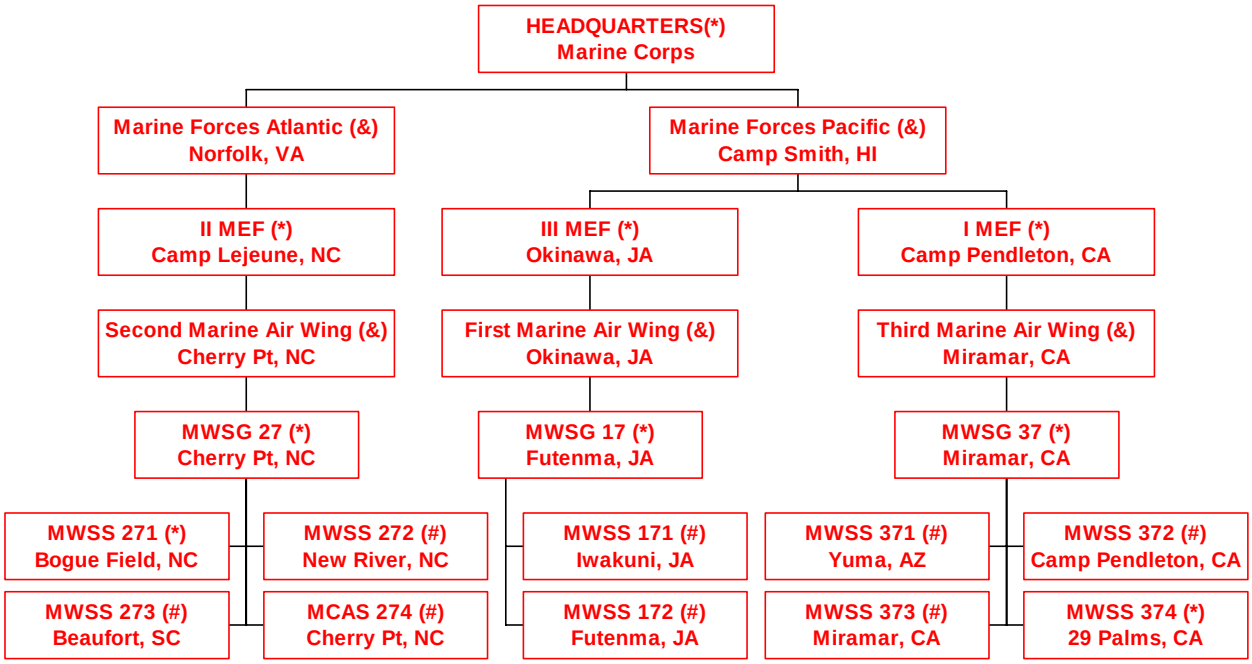
  - The METMF unit is a fully capable METOC facility, supported from the regional offices (maritime theater centers), the large production centers (FNMOC, NAVOCEANO, AFWA), and any other available sources (foreign facsimile, force weather). They are organic to the Marine Wing Support Squadron (MWSS) and normally deploy in direct support of the ACE.

  - The MST is a five man METOC team task organized to the mission with limited stand-alone capability. The MST is also organic to the MWSS and is normally deployed to support the Command Elements of a MEF, MEB, or MEU, as well as the GCE and CSSE. When attached, the MST is organized within the Intelligence Section (G-2) of the supported command and provides staff level METOC support for mission planning and operational execution.

- *Personnel*. USMC METOC Military Occupational Skills (MOS):
  MOS 6802 - Weather Service Officer. All 6802s are prior enlisted (Warrant Officers or Limited Duty Officers)
  MOS 6877 - (Secondary MOS) Weapons and Tactics Instructor (WTI)
  MOS 6821 - Weather Observer
  MOS 6842 - Weather Forecaster
  MOS 6493 - Meteorological Equipment Technician

10.1.2 Fleet Marine Force (FMF) METOC Structure.

The structure and location of Fleet Marine Forces (FMF) is shown below in Figure 10-1. The majority of Marine Corps METOC personnel are organized within the Marine Wing Support Squadron Table of Organization (T/O) and participate in the Fleet Assistance Program (FAP) to augment Marine Corps Air Station Weather Offices when not deployed.



* Weather Officer Assigned
& Collateral Duty for closest assigned Weather Officer
# Weather Officer FAPed to MCAS/MCAF Weather Office

Figure 10-1. Location of Fleet Marine Force Activities

10.1.2.1 Marine Expeditionary Force (MEF) METOC Structure.

There are three MEFs within the Marine Corps: I and II MEF each have four MWSSs, while III MEF has two. Both I MEF and II MEF have 10 Weather Officers, 31 Weather Forecasters, and 48 Weather Observers, while III MEF has 6 Weather Officers, 16 Weather Forecasters, and 24 Weather Observers. The total FMF METOC force consists of 26 Weather Officers, 78 Weather Forecasters, and 120 Weather Observers. Figure 10-2 depicts FMF METOC personnel within a given MEF.

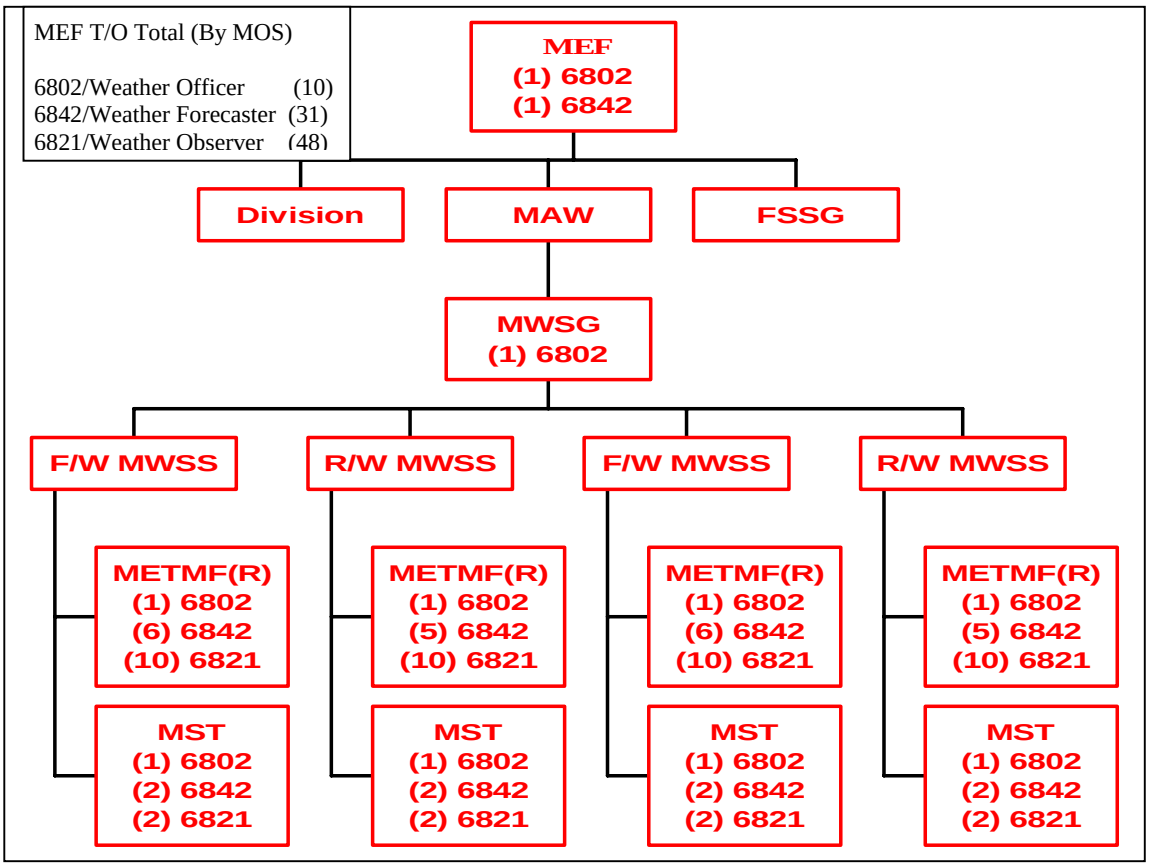


Figure 10-2. Current FMF METOC Organization

10.1.2.2 FMF METOC Command Relationships and Responsibilities.

- MEF Staff Weather Officer (SWO). Each MEF has established staff billets for 1 Weather Officer and 1 Weather Forecaster. These Marines serve in the G-2 section under the cognizance of the Intelligence Operations Officer and provide METOC support to the MEF Commanding General and his staff. As such, they serve as the Subject Matter Expert (SME) on all METOC related issues, ensuring that relevant, timely and accurate METOC support is provided throughout the MAGTF. Additionally, the MEF SWO maintains liaison with other Service counter-parts and represents the Commanding General at Joint Service METOC meetings.

- Marine Wing Support Group (MWSG) Weather Officer. The MWSG Weather Officer is the senior Weather Officer within the Marine Air Wing (MAW), responsible for coordinating all METOC personnel and assets to meet support requirements validated by higher HQ, to include METOC training within the MAW. Additionally, the MWSG Weather Officer serves as the Subject Matter Expert (SME) on all METOC related issues for the MAW.

- Marine Wing Support Squadron (MWSS) Weather Element. The MWSS Weather Element is the primary source for METOC support. Manning at the MWSS consists of 1 officer, 5 forecasters, 10 observers, and 3 meteorological equipment technicians. Odd numbered MWSSs are designated as fixed wing support squadrons and have an

additional forecaster and technician assigned. While in-garrison, all weather personnel FAP to the co-located MCAS/MCAF weather office in order to augment the Air Station work force and to maintain technical proficiency. Each MWSS also has one MST within its structure. The MWSS Weather Element can provide:

- An in-theater METOC production and processing facility using the Meteorological Mobile Facility (Replacement) (MetMF(R)), TMQ-44A, as a central hub to maintain a
- common METOC database.
- A continuous surface weather observation program
- Doppler Radar observations/imagery
- DMSP and NOAA satellite imagery in Fine/Smooth resolution
- Two remote weather sensors for surface weather observations
- Upper atmospheric soundings
- Receive Fleet Multi-Channel Broadcasts
- Terminal Aerodrome Forecasts for airfield and local area (25 NM radius)
- Local area severe weather warnings/advisories
- Climatological, astronomical, and tidal data
- Sea and surf conditions, current and forecast
- Secure and Non-Secure Pilot to METRO Services (PMSV)
- Aviation weather briefs as required by OPNAVINST 3710.7
- Electro-optic TDAs for Mission Planning and weapons system optimization
- Electro-Magnetic effects (IREPS) for mission planning and optimization of Electronic Warfare Support (ES), Electronic Attack (EA), and Electronic Protection (EP)
- Target area, enroute, mission, and staff weather briefings

- MEF Weather Support Team (MST). The MST is a task-organized METOC team developed to provide direct support to elements of the MAGTF other than the Aviation Combat Element (ACE). The MST is normally employed within a Command Element's Intelligence Section in order to integrate METOC impacts into the staff's deliberate and contingency planning as well as the execution phase of an operation. Manning consists of 1 weather officer, 2 forecasters, and 2 observers, although a full team is not always required to provide adequate METOC support. The number of personnel deployed is primarily based on the operational battle rhythm expected during the operation and anticipated METOC requirements. Although the MST is organic to the MWSS, the MST manning is additional structure separate from the manning required for the MetMF(R) and is requested via the MEF G-2/SWO.

  - The MST has a very limited stand-alone capability and relies heavily on NIPRNET/SIPRNET connectivity in order to ingest required METOC products from the MetMF, regional centers, and HHQ METOC elements. MST organic equipment includes the Interim Mobile Oceanographic Support System (IMOSS) which can receive Weather Facsimile (WEFAX), APT Satellite, and HF Radio Broadcast. Each MST has the capability to provide:

> A continuous surface weather observation program
> 24 – 96 hour Forecasts
> Severe weather warnings/advisories
> Climatological, astronomical, and tidal data
> Sea and surf conditions, current and forecast
> Electro-optic TDAs for mission planning and weapons system optimization
> Electro-Magnetic effects (IREPS) for mission planning and optimization of Electronic Warfare Support (ES), Electronic Attack (EA), and Electronic Protection (EP)
> Target Board, impact, amphibious objective area (AOA), and staff weather briefings

10.2 USMC METOC Key Equipment and Software

USMC METOC has two primary pieces of equipment for meteorological communications, data processing, and sensing: the Meteorological Mobile Facility (MetMF) and the Interim Mobile Oceanographic Support System (IMOSS).

10.2.1 Meteorological Mobile Facility (MetMF).

Each MWSS is equipped with a METMF. These facilities are in the process of being replaced with the new MetMF(Replacement) (METMF(R)). Currently 6 of 10 active duty MWSSs have the new MetMF(R) with delivery scheduled to be complete by late FY-01.

10.2.1.1 MetMF(R) Overview.

The MetMF(R) is a transportable system designed to provide tactical METOC support to the MAGTF. It is a fully integrated system capable of automatic data acquisition from communication channels providing METOC data, meteorological satellite down links, and local and remote meteorological sensors. The MetMF(R) is capable of disseminating METOC data and products via communication links and an indigenous video briefing system. The MetMF(R) consists of ten subsystems: Processing Subsystem (PCS), Communications Subsystem (CMS), Meteorological Satellite Subsystem (MSS), Rawinsonde Subsystem (RWS), Local Sensor Subsystem (LSS), Remote Sensor Subsystem (RSS), Video Subsystem (VDS), Meteorological Radar Subsystem (MRS), Portable Meteorological Subsystem (PMS), and Shelter Subsystem (SSS).

10.2.1.2 MetMF(R) Subsystems.

- Processing Subsystem (PCS). The PCS is a modular, software-intensive system designed to process METOC data and produce METOC products. The PCS consists of a resident master database and receives raw and processed data from local and remote meteorological sensors, meteorological satellites and meteorological radar. Presently, the PCS is operating with the Tactical Environmental Support System/Next Century (TESS/NC) Transition and Global Command and Control System – Maritime (GCCS-M). During FY00, the PCS will be replaced by the Navy Integrated Tactical

Environmental Subsystem (NITES) version I, principal METOC analysis and fusion system, and NITES version II, GCCS-M, METOC input to mission planners. It will be Defense Information Infrastructure (DII)/Common Operating Environment (COE) compliant and compatible with evolving joint communication and METOC architectures.

- Communications Subsystem (CMS). The CMS enables the MetMF(R) to transmit and receive secure and non-secure METOC data from meteorological channels, worldwide meteorological broadcast frequencies, and satellite communications. The CMS will have interoperable connectivity between the various other subsystems of MetMF(R), the MAGTF C^4I Local Area Network (LAN), and joint/government agencies and allied nations via the GCCS-M. Two-way communications is accomplished through existing Marine Corps communication infrastructure, normally the SIPRNET.

- Meteorological Satellite Subsystem (MSS). The MSS receives both high and low-resolution meteorological imagery from polar orbiting satellites and low-resolution meteorological imagery from geostationary satellites.

- Rawinsonde Subsystem (RWS). The RWS collects upper air soundings and will automatically be ingested by the PCS.

- Local Sensor Subsystem (LSS). The LSS is installed within close proximity of the MetMF(R) (within 150 feet) shelter and collect weather parameter measurements for automatic ingestion into the PCS. The LSS will be a “WeatherPak” sensor suite designed to measure and report: surface wind direction and speed, surface air and dew point temperature, liquid precipitation rate, cloud height, visibility, atmospheric pressure and altimeter setting.

- Remote Sensor Subsystem (RSS). The RSS consist of two sets of sensors capable of being installed at separate sites located up to 200 nautical miles from the MetMF(R). Each set of “WeatherPak” sensors measures and reports: surface wind direction and speed, surface air and dew point temperature, liquid precipitation rate, atmospheric pressure and altimeter setting. The RSS transmits its measurements to the MetMF(R) by use of Meteorburst (VHF) communications. During periods of low meteorite shower activity, an alternate means of communications may be required. The PMW-185 METOC office is presently working to resolve the issue.

- Video Subsystem (VDS). The VDS is capable of disseminating weather products, meteorological imagery, and alphanumerics to one monitor located within 2000 feet of the MetMF(R).

- Meteorological Radar System (MRS). The MRS (AN/TPS-76) provides real-time surveillance and advanced warning of potentially hazardous atmospheric conditions in the vicinity of the MetMF(R). The Doppler weather radar will measure rainfall intensities and predict the likelihood of hazardous activity, such as conditions for hail,

potential flooding, and analyze the behavior of winds inside convective storm activity. The radar has a max range of 200 nm with a severe weather range of 60 nm

- Portable Meteorological Subsystem (PMS). The PMS will consist of two Navy Integrated Tactical Environmental Subsystem (NITES) version IV systems networked with the MetMF(R) PCS through the MAGTF C^4I LAN and SIPRNET. METOC data and products received will be obtained from deployed MetMF(R)'s, Navy shipboard OA divisions, or directly from METOC regional and processing centers. NITES IV is currently under development and is expected to be ready for Fleet introduction during FY03. In the meantime, two Interim Mobile Oceanography Support Systems (IMOSS) are provided as adequate substitutions for the PMS.

- Shelter Subsystem (SSS). The SSS consist of an Electromagnetic Interference (EMI) International Organization for Standards (ISO) shelter, a Joining Corridor (8ft X 8ft X 10ft) to provide the forecaster with a work/briefing area, two B0013 Environmental Control Units, a power distribution system, and a grounding system.

10.2.1.3 MetMF(R) Communications Requirements.

10.2.1.3.1 Frequency Requirements.

Approval must be granted for primary and secondary frequencies in the following bands:

Table 10-1. MetMF(R) Frequency Requirements

Band	Equipment	Description	Range	Transmitting Power
HF	RT 7000	Transceiver	1.6- 29.999 MHz	125 watts
UHF	AN/GRC-171B(V)4	METRO	200-399.999 MHz	50 watts
VHF	MCC-520B	Meteor Burst Master Station	41.7 MHz (fixed)	250 watts
	MCC-545A	Meteor Burst Remote Terminals	41.7 MHz (fixed)	100 watts
	AN/VRC-90A	SINCGARS	30-87.975MHz	50 watts
SHF	AN/TPS-76	SWR	5.3-5.7 GHz	250 Kwatts

10.2.1.3.2 COMSEC Equipment.

KWR-46	UHF SATCOM	Fleet Multi-channel Broadcast (FMCB)
KY-58	UHF LOS	Secure Pilot to Forecaster METRO
KG-44	DMSP	Meteorological Satellite Imagery
USC-43(V)1	ANDVT	Secure Voice
KG-84A	SIPRNET/MAGTF C^4I	Secure LAN

KG-84C	HF data	Air Force High Frequency Regional Broadcast
SECTEL 1100	AT&T STU III w/Key	Secure voice/data, landline

10.2.1.4 METMF Siting Considerations.

- Sensor Placement - location must be free of obstructions which might block or alter wind flow
- High Energy Emissions - due to high-energy radio frequency emissions from the complex, ordnance, fuel, and personnel areas must be located a minimum of 100 yards away
- Radio Frequency Interference - other high-energy radiation sources must be placed at least 1/2 mile away from the complex
- Signal Blocking - a clear line of sight must be maintained for the operation of the weather radar and satellite receivers
- Security - communications security (COMSEC) equipment and classified material storage require tactical security measures to provide protection for Top Secret materials
- Power - requires 120/208 VAC, 3 phase, 60 HZ Class L Power from either a commercial source or dedicated generators(s) (100amp)

10.2.2 Interim Mobile Oceanographic Support System (IMOSS).

Each MWSS and MST is equipped with an IMOSS to provide forward support. The IMOSS is a modular system, which provides the capability to provide limited METOC support in a stand-alone mode with increasing capabilities realized with the addition of SIPRNET/NIPRNET connectivity.

10.2.2.1 System Configuration.

The IMOSS consists of three sub-systems, the main sub-system, the communication sub-system and the satellite sub-system. Each subsystem can be a stand-alone system depending upon mission requirements. Network Interface Cards (NIC) included in each sub-system allows them to be networked together for easy file transfer and data communications. The ability to network also allows the IMOSS user to tie into Local Area Networks (LANs) or Wide Area Networks (WANs) to obtain products and data from remote sources.

10.2.2.2 Main Module.

The main module is designed to be used primarily for briefing support and the production of products from the GFMPL-NT suite of software.

- Hardware. The Main Module consists primarily of a laptop computer, classified and unclassified hard drives, printer, and network interface devices.

- Laptop Computers. The main sub-system can be one of several types of laptop computers that have been fielded. Due to rapidly changing technology and the procurement cycle for the IMOSS, current laptop types and configurations may vary.

- Software. Due to rapidly changing technology and the procurement cycle for the IMOSS, liaison with the Marine METOC officer will be required to learn what products are currently available.

10.2.2.3 Communications Module.

The Communication Module receives alphanumeric weather data and facsimile broadcast via the HF receiver. The receiver of the module has the capability to connect to the host ship's HF antenna system or be deployed independently with its own antenna. The communication sub-system consists of a laptop computer (any of several that have been fielded), an HF radio, HF receiving antenna, interface devices, Weather Fax for Windows software, and associated cabling.

Kenwood HF Receiver

Dymek antenna system

Laptop Computer

demodulator

Figure 10-3. IMOSS Communications Module Hardware

- Communications equipment

  - HF Receivers

    > Kenwood R-5000 HF Receiver

◊ HF all band short-wave multimode receiver
◊ Double conversion superheterodyne receiver
◊ Frequency range of 100KHz to 30MHz
◊ Receives all AM (Amplitude Modulation), USB (Upper Sideband), LSB (Lower Sideband), FM (Frequency Modulation), CW (Continuous Wave), and RTTY (Radio Teletype)

> Drake R8A/B communication receiver
◊ Frequency ranges 100 - 30,000 kHz
◊ Modes AM, LSB, USB, CW, RTTY, FM
◊ Microprocessor controlled, synthesized, all mode, world wide receiver
◊ RS 232 compatible interface
◊ Programmable memory

- Interface Devices

- DYMEK DA100D Tuner/Power Supply receiver antenna
> Receives frequencies between 50KHz and 30MHz
> Four foot fiberglass whip antenna
> HF pre-amp doubles as the whip antenna mount
> Tuner/power supply supplies 12VDC to the pre-amp and acts as a pre-selector, amplifying only the frequencies desired

- DYMEK DA 100E all wave receiving antenna
> General coverage antenna
> Performance from 0.5 to 30 MHz
> Outdoor pre-amp with 4’8” telescopic element
> 50 foot of RG-58/U coax lead-in and control box
> Output impedance is selectable at 50, 100 or 500 ohms

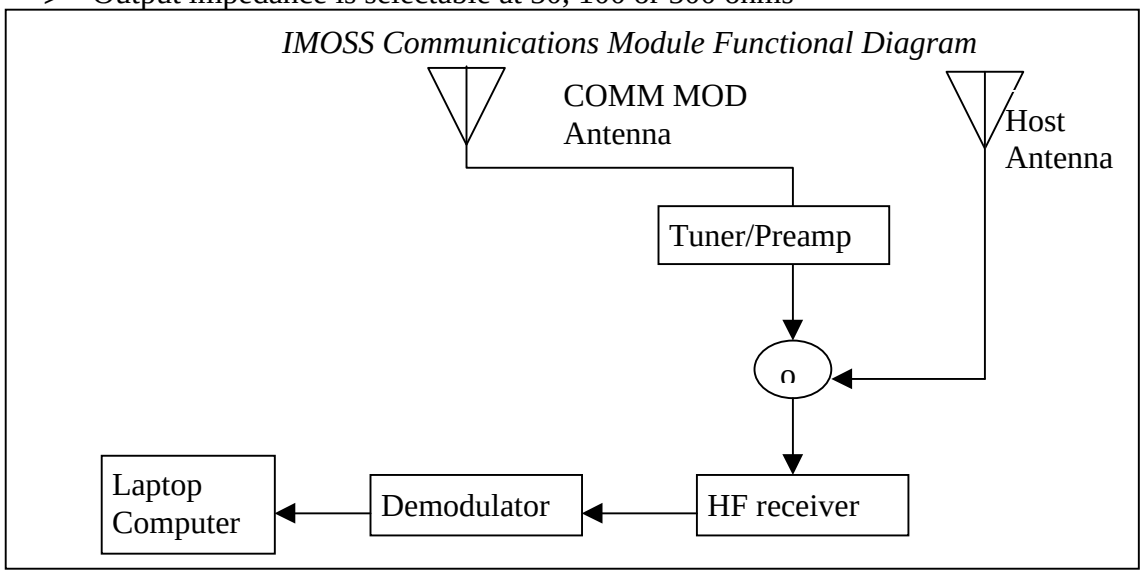


Figure 10-4. IMOSS Communications Module Hardware Configuration.

- Software. IMOSS includes the Weather Facsimile System for Windows (version 3) with Demodulator
  - Works with Windows NT 4.0
  - Multitasking windows 3.1 and Windows 95 multiple document interface program
  - Operates while other programs are running
  - Unattended operations either by timer or by schedule
  - Supports Weather Fax 60, 120, 240-LPM IOC 288 and 576
  - Supports Fax tones 1500-2300 Hz and 600-900 Hz
  - Supports TELEX, Baud 45, 50, 75 and 100 Baud
  - Stores pictures in windows standard DIB format with 256 gray shades
  - Printing and print preview
  - Written in C++
  - All processing is done off line
  - Software configurable to run on COM1 through COM4

10.2.2.4 Satellite Module.

The IMOSS SAT MOD receives, stores, and displays data from meteorological satellites. Depending on the antenna selected, Automatic Picture Transmissions (APT) data from polar orbiters, as well as WEFAX data from geostationary satellites, can be received and managed by WEATHERTRAC software. The SAT MOD can be linked to the COM MOD and the MAIN MOD to provide data transfer and briefing support. It may also be independently deployed. The network interface card (NIC) and modem, which are included in the laptop computer, allow for Local Area Network (LAN) and Wide Area Network (WAN) connectivity.

- Equipment Description. The SAT MOD contains (4) major components:

  - Laptop computer (may be one of several different types that have been fielded)

  - Worldport satellite receiver/demodulator
    > Measures 9.5” deep x 7.5” wide x 1.5 “ high and weighs approximately 1 lb. Metal encased VHF receiver and demodulator, capable of receiving weather satellite imagery signals from APT, WEFAX, and wideband WEFAX sources. It can also demodulate, but cannot receive, HF-FM/FSK from external SSB communications receivers

  - APT receiving antennas (V20 or Quadrifilar)
    > High-performance volute APT WeatherTrac model V20A, with integral preamp--totally enclosed in a 6” x 44” PVC pipe shell with no exposed radials; includes an integral 20dB nominal low noise preamp. This antenna has an N-type connector, and the internal preamp can be bypassed with a BNC barrel adapter.
    > ¼ wave Quadrifilar antenna with external pre-amp--constructed of stainless steel and designed to withstand the hardships of the marine environment.

- WEFAX receiving antenna. A six foot diameter, mesh parabolic antenna (see Figure 10-5). The antenna mounts to a "Patio Mount" and must be oriented toward a geostationary satellite to receive WEFAX. The Integrated 1691 MHz Linear Feed/Downconverter, manufactured by Quorum Communications, receives the signal at 1691 MHz and converts it to 137.5 MHz.

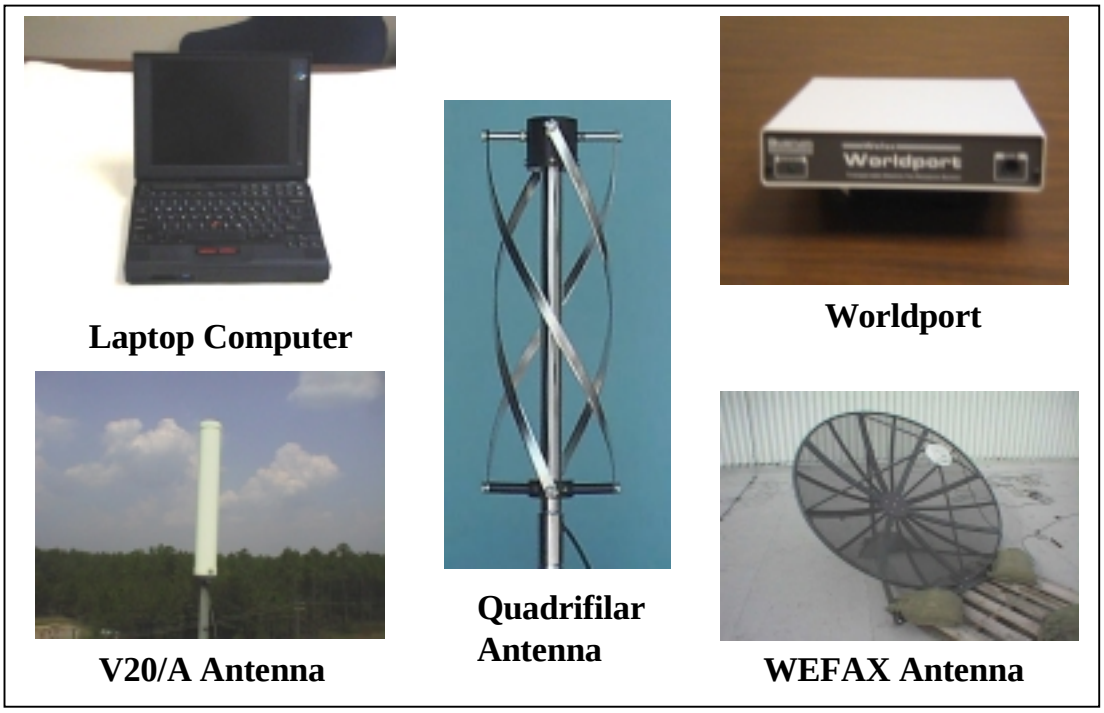


Figure 10-5. IMOSS Satellite Module Components

- Software. Three applications are necessary to capture, ingest and display the satellite data. These are WtCap, WtView, and WtAnim. The GPS0183 Utility is available but is not necessary to receive data. Each application's function is apparent in its name. For example, the primary function of WtCap is to configure the SAT MOD to capture the data. WtView allows image display and analysis. WtAnim is used to loop WEFAX images. The GPS0183 Utility allows IMOSS to receive time and location data from a GPS instrument (not currently an IMOSS allowance item).

10.2.3 Software.

METOC software used by the USMC is comparable, and in most instances identical to, that used by the USN.

10.3 USMC METOC Data

10.3.1 USMC METOC Data Sources.

The Marine Wing Support Squadron (MWSS) is the primary source for weather observations from the Marine Corps participants in joint operations. Aviation operations conducted at expeditionary airfields will be supported by MWSSs, which are equipped with Meteorological Mobile Facilities (MetMFs). These facilities can operate semi-autonomously or participate in a weather network. Figure 10-6 illustrates common data sources available to the MWSS.

Basic observational capabilities of the MWSS include temperature, dewpoint, wind speed/direction, weather phenomena, pressure, altimeter settings, cloud height/amounts/ types, and upper air data.

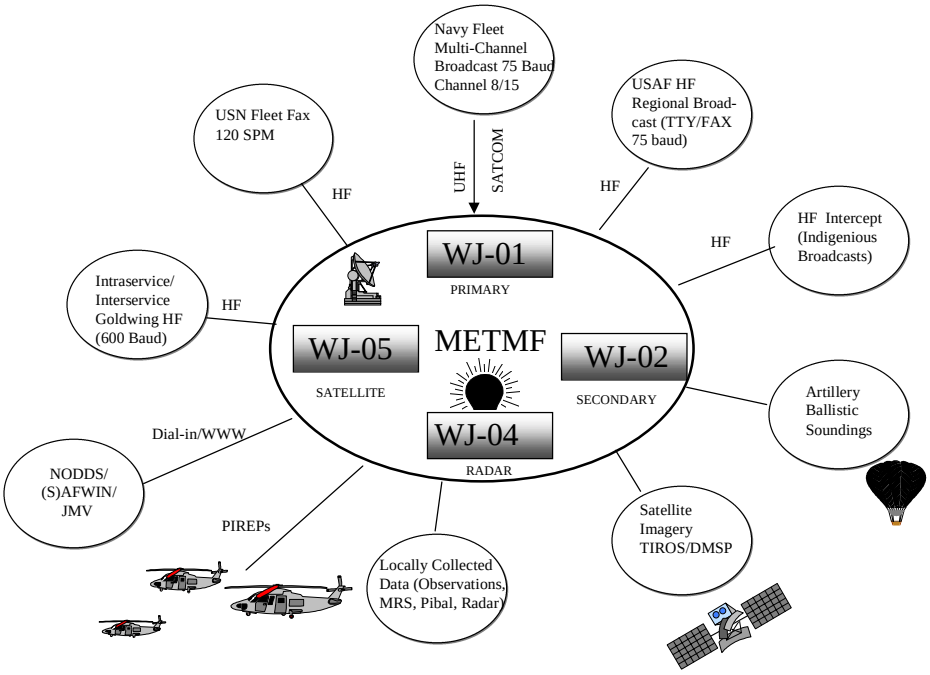


Figure 10-6. Marine Corps Data Sources

10.3.2 USMC METOC Data Products

10.3.2.1 USMC METOC Centralized Products.

- The US Marines have no centralized METOC facility; instead, METOC organizations use theater and centralized US Navy and US Air Force support.

10.3.2.2 USMC METOC Theater Products.

The following products are produced at the discretion of the senior weather officer when not provided by higher headquarters or to provide greater detail:

- MAGTF WEAX. Includes the current METOC situation, 24 hour forecast, and 48-hour outlook. Astronomical data and radiological fallout data is appended as required

- Tactical Atmospheric Summary (TAS). Includes an atmospheric refractive summary, tactical assessment, electromagnetic sensor performance predictions, infrared sensor detection range predictions, and communication range predictions

- Amphibious Objective Area (AOA) forecast. Includes meteorological situation, 24-hour forecast for objective area, surf forecast for target beaches, tactical assessment, abbreviated atmospheric summary, and astronomical data

- Strike forecast. Provides a coordinated forecast whenever multiple strike (OAAW/SEAD/DAS) platforms are operating as an integrated force under one tactical commander

- Assault forecast. Provides a coordinated forecast whenever multiple assault support platforms (VMGR/HMH/HMM/HMLA) are operating as an integrated force under one commander.

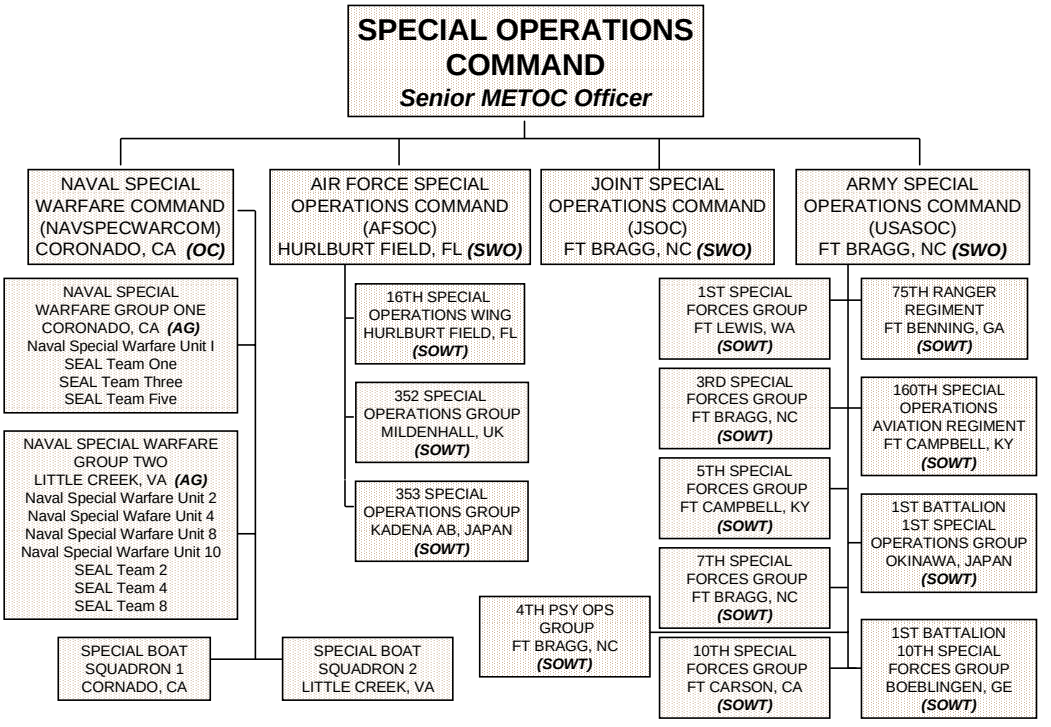
10.4 Key USMC METOC Organizations

- II MEF METOC Officer
  - Capt. B.K. Colby, DSN 751-8558 / comm. (919) 451-8558, email colbybk@iimef.usmc.mil

Chapter 11 - Special Operations Forces (SOF) METOC

This chapter describes U.S. Special Operations Command (USSOCOM) organizational structure, command relationships, and support capabilities and requirements, including SOF METOC and communications equipment.

11.1 Special Operations Forces (SOF)



(SWO) Staff Weather Officer (OC) Staff Oceanographer (AG) Staff Aerographer's Mate (SOWT) Special Operations Weather Team

Figure 11-1. Weather Support to Special Operations Forces

- METOC personnel support SOF missions to plan, prepare, and conduct special operations, civil affairs, and psychological operations in support of geographic CINCs. Incorporating SOF METOC requirements early in the planning process will be critical to ensuring the success of these missions.

  - SOF include U.S. Air Force Special Operations Command (AFSOC), U.S. Army Special Forces, U.S. Army Rangers, and U.S. Navy Seals

  - USAF Weather Teams provide direct support to AFSOC, U.S. Army Special Forces, U.S. Army Rangers and 160th Special Operations Aviation Regiment

- Specialized METOC training includes U.S. Army Airborne School, USAF Survival School, Introduction to Special Operations, Joint Special Operations Staff Officer Course, and Theater Orientation Course

- Establish Joint Special Operations Task Forces (JSOTFs) as required. A JSOTF is a deployed special operations headquarters providing command and control for all theater SOF.

  - JSOTF manning is tailored to the mission. Normally for a large operation, contingency, or exercise, a joint USAF and USN team is formed

  - Joint weather team provides support for air, land, and sea operations normally conducted in the deep battlefield environment

  - Navy Seals normally acquire weather information from the deployed JSOTF or from the nearest Navy METOC activity.

- Only SOCCENT has a permanently assigned METOC officer. All other Theater SOC METOC support is provided or arranged on an additional duty basis by theater METOC assets.

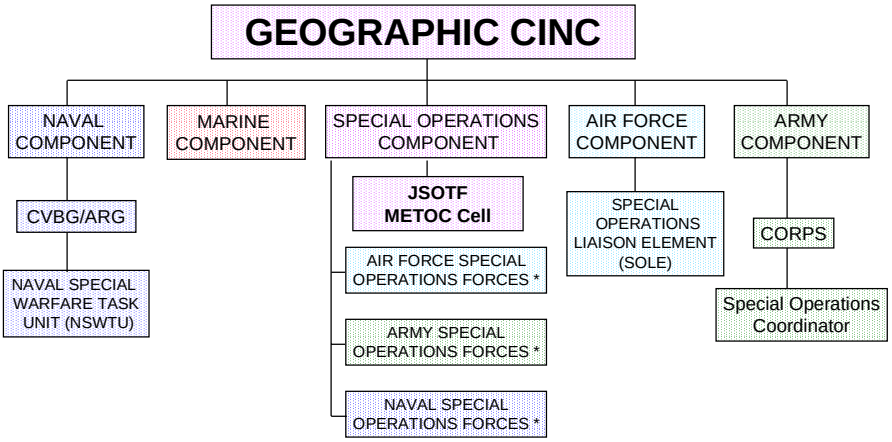


Figure 11-2. Geographic CINC's Special Operations Forces

- Theater SOCs and supporting METOC Organization

SOCACOM	Mobile Environmental Team (MET) Naval Atlantic Meteorology and Oceanography Center (NAVLANTMETOCCEN), Norfolk, VA
SOCCENT	Staff Weather Officer, U.S. Central Command MacDill AFB, FL (Permanent Billet)
SOCKOR	607th Weather Squadron, Yongsan, Korea

SOCEUR	Staff Weather Officer, U.S. European Command, Vaihingen, GE
SOCPAC	Mobile Environmental Team, Naval Pacific Meteorology and Oceanography Center (NAVPACMETOCCEN), Pearl Harbor, HI
SOCSOUTH	Staff Weather Officer, U.S. Southern Command, Miami FL

11.2 SOF METOC Equipment, Communications, and Key Software

- Equipment used by SOF METOC personnel includes MARWIN, SOF METOC, Electronic SWO Kit (ESK), tactical weather radar, Manual Observing System (MOS), ALDEN 9315 TRT, New Tactical Forecast System (N-TFS), Small Tactical Terminal (STT), and Remote Miniature Weather Station (RMWS). Equipment is compatible with Automated Weather Distribution System (AWDS), AWN/MIST, and Navy Integrated Tactical Environmental System (NITES) data streams.

- Several equipment/communications items are discussed in paragraph 8.2, Air Force equipment

11.3 SOF METOC Data

11.3.1 SOF METOC Data Sources.

- Observations are collected by the Special Operations Command (SOC) Special Operations Weather Team (SOWT) from subordinate bases and detachments, but they will not normally be transmitted outside of SOC communications channels due to OPSEC constraints.

11.3.2 SOF METOC Data Products.

- SOF METOC teams rely upon the Special Support Operations Branch at the AF Weather Agency, Offutt AFB NE, the Warfighting Support Center (WSC) at NAVOCEANO, Bay St. Louis, MS, the Air Force Combat Climatology Center (AFCCC) at Asheville, NC, and service regional/theater forecast centers/facilities to assist them in providing tailored support to SOF

- Support capabilities:

  - Target area, en route, mission and staff weather briefings for air, land, and water operations
  - Sea and surf conditions
  - Climatological, astronomical and tidal data

- Electro-optic TDAs for mission planning and weapon employment
- Terminal Aerodrome Forecasts for airfield/forward operating base and local area (25 nm radius)
- Customer tailored weather warning and advisories
- Coordinate tailored weather warning and advisories
- Coordinate Joint SOF mission forecasts

Appendix A - Time-Phased Force and Deployment Data (TPFDD)

This appendix provides a brief overview of the Unit Type Codes (UTCs) used in TPFDDs, which control force flow into (and out of) a theater during deployments.

A.1 TPFDD Planning Guidance and Formats

References:
a. Joint Strategic Capabilities Plan (JSCP)
b. CJCSM 3122.03, Joint Operation Planning and Execution System, Vol. II, Planning Formats and Guidance
b. *Army Mobilization Operations Planning and Execution System* (AMOPES)
c. *Navy Capabilities and Mobilization Plan* (NCMP) and fleet planning guidance
d. *Marine Capabilities Plan* (MCP)
e. Air Force *War and Mobilization Plan* (WMP)
f. Armed Forces Staff College Pub 1, Chapters 6 and 7
g. AFI 10-400, Aerospace Expeditionary Force Planning
h. AFM 10-401, Operation Plan and Concept Plan Development and Implementation
i. AFI 10-402, Mobilization Planning
j. AFI 10-403, Deployment Planning

A.1.1 Process.

In the Deliberate Planning Process, the TPFDD is developed during the Plan Development Phase and forces for planning are apportioned in the Joint Strategic Capabilities Plan (JSCP). The TPFDD is a computer database used to identify types of forces and actual units required to support an OPLAN or OPORD. The data are time-phased, showing cargo and passenger movement from home base to place of employment. TPFDD development involves four phases: force planning (identify units), support planning (identify lift requirements), and transportation planning, leading to deployment/redeployment execution. In Crisis Action Planning, forces for planning are allocated in the WARNING, PLANNING, ALERT, or EXECUTE ORDER. The Joint METOC Officer will need to be involved during the early phases of Crisis Action Planning to track METOC personnel and equipment needed for execution of the operation. Navy and Marine Corps METOC personnel and equipment deploy with their units and do not need to be added to the TPFDD. However, detailed planning must be done for weather support to Air Force and Army units. Weather support is not pre-packaged and must be tailored for each operation. Individual METOC personnel will also need to be added to the TPFDD for the Joint Task Force headquarters (JTF), Joint Force Air Component Command (JFACC), Joint Force Land Component Command (JFLCC), Joint Force Maritime Component Command (JFMCC), and the Joint Special Operations Task Force (JSOTF). The Staff Oceanographer or Weather Officer should work closely with the Senior METOC Officer at the CINC level to assist in METOC augmentation. Additional METOC resources can

come from the supported CINC's components or from a supporting CINC (see paragraph 5.2.3).

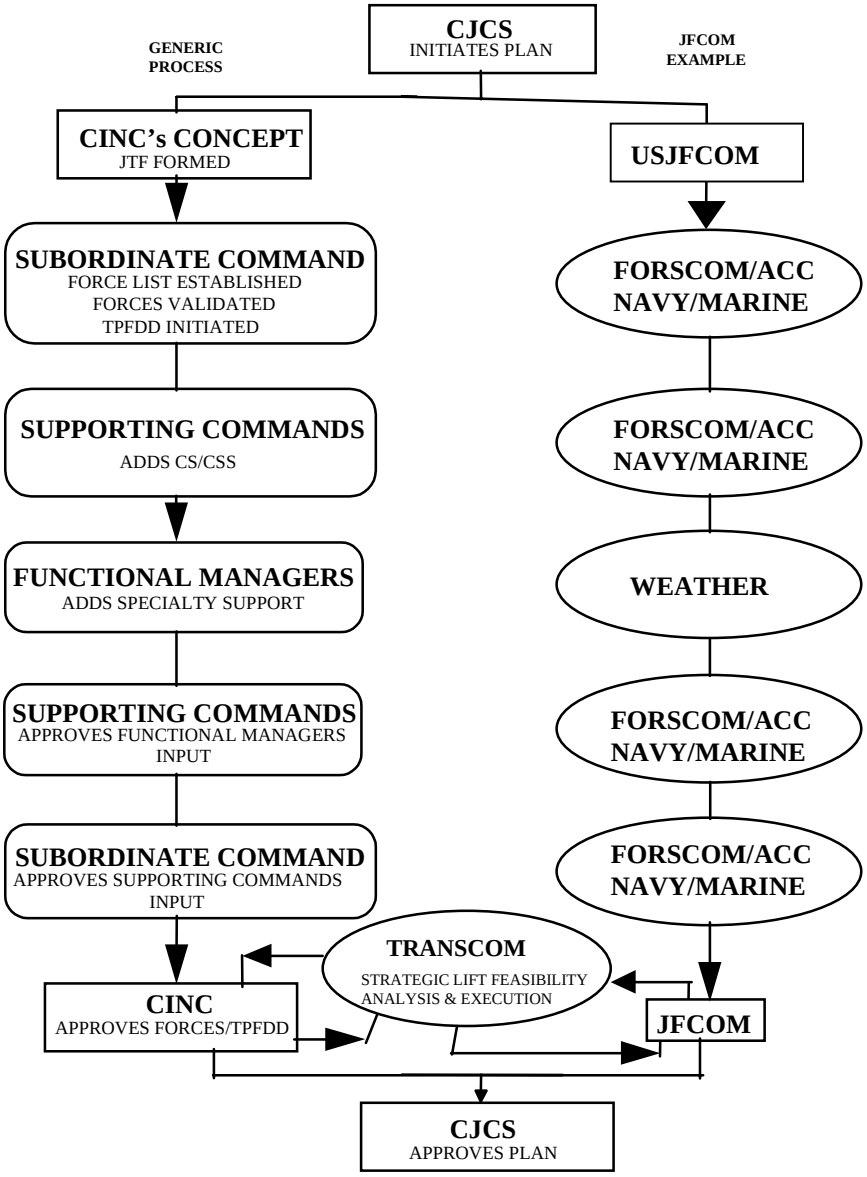


Figure A-1: JTF Force Planning/TPFDD Process

A.1.2 JTF POCs.

- J-1 is the Manpower and Personnel section and usually handles individual augmentation requirements
- J-5 is the Plans section and usually enters records into the TPFDD. The J-4 (Logistics), if not the primary POC, will have a major part in the process

A.1.3 Sample TPFDD Record.

Reference: AFM 40-101.

ULN	FORCE INDICATOR	FIC	UNIT	CRD	SERVICE	PROV-ORG	UTC	UIC
ORIGIN	RLD	MODE /SOURCE	POE	ALD	MODE/ SOURCE	POD	EAD	LAD
	MODE/ SOURCE	DEST	RDD					
#PAX	TONS					PRIORITY		
(ready to load)	(port of embarkation)		(available to load)		(earliest arrival)		(latest arrival)	
	(destination)	(required delivery)		(port of debarkation)				

TAAWA	(plan unique #)	**STANDARD DEPLOY**	**0**	**18 WEA SQ**	**ICR**	(serv specific)	**USAF**	
	CDR ACC	**XWQA1 FFHNR0**						
FT BRAGG	**C002**	**L**(land)	**G**(mtmc)	**POPE AFB**	**C036**	**A**(air)	**K**(amc)	
RAMSTEIN	**C040 C075**	**L**(land)	**H**(unit)	**BAD TOLZ**	**C076**			
1(req pax)	0.3(equip weight)							

In this sample, Ft Bragg (ORIGIN) will have 1 passenger and 0.3 tons of equipment ready to load by C+2 (C is the designated deployment date), travelling by government-provided land transportation to Pope AFB (POE). Deploying individual and equipment will be available at Pope to load by C+36 (ALD), then deploy by Air Mobility Command airlift to Ramstein AB, arriving anywhere from C+40 to C+75 (EAD, LAD). The unit then will provide its own land transportation to get to Bad Tolz (DEST) by C+76 (RDD).

A.2 TPFDD Requirements (Personnel and Equipment)

A.2.1 Air Force.

TPFDD requirements for tactical AFFOR assets are controlled and maintained by the Unified/Component commands. METOC planners should contact HQ ACC, HQ PACAF, USCENTAF, SOUTHAF, and HQ USAFE weather plans sections for TPFDD information regarding their METOC forces and assets:

- ACC Weather Plans (ACC/DOWO): DSN 574-8459/8462
- PACAF Weather Plans (PACAF/DOWX): DSN 449-8479
- USCENTAF Weather Plans (USCENTAF/A3-DOOWP): DSN 965-2297
- USAFE Weather Plans (USAFE AOS/AOXX): DSN 480-8564
- SOUTHAF: DSN 228-4514/4529

A.2.1.1 Tactical AFFOR UTCs and Description.

XW0BS	WEA OBSERVATION KIT (GMQ-33 AND TMQ-34)
XWE0E	WEA ELECTRONIC SWO KIT (LAPTOP COMPUTER)
XWNAM	NATO AUTO MET INFO SYS (NAMIS) (USAFE ONLY)
XWPAC	WEA COMMAND METEOROLOGIST (SENIOR O3 AND UP)
XWQA1	WEA FORECASTER/OBSERVER (E6 AND BELOW)
XWQA2	WEA OPERATIONS MANAGER (E7 AND UP)
XWQA3	WEA FORECASTER (E6 AND BELOW)

XWQAB WEA OPERATIONAL METEOROLOGIST (O1-O3)
WXQCT WEA QUICK REACTION COMM TERMINAL (QRCT) (PACAF ONLY)
XWSTT SMALL TACTICAL TERMINAL (TMQ-43)
XWTFS New-TACTICAL FORECAST SYSTEM (N-TFS)
XWTRT WEA RADIO FAX RECEIVER (9315TRT)
XWTWD WEA TACWIND (TMQ-36)
XWTAC Air Force Jump Qualified Weather Officer
XWTAD Air Force Jump Qualified Weather Observer

A.2.1.2 Individual Air Force Weather Augmentees.

- Weather Officer (O4-O5) AFSC 15W3
- Weather Officer (O1-O4) AFSC 15W3
- Weather Chief (E9) AFSC 1W000
- Weather Forecaster Superintendent (E8) AFSC 1W091
- Weather Forecaster Craftsman (E6-E7) AFSC 1W071A
- Weather Forecaster Journeyman (E4-E5) AFSC 1W051A
- Weather Forecaster Apprentice (E1-E3) AFSC 1W031A
- Weather Observer Analysts (E3-E5) AFSC 1W051
- Weather Observer Apprentice (E1-E3) AFSC 1W031

A.2.2 Army.

- Since the Air Force provides Army weather support, Air Force weather organizations manage UTCs for weather support to the Army. POCs are listed at paragraph 8.5.2 (USAF MAJCOMs) and paragraph 9.5.2 (Army staff organizations)

  - POC for all FORSCOM augmenting forces is ACC/XOWO, delegated to FORSCOM/SWO
  - POC for all USAREUR augmenting forces is USAFE/DOW, sometimes
  - delegated to USAREUR/SWO
  - HQ USAF/XOW is the POC for all Army-support weather UTCs
  - POC for all USARPAC augmenting forces is PACAF/DOW

A.2.2.1 Tactical Army Weather Support UTCs and Description.

XWAAC ARMY SUPPORT COMMAND METEOROLOGIST (SENIOR O3 AND UP)
XWAA2 ARMY SUPPORT WEA OPERATIONS MANAGER (E7 AND UP)
XWAAB ARMY SUPPORT OPERATIONAL METEOROLOGIST (O1-O3)
XWAA1 ARMY SUPPORT WEA FORECASTER/OBSERVER (E6 AND BELOW)

A.2.2.2 Supplies.

AR 115-10/AFJI 15-157 identifies specific service logistics support responsibilities to Army-support weather units.

A.2.3 Navy.

A.2.3.1 Navy METOC Personnel UTCs.

UTC	*Description*	*Qty*	*Rank/Rate*
KWP01	METOC Officer	1	01-04
KWP02	METOC Forecaster	1	E5-E8
KWP03	METOC Observer	1	E1-E5
KWP04	METOC Upper Air Team	2	E1-E5

A.2.3.2 Navy METOC Equipment UTCs.

UTC	*Description*	*Designator*
KWC01	Automated Meteorological Observing Sys	AMOS
KWC02	GOLDWING Tactical Comms System II	AN-GRQ/27
KWC03	Mini-Rawin System	AN/UMQ-12
KWC04	ICS-9700 UltraLite INMARSAT Systems	INMARSAT
KWC05	Mini Facsimile Recorder	TR-4
KWC06	Mobile Oceanographic Support System	MOSS
KWC07	Interim Mobile Oceanographic Support Sys	IMOSS

UTCs are limited to non self-deploying elements to the JTF HQ, JFACC, or JSOTF.

- Personnel: use XWZ99 for UTC and insert the following information:
  - > Oceanographer Officer: Designator 1800
  - > Enlisted Forecaster: Navy Enlisted Code (NEC 7412); E5/E6
  - > E7-E9 (AGC, AGCS, AGCM)
  - > Enlisted Observer: E1-E5 (AGAR,AGAA,AGAN,AG3,AG2)
- Equipment: XWZ99 IMOSS (Interim Meteorology and Oceanographic Support System): 0.5 short ton

A.2.4 US Marine Corps.

A.2.4.1 Military Occupation Specialty (MOS).

Weather Officer	WO1-CWO5; O3-O5 (MOS 6802)
Weather Forecaster	E5-E9 (MOS 6842
Weather Observer	E1-E5 (MOS 6821)

A.2.4.2 Marine forces UTCs.

All METOC equipment is contained within the first two UTCs; METOC personnel are carried in any of the last 6 UTCs as a part of their unit

- 8DSF1: Fixed Wing Support Meteorology Mobile Facility (equipment only)

- 8DWR1: Rotary Wing Support Meteorology Mobile Facility (equipment only)
- 8MLUA: Rotary Wing Support Squadron (entire squadron to include METOC personnel)
- 8MLUB: Rotary Wing Support Squadron with Maritime Pre-positioned Shipping (MPS)
- 8MLUP: Rotary Wing Support Squadron as a fly-in echelon
- 8MMUA: Fixed Wing Support Squadron (entire squadron, to include METOC personnel)
- 8MMUB: Fixed Wing Support Squadron with MPS
- 8MMUP: Fixed wing Support Squadron as a fly-in echelon

A.2.5 Special Operations Forces (SOF).

A.2.5.1 UTCs for JSOTF Headquarters.

- XWQAB Air Force Weather Officer 15W3
- XWQA1 Air Force Weather Forecaster 1W071A
- XWTAB Air Force Jump Qualified Weather Forecaster J1W071A
- KWP01 Navy METOC Officer
- KWP02 Navy METOC Forecaster
- KWP03 Navy METOC Observer
- KWP04 Navy METOC Upper Air Team

Appendix B - Joint Operations Planning and Execution System (JOPES) Formats

References: a. Joint Pub 5-03.1, "Joint Operation Planning and Execution System, Volume I, Planning Policies and Procedures
b. CJCSM 3122.03, "Joint Operation Planning and Execution System, Volume II, Planning Formats and Guidance"

This appendix details the standard locations that METOC information is used within JOPES. Extracts from references (a) and (b) provide document formats. Reference (a) refers to the Intelligence Estimate and Commander's Estimate of the Situation. Reference (b) details the formats for Operation Plans (OPLANs), Concept Plans (CONPLANs) and Operation Orders (OPORDs): Basic Plan , Annex B (Intelligence), Annex C (Operations), Annex H (Meteorological and Oceanographic Operations), Annex K (Command, Control, and Communications Systems), and Annex N (Space Operations).

B.1 JOPES Volume I, Planning Policies and Procedures

This document contains procedures and formats for the Chairman Joint Chiefs of Staff (CJCS) Warning Order, Commander's Estimate, CJCS Planning Order, CJCS Alert Order, CJCS Deployment Order, CJCS Execute Order, and the Operation Order. The CINC's Strategic Concept (for deliberate plans) or the Planning Directive (Crisis Action Planning) (also called the CINC's guidance) is used by staffs to develop the Staff Estimates, which are used to form the Commander's Estimate.

B.1.1 Staff Estimate Formats.

B.1.1.1 Intelligence Estimate.

Reference: Joint Pub 5-03.1, Annex P, Appendix 3

1. MISSION.

2. ENEMY SITUATION. *Statement of conditions which exist and indication of effects of these conditions on enemy capabilities and the assigned mission. This paragraph describes the area of operations, the enemy military situation, and the effect of these two factors on enemy capabilities.*

a. Characteristics of the Area of Operations. *This paragraph discusses the effect of the physical characteristics of the area of operations on military activities of both combatants. If an analysis of the area has been prepared separately, this paragraph in the intelligence estimate may simply steer to it, then discuss the effects of the existing situation on military operations in the area.*

(1) Military Geography.

(a) Topography.

(b) Hydrography.

1. Existing Situation. *Describe the nature of the coastline; adjacent islands; location, extent, and capacity of landing beaches and their approaches and exits; nature of the offshore approaches, including type of bottom and gradients; natural obstacles; surf, tide, and current conditions.*

2. Effect on Enemy Capabilities. *This section discusses the effects of the existing situation on broad enemy capabilities.*

3. Effect of Friendly Courses of Action. *This section discusses the effects of the existing situation on broad COAs for friendly forces*.

(c) Climate and Weather.

1. Existing Situation. *Describe temperature, cloud cover, visibility, precipitation, light data, and other climate and weather conditions and their general effects on roads, rivers, soil trafficability, and observation.*

2. Effect on Enemy Capabilities. *Discuss the effects of the existing climate and weather situation on broad enemy capabilities.*

3. Effect on Friendly Courses of Action. *Discuss the effects of the existing climate and weather on the broad COAs for friendly forces*.

Note: METOC and Intelligence personnel produce this information.

B.1.1.2 Logistics Estimate.

Reference: Joint Pub 5-03.1, Annex P, Appendix 4

The Logistics Estimate will summarize data about the area, taken from the Intelligence Estimate with specific emphasis on significant factors affecting logistics activities. Specific METOC concerns (*e.g.* trafficability) should be passed to the Logistics personnel if applicable to the operations.

B.1.1.3 Commander's Estimate of the Situation.

Reference: Joint Pub 5-03.1, Annex P, Appendix 6

1. MISSION.
2. THE SITUATION AND COURSES OF ACTION.

a. Considerations Affecting the Possible Courses of Action.

(1) Characteristics of the Area of Operations.

(a) Military Geography.

1. Topography.

2. Hydrography. *Include the characteristics of offshore sea areas, approaches to the beaches, currents, tides, the beaches themselves, ports, docks, and similar maritime considerations*.

3. Climate and Weather. *Extremes of temperature, wind velocities, cloud cover, visibility, precipitation, and other such factors that can affect military operations. Sunrise, sunset, and twilight data are normally given in this subparagraph*.

Note: METOC and Intelligence personnel produce this information.

B.1.2 OPLAN/OPORD/CONPLAN Formats.

B.1.2.1 Basic Plan/CINC's Strategic Concept.

Paragraph 4. Administration and Logistics, subparagraph f, Meteorological and Oceanographic Operations. In preparing the Basic Plan, refer to Annex H. Ensure that when Annex H is published, it is included in the list of Annexes at the end of the Basic Plan.

Refer to Annex H when included in the OPORD. For an OPLAN/CONPLAN that may not include an Annex H, a more descriptive paragraph should be included.

B.1.2.2 Annex B, Intelligence.

1. Situation.

a. Characteristics of the Area.

b. Hydrographic, Amphibious, Topographic, and Weather.

(1) Summarize the hydrographic data (sound, tides, wave height, and currents) and amphibious considerations (beach defenses and obstacles, slope, consistency, and routes of ingress and egress) needed to support amphibious and logistics over-the-shore operations (LOTS). References Annex H and M.

(2) Address topographic aspects, including trafficability, key terrain, obstacles, cover, concealment, and avenues of approach. Reference M.

(3) Include, as appropriate, climate and weather aspects as they pertain to the operational environment. Coordinate with the staff weather officer or oceanographer and refer to Annex H.

Note: METOC personnel prepare this information. Astronomical, climatic, and oceanographic data may be published in appendices to this annex.

B.1.2.3 Annex H, Meteorological and Oceanographic Operations.

The following sample may be used as a temple to develop custom messages. Note that the parenthesis should be filled in with the appropriate classification level.

ANNEX H TO CJTF XXX OPLAN XXXX-00
METEOROLOGICAL AND OCEANOGRAPHIC OPERATIONS

( ) REFERENCES: List documents that provide additional guidance and information.

1. ( ) Situation.

a. ( ) Concept of METOC Support. *State the general concept of METOC operations to support for the forces assigned to the OPLAN. May consider highlighting key products (existing, new, tailored; distribution)*

b. ( ) Assumptions. *State the assumptions that affect the METOC operations required by the plan. Provide estimates of the availability of data and facilities in the operational area, availability of support from non-US and US nonmilitary agencies, and the feasibility of obtaining METOC data from radar and satellites.*

c. ( ) Planning Factors. Identify any significant METOC conditions that may influence the execution of the plan. The purpose of this paragraph should be to establish the requirement for any unusual METOC operations that will clarify the assignment of specific responsibilities. Include METOC factors that may influence operations and the probability of their occurrence (broad brush, seasonal patterns: temperature, winds, precipitation, humidity, aviation impacts (clouds, fog, thunderstorms), maritime impacts (currents (ocean and littoral), tides, water levels, sea surface temperature (SST), salinity, acoustics, waves), optical phenomena (mirages), space environmental factors, Mission-Oriented Protective Postures (MOPP) factors (endurance, acclimatization, hydration, exposure), solar/lunar data

d. ( ) Resource Availability. Identify items supporting units need to bring to support the mission for a minimum of 90 days. Identify conventional and non-conventional weather resources (INTERNET, INMARSAT, etc.) planned to be used. Consider including key IP addresses, JOAF/special product headers and availability, and non-US

capabilities (host nation, coalition, non-government organizations (NGOs), humanitarian relief organizations (HROs).

2. ( ) Mission. State in a clear, concise statement the METOC operations objectives in support of the plan. Should answer how, when, who, what and where. Suggestions:
   - When: usually WHENDI (when directed)
   - Who: JTF and METOC support units
   - What: accurate, consistent, coordinated, tailored METOC support
   - Where: every applicable level of the JTF
   - Objective: provide tailored support, timely advice to maximize effectiveness of JTF operations, and provide force and resource protection

3. ( ) Execution.

   a. ( ) Concept of Operations. Describe the METOC operations structure and how it will function in the implementation of the plan. Refer to other documents available to tasked units that establish doctrine and procedures, as appropriate. Note deviations from standard practices and any additional procedures peculiar to the operation. Include the operation's phasing in separate subparagraphs; for example:
      - Predeployment (climatology as planning tool, TPFDD planning, weather data to be used, JMO/SMO coordination, astronomical data)
      - Deployment (climatology/real world data, transition to Joint METOC Forecast Unit (JMFU), JMO/SMO coordination)
      - Employment (real world/climatological data; observe, analyze, and predict the state of the battlespace and advise on impacts; determine customer requirements; evaluate adequacy of support)
      - Transition (same as before; JMO/SMO coordination; deactivation/transfer of JMFU responsibilities)
      - Redeployment (continues until forces redeployed or integrated into follow-on/transition force; JMO/SMO coordination on redeployment requirements)

   b. ( ) Tasks and Responsibilities. Identify the Service or Services responsible for providing space and atmospheric, oceanographic, and terrestrial environmental support during the operation, including weather communications, data base, and production responsibilities. Delineate specific responsibilities to specific units:
      - Requested SMO/CINC support (management of national/theater assets, manpower, equipment, and communications)
      - JMO tasks (climatology; Intelligence Preparation of the Battlefield (IPB); METOC impacts on Courses of Action (COAs); integration of METOC operations into joint operations, including personnel, equipment, communications, organizational structure, and logistics; coordination with components of JTF; assessment of METOC effectiveness; data management; JMFU management)
      - Sample component tasks (METOC structure should mirror JTF structure):
        ◊ ARFOR (battlespace meteorological watch; observations and forecasts; nuclear, biological, and chemical (NBC) focal point; assess METOC impacts; coordinate with JTF)

- ◊ NAVFOR (battlespace metwatch affecting maritime conditions in/near JOA; surface and upper air observations; forecast for air, surface, and sub-surface operations; assess METOC impacts; Amphibious Objective Area (AOA) forecasts; coordinate with JTF)
- ◊ AFFOR (battlespace metwatch affecting air force operations in/near JOA; observations and forecasts; assess METOC impacts; provide air-unique forecasts (refueling, low-level, airdrop) if JFACC; coordinate with JTF)
- ◊ MARFOR (battlespace metwatch affecting MARFOR operations; observations and forecasts; assess METOC impacts; coordinate with JTF; AOA forecast (if NAVFOR not doing it)
- ◊ JSOTF (battlespace metwatch affecting joint special operations; assess METOC impacts; coordinate with JTF)
- ◊ JPOTF (battlespace metwatch affecting joint psychological operations (*e.g.*, leaflet drop forecasts); assess METOC impacts; coordinate with JTF. May be handled by another component; *i.e.*, ARFOR)
- ◊ Joint Civil-Military Operations Task Force (CMOTF provides potential interface with NGOs/HROs)
- ◊ JFACC (battlespace metwatch for air operations in/near JOA; requirements for alternate and divert airfields; observations; air-unique forecasts (air refueling, low-level, airdrop); assess METOC impacts; coordinate air forecasts
- ◊ Service components (*i.e.*, Navy, USAF, Army, USMC—provide support as requested through CINC; coordinate with JMO and SMO as required; manage KQ identifiers and MANOP headings)

c. ( ) Coordinating Instructions. Include instructions common to two or more components. Suggestions:
- JOAF as coordinating forecast
- Assess JTF products for consistency, accuracy
- Develop local, tailored products
- Weather warning and advisory responsibility (may be on-scene or centralized facility)
- Satisfy subordinate units' requirements
- Transmit products to JMFU
- Standardize/coordinate use of software (*e.g.*, NITELITE)
- Designate production center(s), if appropriate (regional, oceanographic, space)
- Forward lessons learned, support deficiencies to JMO (for forwarding to SMO)

4. ( ) Administration and Logistics. Provide broad guidance on how logistic and administrative support is to be furnished for METOC operations. (Reference to Annex D or pertinent command directives may suffice.) If required, tell units to deploy a minimum x-day supply of expendables.

5. ( ) Command and Control. Indicate the channels for control of METOC operations if different from the command relationships outlined in the Basic Plan or in Annex J. May want to include:

a. ( ) A general statement of the scope and type of METOC C4I support applicable to the operation (*e.g.*, GCCS; can reference Annex K.) Include specific details explaining the METOC communications concept and requirements in Annex K.

b. ( ) Instructions to cover periods when communication circuits are not operational. Cite potential impacts to METOC operations and available backup resources.

c. ( ) Instructions for transmitting METOC information at echelons where special circuits are not available.

d. ( ) Mechanism(s) for reporting METOC personnel and equipment status.

e. ( ) Instructions for implementation of METCON, OCEANCON, and ICECON.

f. OPSEC considerations (can reference Annex L).

Appendixes: None are specified in JOPES; however, appropriate matters above may be placed in appendixes, when required, by length or detail of guidance required.

B.1.2.4 Annex K, Command, Control, and Communications Systems.

Ensure that METOC communication requirements are included in Annex K Especially see Appendix 3 to Annex K, Communications Planning and Appendix 4 to Annex K, Satellite Communications Planning. Include Global Broadcast System (GBS) and bandwidth requirements, SIPRNET/NIPRNET connectivity, radio networks (HF, VHF, UHF), telephone networks, fiber optic networks, weather communications, air-to-air and air-to-ground communications, fleet broadcast communications, and ship-shore-ship communications.

B.1.2.5 Annex N, Space Operations.

The following sections from Annex N may be applicable. Note that the word "environmental" in Annex N refers to any meteorological, oceanographic, geodetic, and other environmental support information provided by space assets that affect space, air, surface, or subsurface activities and assets. Describe detailed environmental services in Annex H, Meteorological and Oceanographic Operations.

1. Situation.

c. Friendly. Identify all friendly space forces and assets in theater and to be deployed in theater. *Include METOC satellite requirements as well as any associated receivers and sensors*.

3. Execution.

b. Space Activities. *Ensure all required METOC information from space assets is stated in paragraph (2) of Annex N.*

B.1.2.6 Other Annexes Potentially Requiring METOC Input.

- Annex D, Logistics (see Logistics Estimate)
- Annex M, Mapping, Charting, and Geodesy
- Annex P, Wartime Host-Nation Support
- Annex Z, Distribution

B.2 NATO/PfP (Partnership for Peace) Format

METOC operations can be documented in Annex T or Annex U, METOC Support. The ad hoc Combined Joint Task Force (CJTF) will probably finalize the format. The following layout is similar to what is typically used:

1. Plan Identification (operations plan being implemented, if any)

2. References

3. Task Organization (in an exercise environment, may be Time Zone)

4. Situation

   a. General (can reference the basic Operations Order (OPORD))
   b. Strategic Conceptions, Scope, and Objectives (similar to objectives listed in "Mission", para. 2 of Annex H of a U.S. OPORD)
   c. Risk Assessment and Enemy Forces (probably N/A; could address safety, force protection, supportability, and communications risks)
   d. Centers of Gravity (critical aspects of METOC operations)
   e. Friendly Forces (can reference basic OPORD)
   f. Attachments and Detachments (may not be used)
   g. Assumptions (similar to Annex H para. 1.b.; may want to include additional NATO factors)
   h. Planning Factors and Constraints (similar to Annex H para. 1.c.)
      - Include general characteristics of the region (may be included in appendixes to the annex)

5. Mission (similar to Annex H para 2, "Mission")
   This format can include specific missions being supported, if known.

6. Execution

   a. Commander's Intent (JMO's intent)

b. Concept of Operations (similar to Annex H para 3.a.)
c. Task Allocation (similar to Annex H para 3.b.)
d. Coordination and General Tasks (similar to Annex H Para 3.c., "Coordinating Instructions")
e. Service Support
   - Designate production centers and supporting commands' responsibilities

7. Command and Signal
   a. Communications (circuits, backup, etc.)
   b. Effectiveness of Support (report deficiencies in support)
   c. Control of Information (for naval forces, exercise of METCON/OCCON/ICECON)

Appendix C - METOC Impacts on Operations

Purpose: This appendix provides a list of METOC impacts for typical operations (ground, air, naval, amphibious), various platforms, and weapons systems. *This is not an all-inclusive list.* Critical METOC thresholds are determined by operational commanders. *The METOC values listed below are examples* of critical thresholds, which can significantly reduce the effectiveness of tactical operations or weapon systems. *During the planning phase of each exercise or operation, METOC limiting factors and thresholds must be reevaluated to ensure mission success.*

Joint missions are affected by a wide variety of METOC conditions. Mission planners must be aware of METOC factors that will affect their operations, ensuring the greatest chance of mission success. All planners must be familiar with critical METOC thresholds in order to effectively use weapon systems and to provide maximum safety for friendly personnel. Planners must communicate their mission-specific thresholds to METOC personnel, so that 'heads-up' alerts can be issued. METOC personnel must be knowledgeable about critical METOC thresholds for the weapon systems they support, to ensure they provide important information required by decision-makers.

Weather impacts are typically provided in "stoplight" format:

green	***(Favorable)***	***minimal operational impacts***
amber	***(Marginal)***	***moderate operational impact***
red	***(Unfavorable)***	***severe operational impact***

C.1 Ground Thresholds

OPERATIONS:	FAVORABLE	MARGINAL	UNFAVORABLE
NBC	WIND < 5 KTS	WIND 5 - 10 KTS	WIND> 10KTS
CHEMICAL	WIND TO ENEMY		WIND FM ENEMY
	NO PRECIP	LGT PRECIP	MDT PRECIP
	CLG>5000FT		
	NO LTNG	LTNG<3.1NM	
	HUM>60%	30%<HUM<60%	HUM<30%
*EACH CHEMICAL AGENT HAS ITS OWN SPECIFIC METOC CRITERIA			
NBC SMOKE	WND> 5 KTS	WND 5-18KTS	WND > 18KTS
			TEMP >120F
	LGT PRECIP	MOD PRECIP	HVY PRECIP
	VIS>1000M	400M<VIS<1000M	VIS<400M
			SFC INVERSION

PERSONNEL/ LAND	20< TEMP<85F	-15F TO 20F	TEMP>95F or <-15
	LGT PRECIP	MOD PRECIP	HVY PRECIP
PERSONNEL/	CIG >1000FT		
AIRBORNE	WNDS < 17KTS	WND 13-17KTS	WND>18KTS
	NO PRECIP	LGT PRECIP	MOD PRECIP
		DENS ALT 4000-6899F	DENS ALT>6900F
FARP	TSTMs > 25nm	TSTMs WITHIN 5-25nm	TSTMs W/IN 5 NM
CROSS COUNTRY MANEUVERS	GROUND/DRY	GROUND MOIST	GROUND WET
	RAIN < .1IN/HR	>1” RAIN/12 HRS	>2”RAIN/12HR OR
		OR > .1”/HR	> .5”/HR
	VIS > 3200M	VIS 1000-3199M	VIS < 1000M
	NO SNOW	SNOW ACC<6IN	SNOW ACC>6IN
	CLG>3000FT	1000FT<CLG<3000 FT	CLG<1000FT
			TEMP>89.6F,<32F
	WND<20KTS	20KTS<WND<30KTS	WND>30KTS
			ILLUM<10FCAND
BRIDGING	WND LT 10KTS	WNDS >= 10KTS	WNDS >= 35KTS
ARMOR GUN SIGHTING	VIS > 2000M	VIS 1000 - 2000M	VIS < 1000M
TOW	VIS > 3000M	VIS 2000 - 3000M	VIS < 2000M
HELO OPS	CIG > 500FT	CIG 300 - 500 FT	CIG < 300FT
	VIS > 1600M	VIS 800 - 1600M	VIS < 800M
		LGT TURBC/ICING	MDT TURB/ICING
HELLFIRE	CIG > 2000FT	CIG 800 - 2000FT	CIG < 800FT
	VIS > 5000M	VIS 3000 - 5000M	VIS < 3000M
LOBL- LOCK ON BEFORE LAUNCH	CIG > 1900FT	CIG 400 - 1900FT	CIG < 400FT
	VIS > 7000M	VIS 500 - 7000M	VIS < 500M
LOAL-LOCK ON AFTER LAUNCH	CIG > 1700FT	CIG 800 - 1700FT	CIG < 800FT
	VIS > 7000M	VIS 1700 - 7000M	VIS < 1700M

COPPERHEAD	CIG > 3000FT VIS > 2500M NO PRECIP	CIG 1000 - 3000FT VIS 1000 - 2500M MDT PRECIP	CIG < 1000FT VIS < 1000M HEAVY PRECIP
AIR SUPPORT	CIG > 2000FT VIS > 8000M	CIG 1000 -2000 FT VIS 3200 - 8000M	CIG < 1000FT VIS < 3200M
PARADROP	SFC WND< 13 KTS	SFC WND 13-18 KTS	SFC WND>18 KTS
ARTILLERY	CLG> 1500FT VIS > 3000M WND< 30KTS LGT PRECIP	CLG 600-1499FT VIS 1000-2999M WND 30-35KTS MOD PRECIP	CLG < 600FT VIS < 1000M WND >35KTS TEMP< 20F >125F HVY PRECIP <10-3 FTCANDLE
COMBAT SFC SUPPORT	LGT PRECIP	MOD PRECIP	HVY PRECIP
AIR DEFENSE	CLG > 5000FT WND<20KT	CLG 2500-4999FT 20KT<WND<30KT	CLG < 2500FT VIS < 5000M TEMP>120F WND>30KT ILLUM<10-3FTCAND

C.2 Air Thresholds

OPERATIONS:	FAVORABLE	MARGINAL	UNFAVORABLE
CONVENTIONAL BOMBING MIDLEVEL	>= 3/8 CLDS BELOW	>= 5/8 CLDS BELOW	<= 6/8 CLDS BELOW
CONVENTIONAL BOMBING LOWLEVEL500FT OVER TERRAIN	CIG>= 2000FT VIS >= 5NM NO ICG/TURB AT FL	CIG >= 500FT VIS >= 3NM LGT ICG/TURB AT FL	CIG < 500FT VIS < 3 NM MDT ICG/TURB AT FL
DRONES (UAV)	CIG > 6000FT VIS > 8000M ALT WND<40KTS SFC WND<=15KTS	CIG 4000-6000FT VIS 5000-8000M ALT WND 40-60KTS	CIG < 4000FT VIS < 5000M ALT WND>60KTS SFC WND> 15KTS

	HEAD WND<=25KTS		HEAD WND>25KT
	TEMP 25-125F		TEMP<25,>125F
	PRECIP-NONE	PRECIP LGT	PRECIP-MDT
RECON-HIGH	<4/8 CLD COVER	4/8 CLD COVER	>4/8 CLD COVER
	VIS > 6000M	VIS 3700-6000M	VIS < 3700M
RECON LOW	CIG > 4000FT	CIG 2000-4000FT	CIG < 2000FT
RECON GRD	VIS > 3000M	VIS 1000-3000M	VIS < 1000M
AERIAL REFUELING	FL VIS>=6NM	FL VIS >=1NM	FL VIS <=1NM
	NO ICG/TURB	LGT ICG/TURB AT FL	MDT ICG/TURB
	NO TSTMS	NO TSTMS W/IN 25NM	TSTM W/IN 10NM
TACTICAL AIRLIFT	CIG >=1000FT	200<=CIG>= 500FT	CIG<= 200FT
	VIS >= 5NM	1/2NM<=VIS>= 3NM	VIS <= 1/2NM
	LGT ICG	MDT ICG	SVR ICG
	LGT TURBC AT FL	MDT TURBC AT FL	SVR TURBC
INFRARED SYSTEMS	TRANS >=.6	TRANS>=.3	TRANS < .3
	NO FOG	LGT FOG	FOG
	VIS >= 1NM		VIS <= 1NM
	NO PRECIP	LGT PRECIP	PRECIP
PREDATOR	NO PRECIP	LGT PRECIP	MOD PRECIP
	CROSSWIND< 10KTS	CRWND 10-15KTS	CRWIND> 15KTS
	SUS WND < 20KTS	SUS WND 20-30KTS	SUS WND > 30KT
	CLG > 2000FT	CLG 800-2000FT	CLG< 800FT
	VIS > 3 NM	VIS 2-3NM	VIS < 2NM
	CLD COVER< 30%	30%-50%CLD COVER	CLD COVR > 50%
	NO ICING	LGT ICING	MDT/SVR ICING
	LGT TURBC	LGT- MDT TURBC	MDT TURBC
	TEMP>-19C AT 18000	<-19C BELOW 18000	<-19C BLW 13000
			FREEZING PRECIP

COMBAT SFC SUPPORT	CLG> 1500FT	CLG 200-1499FT	CLG < 200FT
HELO (GEN)	CLG > 1000FT	CLG 300-999FT	CLG < 300FT
HELO (ATTACK)	CLG > 2600FT	CLG 1100-2599FT	CLG < 1100FT
	VIS > 3200M	VIS 1000 - 3199M	VIS < 1000M
	WND < 25KTS	WND 25-40 KTS	WND > 40 KTS
			TEMP > 90F
	PRECIP LT	PRECIP MOD	PRECIP HVY
	NO TSTMS	SCAT TSTMS	FEW TSTMS
CLOSE AIR SUPPORT/AIR INTERDICTION	CLG> 3500FT	CLG 1000-3499FT	CLG <1000FT
	VIS > 3200M	VIS 1600-3199M	VIS < 1600M
	NO TURBC	LGT-MOD TURBC	HVY TURBC
ELECTRICAL OPTICAL/ NVG	CLG SCT	CLG BKN-OVC	CLG OVC
	FULL MOON	MOONRISE	NO MOON
	ABS HUM< 14g/m3	ABS HUM 14-18 g/m3	ABS HUM>18g/m3
	TRANSMITTANCE>.4	TRANS .2-.4	TRANS<.2
	ICING		
	TURBULENCE		
INTEL/ ELECTRONIC	WND< 30KTS	WND 30-45KTS	WND > 45KTS
	TEMP 33-84F	TEMP 85-120F	TEMP< 32F,>120F
	NO PRECIP	.1IN/HR<PRE<.5IN/HR	PRECIP>.5IN/HR
	CLG>3000FT	1000FT<CLG<3000FT	CLG>3000FT
	VIS > 1NM		
	NO TSTMS		TSTMS W/IN 3NM
	ILLUM>=10-3FTCAND		
INTEL/ RECCE	CLDS < 45%	CLDS 45-55%	CLDS > 55%
	TGT SFC VIS > 2000M	1000<SFC VIS<1999M	TGT SFCVIS<1KM
NVG- NIGHT VISION GOGGLES	> 5 MILLILUX	2.5 5 MILLILUX	<2.5 MILLILUX

C.2.1 Weather Sensitivities for Air Combat Command (ACC) and Marine Corps Aircraft.

Aircraft Type:	A-10
Max X-Wind Comp:	25 Kts
RCR#:	
Max X-Wind for RCR#:	
Induction Icing Thresholds:	
Icing:	Lgt may degrade msn, cannot operate in fcst mdt
Turbulence:	May operate in lgt, avoid mdt or greater
Lightning/TSTMS:	Avoid all TSTMs
In-Flight Refueling:	Vsby >= 1nm

Aircraft Type:	B-1		
Max X-Wind Comp:	30 Kts		
RCR#:	0 to 5	6 to 8	>8
Max X-Wind for RCR#:	No Ops	15	20
Induction Icing Thresholds:	Critical for engine start: Temp <= +47F with RH >= 50% and visible moisture present. Visible moisture includes fog (vby<= 1nm), rain, wet snow, etc.		
Icing:	Icing limits operations		
Turbulence:	Avoid mdt/svr, prohibited from mdt/svr mtn waves.		
Lightning/TSTMS:	10nm below FL250, 20 nm at and above.		
In-Flight Refueling:	FL180 to FL210, vsby >= .5nm		
Remarks:	Very sensitive to induction icing. Crew may ask for LL and aerial refueling route forecasts.		

Aircraft Type:	B-2
Max X-Wind Comp:	30 Kts
RCR#:	
Max X-Wind for RCR#:	
Induction Icing Thresholds:	Critical for engine start , temp at or below 4C, with relative humidity greater than or equal to 50 percent and visible moisture preent. Visible moisture includes fog, (vis < 1 m), rain, snow, water or slush on ramp, etc.
Icing:	Limited anti-icing, no de-icing equipment, avoid all areas of observed icing.
Turbulence:	Cat 4 aircraft with few turbulence limitations except during refueling.
Lightning/TSTMS:	Avoid all thunderstorms by 25 nm.
Radar:	Weather radar mode installed.
In-Flight Refueling:	Altitude 21-26,000 ft, vis > 0.5 nm or more
Flight characteristics:	Cruise airspeed - 350 kts, range - 500 nm (depend on flight altitude profile), endurance - 10-12 hrs, maximum cruise altitude - 50,000 ft, normal cruise altitude - 30,000 ft.

Aircraft Type:	B-52
Max X-Wind Comp:	34 Kts
RCR#:	0 to 5 6 to 8 Greater than 8
Max X-Wind for RCR#:	No Ops 15 Kts 20 Kts
Induction Icing Thresholds:	Temp <= +47F and visible moisture. Visible moisture includes fog (vsby <= 1nm), rain, wet snow, etc. Temp <= +47F and the Tdp is within +40F of the temp even though visible moisture is not present.
Icing:	May operate for short periods in mdt
Turbulence:	May operate in mdt
Lightning/TSTMS:	10nm below FL250, 20nm at and above
In-Flight Refueling:	Vsby >= .5nm
Remarks:	Aircrew may ask for LL and aerial refueling route forecasts.

Aircraft Type:	C-17
Max X-Wind Comp:	25 Kts
RCR#:	
Max X-Wind for RCR#:	
Induction Icing Thresholds:	Temp < 7C with precip., or standing water or ice present, temp < 7C with dew point depression < 4C, dew point temp between -4C and -1C and relative humidity > 80 percent.
Icing:	Some anti-icing equipment, may operate in light-moderate.
Turbulence:	May operate in moderate turbulence, no operations in areas of forecast or observed severe.
Lightning/TSTMS:	Avoid all thunderstorms by 10 nm (below 23,000 ft) and 20 nm (above 23,000 ft).
Radar:	Weather radar installed.
In-flight Refueling	Altitude 22-27,000 ft, vis > 1 nm or more.
Flight characteristics:	Cruise Airspeed - 500 kts high alt, 350 kts low alt. Range - 2500 nm (loaded, no refuel). Endurance - 7 hrs. Max cruise alt - 45, 000 ft. Normal cruise alt - 31,000 ft.

Aircraft Type:	C-130
Max X-Wind Comp:	35 Kts
RCR#:	3 4 5 6 7 8 9 0 11 12 23
Max X-Wind for RCR#:	2 5 7 10 12 15 17 20 22 25 35
Induction Icing Thresholds:	
Icing:	Avoid svr
Turbulence:	Avoid svr
Lightning/TSTMS:	10nm below FL250, 20nm at and above (5nm tactical); must brief potential for lightning.
Aircraft Type:	E-3
Max X-Wind Comp:	15 Kts
RCR#:	Acft may not taxi when <6

Max X-Wind for RCR#:	
Induction Icing Thresholds:	
Icing:	Prefers operating outside of icing areas
Turbulence:	Avoid all turbc
Lightning/TSTMS:	Avoid all TSTMs
In-Flight Refueling:	Vsby >= 1nm

Aircraft Type:	E-4			
Max X-Wind Comp:	30 Kts			
RCR#:	0 to 5	6 to 8	9 to 13	>13
Max X-Wind for RCR#:	No Ops	10	15	20
Induction Icing Thresholds:				
Icing:	Avoid svr			
Turbulence:	Avoid svr of fcst svr, may operate in mdt			
Lightning/TSTMS:	10nm below FL230, 20nm at and above			
In-Flight Refueling:	Vsby>= 1nm			

Aircraft Type:	F-15
Max X-Wind Comp:	30 Kts
RCR#:	
Max X-Wind for RCR#:	
Induction Icing Thresholds:	
Icing:	May penetrate areas, no loitering
Turbulence:	Avoid mdt or greater
Lightning/TSTMS:	
In-Flight Refueling:	Vsby >= 1nm

Aircraft Type:	F-15E
Max X-Wind Comp:	30 Kts
RCR#:	
Max X-Wind for RCR#:	
Induction Icing Thresholds:	
Icing:	Anti-icing equipment, no loiter in icing operating conditions.
Turbulence:	Avoid observed moderate-severe turbulence.
Lightning/TSTMS:	10nm below FL250, 20nm at and above (5nm tactical); must brief potential for lightning.
Inflight refueling:	Vis > 1 nm.
Radar:	Weather depiction radar mode.
Flight characteristics:	Cruise alt - 515 kts. Range -1800 nm, ferry w/ dropped tanks. Endurance - 3.5 hrs. Max cruise alt - 45,000 ft. Normal cruise alt - 36,000 ft.

Remarks:	Typical mission climb to combat cruise altitude (22-28,000 ft) at 475 kts, refuel inbound to target area (22-24,000 ft). Normal combat duration 20 min., refueled outbound. Note: future F-22 will have similar weather sensitivities.

Aircraft Type:	F-16
Max X-Wind Comp:	**25 kts**
RCR#:	5 23
Max X-Wind for RCR#:	5 20
Induction Icing Thresholds:	Values vary by unit operating the acft; 40F may be critical
Icing:	Minimize duration of icing conditions
Turbulence:	May degrade msn and acft
Lightning/TSTMS:	
In-Flight Refueling:	Vsby >= 1 nm

Aircraft Type:	F-111 / EF-111A
Max X-Wind Comp:	40 Kts
RCR#:	Wet runway
Max X-Wind for RCR#:	25 (day) 15 (night)
Induction Icing Thresholds:	
Icing:	Icing degrades acft operations
Turbulence:	May operate in lgt/mdt
Lightning/TSTMS:	Avoid all TSTMs
In-Flight Refueling:	FL180 to FL300, vsby >= .5nm

Aircraft Type:	F-117
Max X-Wind Comp:	25 kts dry runway
RCR#:	wet runway
Max X-Wind for RCR#:	15 kts
Induction Icing Thresholds:	Engine icing can occur between ambient air temp -29 C (-20 F) and 4 C (40 F), if dew point is within 4 C (7 F) of ambient air tem. Accumulated sheets of thick ice may break off inlet components when engine anti-ice is turned on.
Icing:	Anti-icing equipment installed at inlets, de-icing for wings, avoidance policy
Turbulence:	Avoid areas of moderate-severe turbulence
Lightning/TSTMS:	Must avoid all TSTMS by 10 nm. Avoid all hail, no matter what size.
In-Flight Refueling:	Vsby >= 0.5nm, 18,000-22,000 FT.
Radar:	Limited weather depiction radar using FLIR.
Flight characteristics:	Cruise Airspeed: 450 kts (max level speed 560 kts. Range: 900 nm. Endurance: 2 hrs. Max cruise alt: 25,000 ft. Normal cruise alt: 20,000 ft.

Aircraft Type:	KC-10
Max X-Wind Comp:	30 Kts
RCR#:	0 to 5 6 to 8 >8
Max X-Wind for RCR#:	No Ops 20
Induction Icing Thresholds:	
Icing:	Icing limits operations
Turbulence:	Avoid mdt or greater
Lightning/TSTMS:	10nm below FL230, 20nm at and above
In-Flight Refueling:	Vsby>= .5nm
Remarks:	Cannot T/O with >.5in of slush or water on runway or 4 in of dry snow on runway. Crew may need aerial refueling route forecast.

Aircraft Type:	KC-135
Max X-Wind Comp:	25 Kts (C-135 & WC-135 = 30 kts)
RCR#:	0 to 5 6 to 8 >8
Max X-Wind for RCR#:	No Ops 20
Induction Icing Thresholds:	
Icing:	May operate up to 10 min in mdt, never in svr or fcst svr. WC-135 may operate up to 15 min in mdt
Turbulence:	Avoid mdt or greater
Lightning/TSTMS:	10nm below FL230, 20nm at and above
In-Flight Refueling:	Some KC-135s refuelable; EC, WC and RC-135s are refuelable.
Remarks	Cannot T/O with >.5 in of slush or water on the runway. Pilots may need height/temp of tropopause and temp at flight level. Crew may need aerial refueling route forecast. C-135 is allowed to T/O and Lnd when afld is below published wx minimums.

Aircraft Type:	T-38
Max X-Wind Comp:	25 Kts
RCR#:	
Max X-Wind for RCR#:	
Induction Icing Thresholds:	
Icing:	Avoid all icing
Turbulence:	May operate in lgt/mdt
Lightning/TSTMS:	Avoid by at least 20nm
In-Flight Refueling:	No capability

Aircraft Type:	TR-1/U-2
Max X-Wind Comp:	15 Kts
RCR#:	0 to 5 6 to 8 >8

Max X-Wind for RCR#:	No Ops 15
Induction Icing Thresholds:	
Icing:	Avoid all icing
Turbulence:	Avoid more than ocnl lgt
Lightning/TSTMS:	10nm below FL250, 20nm at and above
In-Flight Refueling:	No capability
Remarks:	Max X-Wind Comp man depend on pilot's experience

Aircraft Type:	HH-1/UH-1
Max X-Wind Comp:	15 Kts
RCR#:	
Max X-Wind for RCR#:	
Induction Icing Thresholds:	
Icing:	Avoid all icing
Turbulence:	May operate in areas of lgt/mdt
Lightning/TSTMS:	Avoid all TSTMs
In-Flight Refueling:	No capability
Remarks:	Operates under visual wx conditions only

Aircraft Type:	HH-3/CH-3
Max X-Wind Comp:	
RCR#:	
Max X-Wind for RCR#:	
Induction Icing Thresholds:	
Icing:	Avoid all icing
Turbulence:	May operate in areas of lgt/mdt
Lightning/TSTMS:	Avoid all TSTMs
In-Flight Refueling:	
Remarks:	Vsby >= 1nm

Aircraft Type:	AV8B (Harrier)
Conventional Take Off (CTO)	20 kts day/night
Short Take Off (STO)	> 120 kts - 15 kts day/night; < 120 kts - 10 kts
Rolling Vertical Take Off	10 kts day/5 kts night
Vertical Take Off (VTO)	10 kts
NOTE:	Crosswind components of 20 kts are red, 10-19 kts are amber, less than 10 kts is green. Unless there is some limitation, the aircraft may be turned into the wind for a vertical takeoff.
Landings w/ approach speeds	> 140 kts - 20 kts day/night; < 140 kts - 15 kts day, 10 kts night

NOTE:	Daytime - > 20 kts red, < 15 kts green. Nighttime - > 15 kts red, < 10 kts green
Remarks:	Uses the All Weather Landing System (AWLS). The AWLS is authorized for use down to ceilings of 400 feet and visibility of 1 mile. Displays typical airframe reactions to thunderstorms, water ingestion, icing and turbulence.

C.2.2 Air Mobility Command (AMC) Operational Airdrop Limits.

EQUIPMENT AIRDROPS:	**SFC WND LIMITS**
AF EQUIPMENT USING GROUND DISCONNECTS	17KTS
AF CDS USING G-12 PARACHUTES	13KTS
AF CDS USING G-13/14 PARACHUTES	20KTS
HAARS OR HIGH VELOCITY CDS.	NO RESTRICTION
AF TRAINING BUNDLES	25KTS
NON-AF EQUIPMENT	SUPPORTED DZCO DISCRET
PERSONNEL DROPS:	
AF STATIC LINE (LAND)	13KTS
AF STATIC LINE (WATER)	17KTS
AF HALO/HAHO	17KTS
UNILATERAL PARARESCUE (WATER)	22KTS (S/L), 25KTS (HGRP)
UNILATERAL PARARESCUE (TREE)	17KTS
NON-AF PERSONNEL	SUPPORTED DZCO DISCRET

C.3 Navy/Amphibious Thresholds

OPERATIONS:	**FAVORABLE**	**MARGINAL**	**UNFAVORABLE**
NAVAL REFUEL	WV HGT < 5 FT	WV HGT 5-9FT	WV HGT > 9FT
	WND < 20 KTS	WND 20-30 KTS	WND > 30 KTS
FLT OPS CARRIER	WV HGT< 7 FT	WV HGT 7-12 FT	WV HGT > 12FT
	WND < 25 KTS	WND 25-35 KTS	WND > 35 KTS
	VIS> 3NM	VIS .5NM-3NM	VIS<.5NM
	CLG > 1500FT	200FT-1500FT	CLG < 200FT
			TEMP>89.6F,<32F
	RAIN< .01IN/HR	01IN/HR<RAIN>.5IN/HR	RAIN>.5IN/HR
	LTNG> 5NM FM SHIP	1.2NM<LTNG>5NM	LTNG<1.2NM
ASM (MISSILE OPS)	WV HGT< 6FT	WV HGT 6-10FT	WV HGT> 10 FT
ASW (ANTI- SUB WARFARE)	WV HGT< 6FT	WV HGT 6 -10FT	WV HGT > 10 FT

SPODS-SEAPORTS		SFC WND 20-35 KTS	SFC WND>35 KTS
		PRECIP .1-2IN/12HRS	PRECIP>2.1IN/12
APODS-AIRPORTS		1500FT AGL/4800M	200FT AGL/900M
		8-12 RCR	< RCR 8
AIR TO AIR AFTER VISUAL	NO CLDS +/- 5000FT	NO CLDS +/- 3000-	CLDSW/IN3000FT
	FM FLT LVL	5000FT FM FLT LVL	OF FLT LVL
	FL VIS >= 5NM	FL VIS >= 3NM	FL VIS < 3NM
	NO CONTRAILS		
PATROL BOAT OPS	WV HGT < 8FT	WV HGT 8-12FT	WV HGT > 12FT
	WIND < 25KTS	WND 25-40KTS	WND > 40 KTS
PERSONNEL OPS			WATER 32 DEG F
Use Water Chill with or w/out Anti-Exposure Suit nomogram for hypothermia/survival parameters			
AMPHIB OPS General	WV HGT < 6FT	WV HGT 6-8FT	WV HGT > 8FT
	WND < 20KTS	WND 20-30 KTS	WND > 30KTS
			MSI > 6
			LITT CURR>3KT
			RIPTIDE
			TEMP>89.6F,<32F
	CLG>3000FT	1000FT<CLG<3000 FT	CLG<1000FT
	NO TSTMS		TSTMS W/IN 3NM
NVG'S	HIGH > .0022 LUX	MED .0011-.0022 LUX	LOW < .0011 LUX
AIR ASSAULT (H-53/CH-46/COBRA)	VFR	SVFR	IFR
DAY	>1000FT/>3MI	500-1000FT/1-3MI	<500 FT/<1MI
NIGHT	>1000FT/>3MI	500-1000FT/<3MI	<1000FT/<3MI
***SURFACE WINDS**	<25 KTS	25-45 KTS	> 45 KTS

**Relative winds must be within ship launch envelope*

***WATERBORNE ASSAULT (GENERAL)**			
CCRC	SS1	SS2	> SS2
LCM8	SS2	SS3	> SS3
LCU	SS2	SS3	> SS3
LCAC	SS3	SS4	> SS4
(Surf and/or combined seas have greater impact on exiting well deck rather than onshore arrival)			
**Landing Craft parameters based on normal troop loadout for AMW assault.*			
Max Surf			
CCRC	< 2 FT	2-3 FT	> 3 FT
LCM8	< 6 FT	6-7 FT	> 7 FT
LCU	< 6 FT	6-7 FT	> 7 FT
LCAC	< 7 FT	7-8 FT	> 9 FT
Winds			
LCAC	< 25 KTS	> 25-30 KTS	> 30 KTS
Breaker Type			
LCAC	Spilling	Surging	Plunging (steep)
Littoral Current (LCU)	< 1 KT	1-2 KTS	> 2 KTS
(This is very generalized and can change significantly depending on user/mission type.)			
Modified Surf Index (MSI)			
LCM8	< 7	7-8	> 8
LCU	< 11	11-12	> 12
LCVP	< 4	4-5	> 5
****SIG Breaker HGT***	0-4 FT	4-8 FT	8-12 FT
LCAC	75 tons overload	60 tons (normal)	45 tons (reduced)
*MSI criteria does not impact LCAC operations, limiting conditions for LCAC operations are based on load size and significant breaker heights.			
AMPHIB MARINE WARFARE / HELO	CLG > 5000FT VIS > 4800M	CLG 300-4999FT VIS 1000-4799M	CLG < 300FT VIS < 1000M

AMPHIB MARINE WARFARE/ LND CRAFT	CMBD SEAS < 1FT MSI< 8 BRKER HGT< 5FT WAKE PERIOD> 8SEC	CMBD SEAS 1-5FT SURF IND 8-10 BRKER HGT 5-8FT WAKE PERIOD 6-7SE	CMBD SEAS> 5FT SURF IND > 10 BRKER HGT>8FT WAKE PRD<6SEC
ANTI-SFC WARFARE / OVER THE HORIZON	SEAS < 6FT LGT PRECIP	SEAS 6-8FT MDT PRECIP	SEAS > 8FT HVY PRECIP TEMP > 103F WNDS > 60 KTS
COMBAT SFC SUPPORT	CMBD SEAS < 12FT VIS > 400M	CMBD SEAS 12-19FT	CMBD SEA> 19FT
MINESWEEPER WARFARE (MIW) / AVIATION	WND< 25KTS	WND 25-35KTS	CLG< 300FT VIS > 1000M WND>35KTS
MIW EOD DIVERS	CURRENT< 1KT CMBD SEAS < 3FT	CURRENT 1-2 KT CMBD SEAS 3-5FT	CURRENT >2FT CMBD SEA > 5FT
MIW/ HUNT	CMBD SEAS < 3FT WND< 20 KTS	CMBD SEAS 3-5FT WND 20-30 KTS	CMBD SEA > 5FT WND > 30 KTS
MIW/SWEEP	CMBD SEAS< 3FT	CMBD SEAS 3-6FT	CMBD SEA > 6FT

C.4 Special Operations.

The U.S. Special Operations Command publishes critical Meteorological and Oceanographic thresholds for SOF operations. The current version is on the USSOCOM SIPRNET homepage (http://soop.socom.smil.mil/html/metocadm.html). METOC elements, critical thresholds, and impacts on operations are provided for the following areas:

- Appendix A. USASOC Critical METOC Thresholds
  - Army Special Operations Aviation/Airdrop
  - Ground Operations
  - Communications/Electro-Optical/Infrared Operations
  - Maritime/SCUBA/Swim Operations
  - Psychological Operations/Civil Affairs

- Appendix B. AFSOC Critical METOC Thresholds
  - MC-130E/H/P, Combat Talon I & II
  - HC-130P Combat Shadow
  - AC-130H/U Specter

  - C-130 Pathfinder
  - C-141 SOLL II
  - CASA 212
  - MH-53J PAVE LOW III E/MH-60 PAVE HAWK
  - MH-60G Shadow Hawk
  - Airborne Operations: Personnel
  - Airborne Operations: Equipment

- Appendix C. Naval Special Warfare Critical METOC Thresholds
  - Parachute Operations
  - SEAL Delivery Vehicle (SDV) Operations
  - Combat Rubber Raiding Craft (CRRC):
  - MK IV Patrol Boat (PB)
  - Mini-Armored Troop Carrier (MATC)
  - Patrol Boat, Light (PBL)
  - Patrol Boat, Riverine (PBR)
  - Rigid Inflatable Boat (RIBS)
  - High Speed Boat (HSB)
  - Patrol Craft (PC)
  - MK V Special Operations Craft (MK V SOC)
  - Swimmer Operations

C.5 Space Weather Impacts on Systems

Tutorials on space weather and impacts are available from 55 Space Weather Squadron (SIPRNET http://204.20.247.68/index_tutor.htm).

C.5.1 Space-Based Systems.

- *Satellite Operation*. As satellites are used more and more to support warfighters, space weather effects on satellites become more important. Geomagnetic storms and high-energy particles from solar flares can cause satellites to behave abnormally and become useless for extended periods. In the most extreme cases, these events can cause permanent failure of a satellite.

- *SATCOM*. Many theater warfighters are becoming increasingly reliant upon satellite communications (SATCOM), which is susceptible to scintillation. Scintillation produces a rapid fluctuation in signal strength similar to the shimmering effect sometimes visible over a road on a hot summer day. This “shimmering” causes a SATCOM signal to fade or be lost completely for short periods of time, hindering or preventing communications. Scintillation is most severe at high latitudes and within about 25 degrees of the equator. In addition to scintillation, radio bursts from solar flares produce interference (usually for less than an hour) for ground receivers that are pointed towards the sun.

- *GPS Navigation*. Scintillation also affects GPS navigation signals. Under extreme conditions, GPS signals could be intermittently lost for several hours at a time. Potentially, the signals from enough satellites could be lost as to cause loss of navigation capability. This is especially important for GPS-guided munitions and GPS-guided aircraft landings. In addition, extreme bending of GPS signals by the ionosphere can introduce errors of up to 100 meters in single frequency GPS receivers.

- *High Altitude Aircraft.* High energy particles from solar flares can pose a significant radiation hazard to pilots of high altitude reconnaissance aircraft.

C.5.2 Ground-Based Systems.

- *HF Radio Systems*. HF (or shortwave) communications reflect signals off of the ionosphere, enabling radio transmissions over large distances. Since the ionosphere can be highly variable, shortwave communications depend heavily on good space weather conditions for operation. X- rays from solar flares can change the ionosphere so much that sometimes shortwave radios cannot operate for one to two hours over the whole sunlit half of the earth. Geomagnetic storms and high-energy particles from flares can cause shortwave radio blackouts over and near the polar regions that can last for days.

- *LF and VLF Navigation Systems*. During solar flare-induced disturbances, LF and VLF systems can experience large errors and signal problems.

- *Compass Navigation.* Intense geomagnetic storms can cause errors to compass readings.

- *Radar returns.* Solar flare activity and resulting geomagnetic storms can cause false returns and radar interference if the radar is pointed poleward or sunward.

Appendix D - Joint Operational Area Forecast (JOAF) Examples

D.1 JOAF Format

Consider use of existing bulletins as the JOAF. If a new product is required, a suggested format could include:

- Remarks
- Prognostic Discussion
- Forecast out 24 hours (for Area 1, Area 2, *etc*. Include clouds, winds, temperature, weather, visibility, etc.)
- Forecast out 48 hours (for Area 1, Area 2, *etc*.)
- Impacts on warfare areas (air, ground, amphibious, etc.)
- Astronomical data
- Tides/sea data
- TAFs available:
- Next JOAF / coordination

D.2 JOAF Examples

D.2.1 JOAF Example 1.

EXER/JTFEX 95-1//
SUBJ/JOINT OPAREA FORECAST//
POC/FURZE/CDR/J335/(804) 322-5990 EXT 7744/DSN 836-5990 EXT 7744//
RMKS/1. INTENT OF THIS MESSAGE IS ALIGNMENT OF WEATHER FORECASTS THROUGHOUT THE JOINT TASK FORCE. DAILY UPDATES TO THIS OPAREA FORECAST WILL BE ISSUED PRIOR TO 1700Z. DIRECT QUESTIONS TO CJTF 950 METOC.
2. PROGNOSTIC DISCUSSION: HIGH PRESSURE OVER KARTUNA, KORONA AND TELARI MOVES NORTH-NORTHEAST INTO THE LABRADOR SEA. AN INTENSE ARCTIC LOW OVER THE WESTERN GREAT LAKES MOVES EASTWARD. ASSOCIATED COLD FRONT EXTENDING SOUTH THROUGH TELARI MOVES RAPIDLY OFF THE EAST COAST BY SATURDAY EVENING. A NEW LOW DEVELOPS OVER SOUTHEAST KORONA SATURDAY MORNING. MERGES WITH THE FRONTAL SYSTEM (FORE MENTIONED) AND MOVES RAPIDLY NORTH-NORTHEAST ALONG FRONT. 1038MB HIGH OVER MIDWEST MOVES EASTWARD TO WESTERN TELARI SUNDAY, PRODUCING STRONG NORTHWEST FLOW OVER THE OPAREA. HIGH REMAINS IN PLACE THROUGH WEDNESDAY.
3. FORECAST FOR COASTAL REGION AND 150 NAUTICAL MILES OFFSHORE FROM KORONA NAVAL BASE 1 (NORFOLK, VA) TO SABANI AIR BASE 1:
A. SATURDAY- CLOUDY WITH MIXED AND FROZEN PRECIPITATION IN NORTHERN TELARI, NORTHEAST KORONA AND KARTUNA. HEAVY RAIN/ EMBEDDED SHOWERS THROUGHOUT REMAINDER OF THE OPAREA. MODERATE SOUTHEAST FLOW AHEAD OF FRONT WILL VEER AND BECOME STRONG WEST-NORTHWEST AFTER FRONTAL PASSAGE. SEA STATE 5 BECOMING 6, EXCEPT COASTAL, SEA STATE 2.
B. SUNDAY- CLEARING RAPIDLY OVER ENTIRE OPAREA AS HIGH PRESSURE RIDGES SOUTHEAST. STRONG NORTHWEST WINDS OVER NORTHERN TELARI AND ADJACENT WATERS; MODERATE NORTHERLY FLOW OVER SOUTHERN TELARI, KORONA AND KARTUNA; STRONG NORTHERLY FLOW OVER GULF OF SABANI. TEMPERATURES 18-22F,

WIND CHILLS -11F INLAND, 28-32F COASTAL. SEA STATE 5 BECOMING 6 OVER THE GULF STREAM, EXCEPT COASTAL.
C. MONDAY- CLEAR TO PARTLY CLOUDY. WINDS LIGHT AND VARIABLE OVER LAND, MODERATE NORTHERLY FLOW OFFSHORE. SEA STATE 5, 4 IN SOUTHERN GULF OF SABANI.
D. TUESDAY- CLEAR TO PARTLY CLOUDY WITH COASTAL MORNING FOG OVER SOUTHERN KORONA AND SOUTHEASTERN TELARI. WINDS LIGHT AND VARIABLE OVER LAND REGIONS OF OPAREA. MODERATE NORTHERLY FLOW OVER GULF OF SABANI. SEA STATE 5 DIMINISHING TO 4 NOON.
E. WEDNESDAY- CLEAR TO PARTLY CLOUDY WITH COASTAL MORNING FOG. WINDS LIGHT AND VARIABLE OVER ENTIRE OPAREA. SEA STATE 4 DIMINISHING TO 2.
4. WEATHER IMPACTS ON WARFARE THRU FIVE DAYS :

	SAT	SUN	MON	TUE	WED
AIROPS	RED	GREEN	GREEN	GREEN	GREEN
AMPHIB OPS	RED	YELLOW	GREEN	GREEN	GREEN
AIR/LAND OPS	RED	YELLOW	GREEN	GREEN	GREEN
MARITIME	RED	RED	YELLOW	GREEN	GREEN//

D.2.2 JOAF Example 2.

/OPER/UPHOLD DEMOCRACY/
MSGID/GENADMIN/NAVLANTMETOCDET GTMO//
SUBJ/JOINT OPAREA FORECAST/ JOAF (PART TWO)//
RMKS/1. SYNOPTIC SITUATION AT 050000Z: AREA OF LOW PRESSURE NR 29N 76W IS MVG EAST AT 08 KTS. ASSOCIATED TROF XTNDS SWD FROM LOW THROUGH THE FL STRAITS INTO THE EASTERN GULF OF MEXICO AND IS SLOWLY MVG SOUTH, AND WILL INFLUENCE THE HAITI AND GTMO OPAREAS ON THURSDAY. EASTERLY TRADES PREVAIL OVER THE CARIBBEAN WITH RIDGING FROM THE MIDDLE ATLANTIC HIGH INFLUENCING THE NORTH-CENTRAL AND NORTHEASTERN CARIBBEAN. WAVE PREVIOUSLY ALONG 70W IS NOW NR 75W SOUTH OF 17N MVG W AT 12 KTS AND WILL NOT AFFECT THE HAITI OR GTMO OPAREAS. ANOTHER WAVE ALONG 64W MVG W AT 10-15 KTS WILL WEAKEN AS IT MOVES UNDER AN AREA OF UPPER LEVEL CONVERGENCE AND WILL NOT AFFECT THE OPAREAS. ELSEWHERE, WAVES ARE LOCATED ALG 53W, AND 35W MVG W AT 10-15KTS.//
2. 24 HR FCST COMMENCING AT 050600Z OCT 94 FOR THE FOLLOWING AREAS:
3. CITY OF PORT-AU-PRINCE:
A. SKY/WX: PTLY CLDY OCNL MSTLY CLDY WITH ISOLD RASH/TSTMS THRU EARLY AFTN AND EVENING HOURS.
B. VIS (NM): UNRSTD, 1-3 IN PRECIP
C. SFC WINDS (KTS): ESE 4-8, INCRG 6-12 BY MID MRNG, THEN BCMG WESTERLY 10-15 BY MID AFTN (SEABREEZE). ESE 4-8 AFT SUNSET.
D. MAX/MIN TEMP (F/C): 95/35, 78/26.
E. ASTRONOMICAL DATA (ALL TIMES ZULU) COMPUTED FOR 18.5N 72.3W
SUNRISE: 05/1041 SUNSET: 05/2235
MORNING NAUTICAL TWILIGHT: 05/0954
EVENING NAUTICAL TWILIGHT: 05/2322
MOONRISE: 05/1100 MOONSET: 05/2300
PCT MOON ILLUM: 00
SUNRISE: 06/1041 SUNSET: 06/2234
MORNING NAUTICAL TWILIGHT: 06/0954
EVENING NAUTICAL TWILIGHT: 06/2321
MOONRISE: 06/1204 MOONSET: 06/2351
PCT MOON ILLUM: 04

F. PORT-AU-PRINCE TIDES (FT) VALID 05 OCT - 08 OCT (ALL TIMES ZULU)

HIGH: TIME	HEIGHT	LOW: TIME	HEIGHT
05/1318	1.91	05/0636	.22
06/0112	1.44	05/1942	.48
06/1412	2.02	06/0718	.12
07/0154	1.39	06/2036	.52
08/0242	1.34	07/1506	2.08

4. 24 HR FCST COMMENCING 050600Z FOR FOLLOWING AREAS:
THE GULF OF GONAIVES TO INCLUDE SEAWARD OF PORT-AU-PRINCE (EAST OF A LINE FROM 19.6N 73.4W TO 18.4N 74.5W).
NORTH OF HAITI AND NORTHERN WINDWARD PASSAGE (NORTH COAST OF CUBA AT 75.4W TO 21.5N 75.4W TO 21.5N 70.6W TO NORTH COAST OF HAITI AT 70.6W COASTAL TO 19.6N 73.4W TO 20.2N 74.2W COASTAL TO COAST OF CUBA AT 75.4W) SOUTH OF HAITI (18.4N 74.5W TO 18.4N 75.4W TO 17.3N 75.4W to 17.3N 70.6W TO SOUTH COAST OF DOMINICAN REPUBLIC AT 70.6W COASTAL TO 18.4N 74.5W)
A. SKY/WX: PTLY CLDY OCNL MSTLY CLDY WITH ISOLD RASH/TSTMS OVER LAND AREAS MID AFTN/'EARLY EVENING, AND OVER WATER AREAS MIDNIGHT TO SUNRISE.
B. VIS (NM): UNRESTRICTED, 1-3 IN PRECIP.
C. SFC WINDS (KTS): ESE 10-15 KT, XCPT SSW 10-15 KTS NORTH OF HAITI AND THE WINDWARD PASSAGE DUE TO RIDGING FROM THE MIDDLE ATLANTIC HIGH.
D. SEAS (FT): ESE 2-4, XCPT EAST 1-2 IN EASTERN GULF OF GONAIVES. SSW 2-4 NORTH OF HAITI AND WINDWARD PASSAGE.
5. 24 TO 48 HR OUTLOOK: DEVELOPING WAVE ALONG SURFACE TROF NR 25N 74W WILL CREATE AN AREA OF LOW LEVEL CONVERGENCE OVER HAITI AND EASTERN CUBA ENHANCING CONVECTIVE ACTIVITY THURSDAY. EXPECT MSTLY CLDY SKIES WITH SCATTERED RASH/ISOLD TSTMS. WINDS SSW 10-15 KTS, SEAS SSW 3-5 FT.
6. 48 TO 72 HR OUTLOOK: NORMAL DIURNAL CONDITIONS RETURN AS WAVE TRACKS NE AND WEAKENS. PTLY CLDY TO MSTLY CLDY SKIES WITH ISOLD RASH/TSTMS. WINDS E 10-15 KTS, SEAS E 2-4 FT.
7. 3 TO 5 DAY OUTLOOK: XPCT CONTD NORMAL DIURNAL CONDITIONS THROUGH THE PERIOD. WAVE NEAR 53W WILL APPROACH THE HAITI OPAREA BY SUNDAY WITH MOST OF THE CONVECTIVE ACTIVITY REMAINING SOUTH OF 18N.
8. REQ SHIPS IN OPAREA AND WATERS SURROUNDING HISPANIOLA PROVIDE 6 HRLY/3HRLY WX OBS AND UA SOUNDINGS TO:
NAVLANTMETOC DET GUANTANAMO BAY CU//00//JMFU//
9. 24 HR TAFS (02Z, 08Z, 14Z, 20Z) AND HOURLY OBS FOR PORT AU PRINCE AND CAP HATIEN ARE AVAILABLE UNDER HEADERS KQUU AND KQUW, RESPECTIVELY.
10. NEXT JOAF 060202Z.
11. MINIMIZE CONSIDERED. RELEASED BY LCDR HELM//
SUBJ/JOINT OPAREA FORECAST/JOAF (PART THREE)//
RMKS/24 HR TAFS FOR THE FOLLOWING LOCATIONS:
1. PORT AU PRINCE:
TAF 1818 27005KT 9999 SCT010 SCT030 BKN100 QNH 2980INS CIG100 BCMG 2223 09005KT 9999 SCT010 BKN030 BKN100 QNH2984INS CIG030 VCTSRA TILL 03
2. CAMP D APPLICATION:
TAF 1818 2800515KT 9999 SCT015 SCT030 BKN080 QNH2980INS CIG100 VCSHRA TEMPO 2203 3200 TSRA BKN020 OVC030 CIG020 BCMG 0506 12009KT 9999 SCT030 SCT080 BKN250 QNH2983INS CIG250
3. CAP HAITIEN:
TAF 1818 32007KT 9999 SCT030 BKN080 QNH2980INS CIG080 VCSHRA WND VRBO4 AFT 05 TEMPO 2002 VRB10G15KT 4800 TSRA SCT020 BKN030CB OVC055 CIG030 BCMG 1415 03009KT 9999 SCT030 SCT250 QNH2984INS
4. GONAIVES:
TAF 1818 27005KT 9999 BKN030 BKN100 BKN250 QNH2985INS CIG030 VCSHRA TEMPO 2202 VRB10G15KT 4800 -TSRA BKN020CB BKN030 OVC080 CIG020 BCMG 0405 12003KT 9999 SCT030 SCT080 BKN250 QNH2985INS

5. JACMEL:
TAF 1818 16012G15KT BKN030 BKN080 BKN250 QNH2985INS CIG030 VCSHRA
TEMPO 2003 VRB15G20KT 3200 TSRA BKN015CB BKN030 OVC080 CIG015 BCMG 0506
18005KT 9999 SCT030 BKN080 BKN250 QNH2983INS CIG080
6. TAFS WILL BE ISSUED AT 00Z, 06Z, 12Z, 18Z
7. MINIMIZE CONSIDERED. RELEASED BY CAPT REINS//
BT

D.2.3 JOAF Example 3.

SUBJ/JOINT AREA FCST (JOAF)//
RMKS/ THE MISSION PLANNING FORECAST WILL BE METWATCHED AND AMENDED AS REQUIRED//
1. FLIGHT MINIMUM DEFINITIONS:
VFR: GTE CIG040, VIS 8000
MVFR: CIG039-020, VIS 7000-6000
IFR: LT CIG020, VIS 6000
2. JOAF NUMBER 347. VALID 100900Z TO 110900Z DEC 95.
A. SYNOPTIC SITUATION: HI PRES CONTS TO RDG SOUTHEAST ACRS REGION PRDCG XTNSV LO CLDS AND HVY FOG.
B. MARITIME ADRIATIC FORECAST
WEATHER: MSTLY CLDY OCNLY OVC
WIND (KTS): NORTH: NORTHEAST 10-15 CNTRL/SOUTH: EASTLY 6-12
TURBC: NONE
ICING: NONE
MAX/MIN TEMP (F/C): 50/10 46/08
MIN ALTSTG: 30.49
SEAS (FT): NORTH: NORTHLY 1-3 CNTRL/SOUTH: NORTHEAST 1-2
SEA SURFACE TEMP (C): NORTH: 15 CNTRL: 15-16 SOUTH: 16
DITCH HEADING (MAGNETIC): NORTH: 330 CNTRL/SOUTH: 110
C. COASTAL REGION UP TO DINARIC ALPS
AREA FORECAST: 2000 BR SCTVBKN050/010 BKNOVC020/040 TEMPO 0921 0800 FG OVC006 BECMG 2123 0800 F BKNOVC005/010 TEMPO 2109 2000 BR SCTVBKN 010/020
TURBC: NONE
ICING: NONE
MAX/MIN TEMP (F/C): 46/08 43/06
MIN ALTSTG: 30.47
D. CENTRAL MOUNTAIN REGION AROUND SARAJEVO AND TUZLA
AREA FORECAST: 0400 FG BKNVOVC005/008 BKNOVC 015/030 TEMPO 1021 2000 BR SCTVBKN010/030
TURBC: NONE
ICING: NONE
MAX/MIN TEMP (F/C): 36/02 32/00
MIN ALTSTG: 30.39
E. ZAGREB AND NORTHERN REGION
AREA FORECAST: 0400 FG BKNVOVC010/030 TEMPO 1120 2000 BR SCTVBKN010/030
TURBC: NONE
ICING: NONE
MAX/MIN (F/C): 34/02 30/M01
MIN ALTSTG; 30.38
F. 48 HOUR OUTLOOK VALID 110900Z DEC 95: HI PRES CONTS TO RDG SOUTHEAST DOMINATG REGION PRDCG 15-20KT BORA WINDS ACRS ENTIRE EASTRN SHORE EARLY IN PRD. FOG AND XTNSV LO CLDS LIFT OVR WATER WHILE LO CLDS AND HVY FOG RMN OVR MTN AREAS.

G. 72 HOUR OUTLOOK VALID 120900Z DEC 95: HI PRES PRESISTS THRU PRD PRDCG SLIGHTLY INCRG BORA WNDS. HVT FOG RMNS OVR MTN REGIONS.
H. FOR ADDITIONAL INFORMATION CONTACT NAVEURMETOCCEN ROTA SP BY MSG OR DSN 727-2410/3985.
FORECASTER: SMITH//

Appendix E - METOC Letter of Instruction (LOI) Examples

E.1 METOC Letters of Instruction

In developing a METOC LOI, be sensitive to differences between the Services. The Air Force tends to be explicit and will explain and task many items in an LOI. The "plan" is developed, and deviations or additional actions are coordinated as required during the "decentralized execution". The Navy minimizes amplifying guidance, maximizing use of existing internal directives. If the CONOPS or LOI doesn't say *not* to do it, you can do it (command by negation). Each mission is much like the previous, and Navy personnel usually know what to do without need for coordination. Suggested format for an LOI (from JP 3-59):

- Originator
- Addressees: units in the JTF, supporting force commanders, and supporting activities
- Classification
- Subject: unclassified exercise/operation name, followed by 'METOC LOI'
- Reference: applicable/supporting OPORDs, OPLANs, etc.
- Points of contact
- Purpose: what does this LOI achieve?
- Situation: why is a joint force METOC operation required?
- Concept of METOC operations: how will the METOC function operate? Can reference Annex H
- Assumptions
- Planning factors: METOC conditions that may affect plan execution
- Mission: METOC objectives in support of the Joint Force Commander's plan
- Execution: time period of expected operations, coordinating instructions, tasks and responsibilities. Paragraph B.1.2.3 of the Handbook includes suggestions for paragraph 3 (Execution) of Annex H that are applicable in an LOI
- Deployment: on-station time
- OPSEC
- Coordination instructions: instructions common to two or more components or subdivisions
- Operational constraints: limiting factors, such as manning or equipment
- Administration and Logistics
- Equipment and Supplies
- Command and Control: command relationships
- METCON, OCEANCON, ICECON, SPACECON: conditions for implementation
- Communications: METOC data flow/availability; homepages, KQ identifiers, etc.
- Reporting: after action reports, equipment/personnel status, product assessments, etc.
- METOC Assistance Requests: how to request special products

E.1.1 METOC LOI Example 1

MSGID/GENADMIN/USEUCOM/J33/DEC//
SUBJ/METOC LETTER OF INSTRUCTION-OPERATION JOINT ENDEAVOR//
REF/A/DOC/CJCS1 3810.01, METERORLOGICAL AND OCEANOGRAPHICAL SUPPORT, 30 JUN 93//
REF/B/DOC/JOINT PUB 3-59, JOINT DOCTRINE FOR METEOROLOGICAL AND OCEANOGRAPHIC SUPPORT, 22 DEC 93//
REF/C/DOC/CINCSOUTH OPLAN 40105, 24 NOV 95//
REF/D/DOC/CINCEUR OPLAN 4243, 2 DEC 95//
NARR/REF A AND B DESCRIBE NOTIONAL METOC SUPPORT TO OPERATIONS. REF C IS THE NATO OPLAN DESCRIBING OVERALL NATO FORCES OPERATIONS IN SUPPORT OF "OPERATION JOINT ENDEAVOR", AND REF D IS THE US SUPPORTING PAGE 03 RUSNMHS1026 UNCLAS
OPLAN TO REF C.//
POC/T. E. COE/MAJ/DSN: 314-430-8141//
RMKS/1. PURPOSE. THIS METOC LETTER OF INSTRUCTION (LOI) IS FORWARDED TO AMPLIFY INFORMATION PROVIDED IN REFERENCE D. COORDINATION BETWEEN NATO METEOROLICAL AND OCEANOGRAPHIC (METOC) ELEMENTS IS CRITICAL FOR OPERATION JOINT ENDEAVOR (JE) IN ORDER TO ACHIEVE UNITY OF EFFORT. THIS LOI DESCRIBES US METOC FORCE AUGMENTATION TO NATO HEADQUARTERS AS REQUESTED BY SHAPE IN THEIR CRISIS ESTABLISHMENT DOCUMENT, AND US FORCES DEPLOYING IN SUPPORT JE.
2. CONCEPT OF OPERATIONS (CONOPS). US METOC PERSONNEL WILL PROVIDE METOC SERVICES AND PRODUCTS TO NATO AND US HEADQUATRERS ELEMENTS, AND TO US FORCES SUPPORTING US, NATO, AND UN OPERATIONS IN THE JE AOR IAW REFERENCES A AND B. SINCE JE IS A NATO OPERATION IAW REF C, ALL US METOC FORCES (EXCEPT TALCE SUPPORT) WILL BE PLACED UNDER THE OPERATIONAL CONTROL OF THE SENIOR US METOC OFFICER (SMO), LOCATED WITH THE NATO IMPLEMENTATION FORCES (IFOR) COMMANDR. THE FOXX BULLETINS PRODUCED BY THE EUROPEAN METOC CENTER (EMC) AT PAGE 04 RUSNMHS1026 UNCLAS
TRABEN-TRARBACH, GE, ARE THE OFFICIAL LAND FORECASTS FOR US OPERATIONS SUPPORTING JE. THE EMC WILL COORDINATE THESE FORECASTS WITH THE NATO UNIFIED WEATHER FORECAST, PRODUCED BY THE AFSOUTH METOC BRANCH AT NAPLES, ITALY; AND WITH THE NAVY EUROPEAN METOC CENTER (NEMOC) AT ROTA, SPAIN. ANY DEVIATION FROM THESE FORECASTS SHOULD BE COORDINATED IN ADVANCE WITH THE EMC. EACH SERVICE COMPONENT WILL COLLECT METOC INFORMATION FROM AND DISSEMINATE INFORMATION TO THEIR SUBORDINATE UNITS (SEE PARAGRAPH 4).
3. LOCATIONS AND TASKS. ALL DEPLOYMENT LOCATIONS ARE CURRENT AS OF 12 DEC 95.
A. IFOR HEADQUARTERS, ZAGREB, HR (KQLM). THE IFOR SENIOR US METOC OFFICER (SMO) WILL DEPLOY TO SUPPORT THE NATO IFOR SENIOR US METOC OFFICER (SMO) WILL DEPLOY TO SUPPORT THE NATO IFOR HEADQUARTERS. HE WILL DPLOY WITH THE AFSOUTH NATO CHIEF MET OFFICER (C MET O), AND ONE AF AND ONE NAVY METOC TECHNICIAN (E-6/E-7). HE WILL BE RESPONSIBLE FOR COORDINATING THE COLLECTION AND DISSEMINATION OF NATO AND US OBSERVATIONS AND FORECASTS. THIS INCLUDES DETERMINING WHICH UNIT WILL PROVIDE THE OFFICIAL OBSERVATION AND/OR FORECAST FOR EACH
PAGE 05 RUSNMHS1026 UNCLAS
LOCATION WHERE THERE IS MORE THAM ONE UNIT. IT IS IMPERATIVE THAT THIS TIME-SENSITIVE DATA BE TRANSMITTED INTO THE AWN / MIST AS SOON AS POSSIBLE. EUCOM WILL DISSEMINTE THE HQ IFOR KQ IDENTIFIER ONCE THEY DETERMINE THE FINAL HQ IFOR DEPLOYMENT LOCATION.

B. ALLIED RAPID RESPONSE CORPS (ARRC) MAIN, SARAJEVO, HR (KQLR). ONE USAF OFFICER WILL DEPLOY TO SUPPORT THE NATO SENIOR MET OFFICER AT THE ARRC, PROVIDING METOC SUPPORT TO THE LOGISTICAL HEADQUARTERS OF THE NATO MAIN FORCE.
C. USAREUR FORWARD, TASZAR, HU (KQKA; AIRFIELD: KQKB; ISB: KQKH). A TWO-OFFICER ELEMENT WILL DEPLOY TO PROVIDE METOC SUPPORT TO THE NATIONAL SUPPORT ELEMENT ON TH EUS MAIN BODY FORCE.
D. 1ST ARMORED DIVISION (1 AD), TUZLA, HR (TOC: KQAC; AIRFIELD: KQLH). THE 1 AD 18-PERSON STAFF WEATHER OFFICE, DET 2, 617 WS, WILL DEPLOY WITH THE PRIMARY US IFOR UNIT. THEY WILL BE RESPONSIBLE FOR PROVIDING ALL METOC SUPPORT FOR THE DIVISION, INCLUDING ALL AIR ASSETS.
E. THERE WILL BE FOUR USAF TACTICAL AIRLIFT CONTROL ELEMENTS (TALCE), LOCATED AT TUZLA, HR; SARAJEVO, HR; TASZAR, HU, AND RHEIN
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MAIN AB, GE. MANNING FOR THESE UNITS HAS NOT BEEN FINALIZED AT THIS TIME; AGAIN, EUCOM WILL DISSEMINATE THE TALCE KQ IDENTIFIERS ONCE THEIR MANNING AND LOCATIONS ARE KNOWN.
F. SPECIAL OPERATIONS FORCES WILL ALSO DEPLOY A NUMBER A NUMBER OF TEAMS INTO THE FORWARD AREAS. EUCOM WILL DISSEMINATE THE KQ IDENTIFIERS ONCE FIRM LOCATIONS KNOWN.
G. DETACHMENT 4, 617TH WEATHER SQUADRON (USAFE) AT TRABEN-TRARBACH, GE WILL PRODUCE THE OFFICIAL US OPERATIONAL FORECASTS (FOXX BULLETINS). THESE BULLETINS ARE/WILL BE ABAILABLE BE VARIOUS MEANS; SEE PARAGRAPH 4.C.
H. THE NAVAL EUROPEAN METOC CENTER (NAVEURMETOCCEN) ROTA, SPAIN WILL PROVIDE THE OFFICIAL ADRIATIC SEA FORECASTS AND SUPPLEMENT DISSEMINATION BY POSTING METOC BULLETINS ON THIER BROADCASTS AND BBS, AS WELL AS COORDINATING SUPPORT WITH COMSIXTHFLT METOC OFFICER FOR FORCES AFLOAT. NAVEURMETOCCEN WILL BE RESPONSIBLE FOR COORDINATING AND POSTING METOC DATA AN THE TAC III SIPRNET (NITES) WORKSTATION FOR
PAGE 07 RUSNMHS1026 UNCLAS
ACCESS VIA THEIR HOMEPAGE.
I. MARITIME METOC FORCES: OA DIVISION - USS WASP, MOBILE ENVIRONMENTAL TEAMS: CDS-14 EMBARKED USS SCOTT, USS SOUTH COAROLINA, AND USS NORMANDY. THE SENIOR METOC OFFICER AFLOAT SUPPORTING JOINT ENDEAVOR WILL COORDINATE METOC SUPPORT FOR AFLOAT UNITS, AS DIRECTED BY COMSIXTHFLT METOC OFFICER IN OPTASK METOC.
4 METOC BULLETINS
A. THE OFFICIAL NATO CENTRALIZED FORECAST FOR JE, THE UNIFIED WEATHER FORECAST (UWF), IS ONLY AVAILABLE ON THE NATO COMMAND AND CONTROL SYSTEM (CCIS). SINCE CCIS IS NOT ROUTINELY ACCESSIBLE TO EVERONE, THE EMC AND NEMOC ROTA WILL CONTINUE TO PRODUCE THE FOLLOWING BULLETINS.
(1) FOXX 21 ETTT: FORECASTS FOR SARAJEVO, SPLIT, SKOPJE, DUBROVNIK, BIHAC, BANJA LUKA, MOSTAR, TUZLA, KAPOSVAR/TASZAR, AND AN ADRIATIC SEA FORECAST. AS UNITS DEPLOY TO TESE LOCATIONS AND BEGIN ISSUING TAFS, THAT LOCATION WILL BE DROPPED FROM THE BULLETIN
(2) FOXX 21 EUTT: LONG-RANGE FORECAST FOR THE FRY. NO CHANGE.
(3) FOXX 23 ETTT: GOUND FORECAST AND IMPACTS TO OPERATIONS FOR SARAJEVO. WILL BE TRANSFERED TO DPLOYED FORCES UPON ARRIVAL.
(4) FOXX 24 ETTT: GROUND FORECAST AND IMPACTS TO PPERATIONS FOR SKOPJE. NO CHANGE.
(5) FOXX 25-26 ETTT: GROUND FORECAST AND IMPACTS TO OPERATIONS FOR ZAGREB AND TUZLA, RESPECTIVELY. WILL BE TRANSFERRED TO DEPLOYED FORCES UPON ARRIVAL.
(6) FOXX 27 ETTT: GROUND AND RAIL MOVEMENT TO THEATER FORECAST. WILL BE EXPANDED TO INCLUDE THEATER LOGISTIC POINTS.
(7) FOXX 35 LERT: ADRIATIC AIR TO AIR REFUELING FORECAST

(8) FOXX 36 LERT: JOINT TASK FORCE PROVIDE PROMISE JOAF, ISSUED BY NEMOC. DISCONTINUED MID-LATE DECEMBER. (COORDINATION REQUIRED BETWEEN EMC, NAVEURMETOCCEN, AND JTFPP METOC OFFICERS.)
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(9) MSME 31 LERT: ADRIATIC SEA FORECAST
(10) WWMM 30/31 LERT: MED, BLACK SEA, BALTIC HIGH WINDS AND SEAS FORECAST.
(11) FOXX15 ETAX: UNOFFICIAL WEATHER INFORMATION FOR TUZLA AND TASZAR.
B. THERE WILL BE TWO NEW BULLETINS COMPILED AND TRANSMITTED BY GMGO; NEITHER HAVE YET BEEN ASSIGNED A NUMBER. ONE WILL BE A THEATER KQ TAF OBSERVATIONS BULLETIN, THE OTHER A THERATER KQ TAF BULLETIN. BULLETIN HEADERS WILL BE PASSED AS SOON AS THEY ARE AVAILABLE.
C. BULLETINS AND DATA WILL BE ROUTINELY AVAILABLE ON THE FOLLOWING SYSTEMS: AWN / MIST, NODDS, AWDS, GMGO SATCOM SYSTEM (MATASSIS), STANDARD THEATER COMMAND AND CONTROL ARCHITECTURE, MSE AND DSN 617 WS BBS (DUDS), 617 WS HOMEPAGE ON INTERNET, 66 MI HOMEPAGE ON SIPRNET, NAVEURMETOCCEN ROTA BBS (JEMEDES), AND NAVEURMETOCCEN ROTA HOMEPAGE ON SIPRENET.
5. REPORTS.
A. MANPOWER TRACKING. HQ USEUCOM, INCLUDING THE METOC BRANCH, IS TASKED TO PROVIDE FORCE STATUS AND TRACKING INFORMATION TO CINCEUR
PAGE 04 RUSNMHS 2636 UNCLAS
AND THE JOINT STAFF FOR ANY DEPLOYMENT, ESPECIALLY THOSE WITH SEVERE MANNING CAPS LIKE JE. TO ACCOMPLISH THIS TASKING, AND TO PREVENT DUPLICATION OF EFFORT AND UNDER-UTILIZATION OF MANPOWER, WE NEED EACH COMPONENT HEADQUARTERS TO PROVIDE A FORCE LIST OF ALL DEPLOYED PERSONNEL, AND THEIR DEPLOYED AND HOME STATION LOCATIONS. WE REQUEST AN INITIAL, BASELINE REPORT NLT 1 JANUARY; THEN FOLLOW-UP REPORTS (IF THERE ARE ANY CHANGES) ONCE PER MONTH NLT THE 10TH.
B. AFTER ACTION REPORTS AND TRIP REPORTS. THE US SMO WILL PROVIDE A REPORT TO HQ USECOM J33-WE WITHIN 10 WORKING DAYS AFTER COMPLETING AN OFFICIAL SMO TDY/TAD TRIP, AFTER BEING REPLACE, OR UPON HQ IFOR DEACTIVATION. THIS REPORT WILL COVER SINIFICANT SMO ACTIVITIES, SIGNIFICANT METOC IMPACTS ON JE OPERATIONS, AREAS OF EXCELLENCE, PROBLEMS ENCOUNTERED/RESOLVED, SHORTFALLS, AND COORDINATION PROBLEMS BETWEEN SMO AND SUBORDINATE METOC SUPPORT ELEMENTS.
C. METOC LESSONS LEARNED. ALL METOC OFFICERS WILL ENSURE ALL SIGNIFICANT LESSONS LEARNED ARE ENTERED IN TO THE JOINT UNIFORMED
PAGE 05 RUSNMHS2636 UNCLAS
LESSONS LEARNED SYSTEM (JULLS).
D. SIGNIFICANT METOC IMPACTS ON OPERATIONS AND SHORTFALLS IN METOC OPERATIONS AND SUPPORT MUST BE INCLUDED IN THE SUPPORTED UNIT'S SITUATION REPORTS (SITREPS). PROVIDE INFORMATION COPIES TO THE SMO, WHO IN TURN WILL PROVIDE THEM TO HQ USECOM METOC BRANCH (USCINEUR VAIHINGEN GE//ECJ33-WE//).//

E.1.2 METOC LOI Example 2

SUBJ: JTF-180 METEOROLGICAL AND OCEANOGRAPHIC (METOC) INITIAL CONCEPT OF OPERATIONS
1. THIS RETRANSMISSION INCLUDES CORRECTED COPY 1, 151530Z SEP 94(S) AND SUPPLEMENT 1, 161514Z SEP 94. THE FOLLOWING REFERENCES STILL APPLY:
A. JOINT PUB 3-59, JOINT DOCTRINE FOR METEOROLOGICAL AND OCEANOGRAPHIC SUPPORT (NOTAL).
B. CJCS INSTRUCTION 3810.01, METEOROLOGICAL AND OCEANOGRAPHIC SUPPORT (NOTAL).

C. CINCUSACOM MSG, 111551Z SEP 94, USACOM ANNEX H TO OPORD UPHOLD DEMOCRACY (NOTAL)
D. CINCUSACOM MSG, 111915Z SEP 94, USACOM OPORD FOR UPHOLD DEMOCRACY (NOTAL)
E. CINCUSACOM MSG, 131656Z SEP 94, JOINT METOC OFFICER (JMO) DESIGNATION (NOTAL).
F. USCINCLANT OPORD 2410-86, WEATHER SUPPORT FOR JOINT OPERATIONS USLANTCOM (NOTAL).
G. NAVOCENCOMINST 3140.1 SERIES, “US NAVY OCEANOGRAPHIC AND METEOROLOGICAL SUPPORT MANUAL” (NOTAL).
H. AR 115-10/AFR 105-3, METEOROLICAL SUPPORT FOR THE US ARMY (NOTAL).
I. ACCR 105-1, AIR COMBAT COMMAND WEATHER SUPPORT (NOTAL).
J. AMCR 105-1, AIR MOBILITY COMMAND WEATHER SUPPORT REQUIREMENTS (NOTAL).

2. PURPOSE: PROVIDE THE CONCEPT OF OPERATION, INSTRUCTIONS AND PLANNING GUIDANCE FOR OPERATION UPHOLD DEMOCRACY PARTICAPANTS.

3. UPHOLD DEMOCRACY IS A CJCS-DIRECTED, US ATLANTIC COMMAND (USACOM) SPONSORED, COMMANDER JOINT TASK FORCE 180 (CJTF-180) EXECUTED, JOINT OPERATION. THE PURPOSE IS TO IMPLEMENT CONTINGENCY FORCES AND STAFF IN SUPPORT OF OTHER CINC’S REQUIREMENTS; IMPLEMENT JTF, COMPONENT TASK FORCES (CTF) AND STAFFS IN PLANNING AND CONDUCTING JOINT OPERATIONS USING CRISIS ACTION PROCEDURES AS WELL AS CONDUCTING JOINT OPERATIONS. THE ENDSTATE WIL RESULT IN DEMOCRATICALLY ELECTED PRESIDENT OF HAITI, JEAN BERTRAND ARISTIDE, BEING RETURNED AS THE HEAD OF STATE. 10 SEPTEMBER 1994 WAS DECLARED C-DAY. D-DAY IS YET TO BE DETERMINED.

4. METOC SUPPORT OBJECTIVES

A. IMPLEMENT JOINT METOC DOCTRINE CONCEPTS AS DOCUMENTED IN CJCS INSTRUCTION 3810-01 AND JOINT PUB 3-59; ENSURE INTEROPERABILITY AND ACHIEVE METOC OPERATIONAL CONSISTENCY IN SUPPORT OF A JOINT FORCES TO PROVIDE UNITY OF EFFORT; AND ENSURE TIMELINESS AND ACCURANCY OF METOC PRODUCTS, IN AN EFFORT TO ENSURE SAFETY OF MILITARY PERSONNEL, AIRCRAFT, AND EQUIPMENT.

5. METOC SUPPORT. DEPLOYED METOC SUPPORT FORCE WILL CONSIST OF: (DEPLOYMENT DATES ARE APPROXIMATE)

	OFF/FCSTR/OBS	SUPPORTED FORCE	LOCATION	DATE
A.	1/1/0	CJTF-180 (MAIN)	FT. BRAGG	C+3
B.	1/0/0	CTF-180 (FORWARD)	MT WHITNEY/PAP	C+4
C.	1/1/0	JFACC/AFFOR	POPE AFB	C+4
(1)	0/3/0	AIR OPS CTR (AOC)	POPE AFB	C+4
(2)	0/3/0	TANKER AIRLIFT CONTROL ELEMENT (TALCE)-1	PORT-AU-PRINCE	C+10
(3)	0/2/1	TALCE-2	CAP HAITTEN	C+10
(4)	1/2/0	AUGMENTATION	ROSEY RDS PR	C+9
(5)	1/2/0	TANKER SUPPORT	HOMESTEAD, FL	
(6)	0/3/0	MISSION SUPPORT	MACDILL, FL	C+6
D. ARFOR				
(1)	1/2/2	82D ABN DIV	PORT-AU-PRINCE	C+6
(2)	0/2/2	82D AVN BDE	HST THEN PEGASUS DZ	C+4
E. NAVFOR				
(1)	6	CTF-185	MT WHITNEY	C+4
(2)	12	CTF-185	EISENHOWER	

(3)	12	CTF-185	WASP	
(4)	12	CTF-185	AMERICA	
F.	1/3/1	JOINT SPECIAL OPS TASK FORCE (JSOTF)	GTMO THEN PAP	C+3
(1)	0/4/0	FORWARD OPERATING BASE (FOB)	PORT-AU-PRINCE	C+12
(2)	1/2/0	AFSOC	GTMO	
(3)	0/1/0	AFSOC	SAVANNAH	C+2
(4)	1/0/0	4TH PSYCHOLGICAL OPS GP (POG)	PORT-AU-PRINCE	C+10
G.	2/5/0	JMFU	GTMO	

6. CONCEPT OF OPERATIONS

A. JTF-180 JOINT METOC OFFICER (JMO). RESPONSIBLE TO THE JTF-180 FOR OVERALL METOC SUPPORT AND FOR EXECUTING METOC SUPPORT FOR OPERATION UPHOLD DEMOCRACY. THE JMO WILL TASK METOC CAPABILITIES AND COORDINATE REQUIRED SUPPORT. THE JTF-180 MAIN JMO WILL REMAIN AT FT BRAGG. ANOTHER WEATHER OFFICER WILL SAIL ON THE USS MT WHITNEY TO SUPPORT THE JTF-180 COMMANDER ON C+4. AT A DESIGNATED TIME PRIOR TO THE D-DAY, THE COMMANDER JTF-180 WILL DEPLOY TO THE USS MT WHITNEY WHERE THE JTF-180 FORWARD WILL FORMALLY STAND-UP AND BE SUPPORTED BY THIS DEPLOYED METOC OFFICER. IF THE CJTF GOES ASHORE, HIS METOC OFFICER WILL ALSO GO ASHORE.
O 171500Z SEP 94 PSN 557688L39

B. JFACC/AFFOR METOC OFFICER. RESPONSIBLE FOR METOC SUPPORT TO ALL SUBORDINATE AIR FORCE UNITS. WILL COORDINATE REQUESTS FOR AIR REFUELING FORECASTS, DROP ZONE FORECAST, AND FLIGHT WEATHER BRIEFINGS AND FORWARD TO THE JMO ANY PRODUCT REQUESTS THAT THE AOC WEATHER CELL CAN NOT FULFILL.

(1) AIR FORCE WINGS FLYING FROM HOME STATION WILL BE SUPPORTED BY THEIR METOC PERSONNEL USING ALL IN-PLACE WEATHER EQUIPEMENT.
(2) TALCE-1. ONE TANKER AIRLIFT CONTROL ELEMENT (TALCE) METOC TEAM WILL DEPLOY WITH A SATELLITE RECEIVER, 9315TRT, AND ESK.
(3) TALCE-2. ANOTHER TALCE METOC TEAM WILL DPLOY WITH A SATELLITE RECEIVER, 9315TRT, AND ESK.
(4) AUGMENTATION. AN AUGMENTATION METOC TEAM WILL DEPLOY TO A FIXED LOCATION
(5) TANKER SUPPORT. A FOURTH METOC TEAM WIL DEPLOY TO A FIXED LOCATION.
(6) MISSION SUPPORT TEAM WILL DEPLOY TO A FIXED LOCATION.
C. ARFOR/82D AIRBORNE DIVISION METOC OFFICER. RESPONSIBLE FOR METOC SUPPORT TO THE 82D AIRBORNE DIVISION (82 ABN DIV0 AND SUBORDINATE UNITS. WILL COORDINATE REQUESTS FOR ANY SPECIAL ARMY PRODUCTS AND FORWARD TO THE JMO ANY PRODUCT REQUESTS THAT THE METOC TEAM AND SUBORDINATE UNITS CANNOT FULFILL. THE 82D ABN DIV METOC TEAM WILL HAVE AN INMARSAT TERMINAL, PRC104 RADIO, PORTABLE SATELLITE AND BWK.

(1) 82 ABN BDE METOC OFFICER. RESPONSIBLE FOR METOC SUPPORT TO THE 82D AVIATION BRIGADE (82D AVN BDE). THE 82 AVN BDE METOC TEAM WILL DEPLOY WITH A PRC104 RADIO, ESK, AND BWK TO A STAGING BASE. THEN MOVE FORWARD INTO THE AO.

D. NAVFOR METOC OFFICER. RESPONSIBLE FOR METOC SUPPORT TO SPECIAL OPERATIONS COMMAND ATLANTIC (SOCLANT) AND ALL SUBORDINATE SPECIAL OPERATIONS UNITS. WILL COORDINATE REQUESTS FOR SPECIAL OPERATIONS METOC

PRODUCTS AND FORWARD TO THE JMO ANY PRODUCT REQUESTS THAT THE JSOTF METOC CELL CAN NOT FULFILL. THE JSOTF METOC CELL WILL DEPLOY WITH AN ESK, GOLDWING, 9315TRT, WRAASE SATELLITE SYSTEM AND BWK.

(1) AFSOC METOC OFFICER. RESPONSIBLE FOR METOC SUPPORT TO THE AIR FORCE SPECIAL OPERATIONS COMMAND AND SUBORDINATE UNITS. WILL COORDINATE REQUESTS FOR SPECIAL PRODUCTS AND FORWARD TO THE JSOTF METOC OFFICER ANY PRODUCT REQUEST THAT THE AFSOC METOC CELL CAN NOT FULFILL.

(2) 3 SFG FOB METOC OFFICER. RESPONSIBLE FOR METOC SUPPORT TO THE 3 SFG FOB. WILL DEPLOY WITH AN ESK, GOLDWING, 9315TRT, AND BELT WEATHER KIT.

(3) 4TH PSYCHOLOGICAL OPERATIONS GROUP (POG) METOC OFFICER. RESPONSIBLE FOR METOC SUPPORT TO THE 4 POG FOR LEAFLET DROPS. WILL DPLOY WITH A MARWIN AND ESK.

F. JMFU. THE JOINT FORECAST METOC UNIT IS COMPOSED OF FORCES DRAWN FROM ALL SERVICES TO ENSURE THAT QUALITY SERVICE-UNIQUE METOC SUPPORT IS PROVIDED. PRODUCTS PROVIDED BY THE JMFU AR LISTED IN PARAGRAPH 9.

7. CENTRALIZED PRODUCTS

A. THE JOINT METOC FORECAST UNIT, ESTABLISHED AT GUANTANAMO BAY, CUBA WILL ISSUE THE JOINT OPERATIONS AREA FORECAST (JOAF) UNDER THE BULLETIN HEADERS FXXX3 JFCA, FXXX4 JFCA, FXXX5 JFCA, FXXX6 JFCA. (AF PIDS 661, 662, 663, 664) THE JOAF IS THE OFFICIAL JOINT FORECAST THAT CAN BE TAILORED FOR USE AT ALL LEVELS. THE JOAF FORECASTS WILL BE IDENTIFIED BY THE HEADERS SWO33, SWO34, SWO35, AND SWO36, RESPECTIVELY. THEY WILL BE ISSUED AT 0201Z, 0202Z. 0203Z, 0204Z (1401Z, 1402Z, 1403Z, 1404Z). THESE BULLETINS ARE AVAILABLE VIA AUTODIN, ON THE AUTOMATED WEATHER NETWORK (AWN) / MIST, AND ON THE AIR FORCE DIAL-IN SYSTEM (AFDIS). ON AFDIS HEADERS ARE: FXX1 (FOR SWO 34 AND SWO 35) AND FXX8 (FOR SWO 33 AND SWO 36). THE JMFU FORECAST SHOULD BE CONSIDERED THE OFFICIAL FORECAT AND IS TO BE USED BY ALL AGENCIES IN THE JOINT FORCE AREA OF OPERATIONS. SIGNIFICANT DEVIATIONS FROM OFFICIAL FORECASTS BY SUBORDINATE ACTIVITES SHOULD BE COOORDINATED WITH THE JMO AND JMFU PRIOR TO ISSUANCE, EXCEPT TO SATISFY AN IMMEDIATE SAFETY OF PERSONNEL OR EQUIPMENT. UNDER SUCH CONDITIONS, COORDINATION WILL BE ACCOMPLISHED AS SOON AS POSSIBLE. COORDINATION WILL ASSIST IN THE ACCOMPLISHMENT OF THE “ONE THEATER/ONE FORECAST” CONCEPT. THE JOAF WILL BE ISSUED TWICE DAILY AT 02Z AND 14Z. A SPECIFIC FORECAST FOR THE CITY OF PORT-AU-PRINCE WILL BE INCLUDED. THIS FORECAST WILL ALSO BE USED AS THE OFFICIAL DROP ZONE FORECAST IN THE EVENT A DROP OCCURS.

B. THE NAVFOR METOC OFFICER ABOARD THE USS MT WHITNEY WILL ISSUE A TAILORED NAVAL OPERATIONAL AREA FORECAST (NOAF) THAT WILL BE SPECIFIC FOR SEA AND NAVAL OPERATIONS. THE NOAF WILL BE IN AGREEMENT WITH HOAF EXCEPT THAT IT WILL BE MORE SPECIFIC. THE HEADER FOR THE BULLETIN WILL BE FXXX3 XXXX (THE PRODUCT IDENTIFICATION NUMBER FOR AF UNITS IS 3413). THIS BULLETIN WILL BE AVAILABLE VIA AWN / MIST REQUEST, AFDIS (FXX2), AND AUTODIN. THE NOAF WIL BE ISSUED AT O4Z AND 16Z. FORMAT WILL BE STANDARD.

C. THE TANKER AIRLIFT CONTROL CENTER (TACC) AT SCOTT AFB WILL ISSUE ALL AIR REFUELING (AR) FORECAST UNDER THE FOLLOWING BULLETIN HEADER FXXX4 XXXX (PID 9096). ONCE THE AFFOR IS IN PLACE, THEY WILL ASSUME THESE DUTIES FOR INTRA-THEATER REQUIREMENTS AS SOON AS EQUIPMENT IS UP AND OPERATIONAL. SEE PARAGRAPH 9(D). THE TACC WILL CONTINUE TO SUPPORT ALL STRATEGIC AIRLIFT

IN AND OUT OF THE AOR. BOTH BULLETINS ARE AVAILABLE VIA THE AWN / MSIT AND AFDIS (FXX2). FOR THE LOCATIONS AND NAMES OF THE AR REFER TO 12 AF AIRSPACE CONTRAOL ORDER (ACO). FOR FURTHER INFORMATION CONTACT THE TACC AT DSN 576-4794/5/6.

D. THE JFACC/AFFOR METOC SUPPORT CELL IN THE AOC WILL TAILOR THE JOAF AND OTHER JMFU PRODUCTS TO PREPARE FORECAST GUIDANCE TO MEET SPECIFIC REQUIREMENTS FOR ALL INTRA-THEATER AIR OPERATIONS: NAVY, AIR FORCE, ARMY AND MARINES. THE BULLETIN HEADER (AND PID FOR AIR FORCE UNITS) IS STILL TO BE DETERMINED). UNITS WILL NEED TO REFER TO THE FRAG ORDER FOR SPECIFIC INFORMATION. THE A/R FORECAST IS NOT A DUPLICATE OF THE FXXX4 JFCA BULLETIN ISSUED BY THE JMFU, OR THE FXXX4 XXXX ISSUED BY THE TACC. THE JFCA/AFFOR METOC CELL A/R FORECAST WILL USE THE JMFU PRODUCT TO PRODUCE A DETAILED A/R FORECAST FOR SPECIFIC MISSIONS.

E. THE NATIONAL HURRICANE CENTER (NHC) , MIAMI , FL, ISSUES CYCLONE BULLETINS WHEN STORMS ARE ACTIVE. BULLETIN HEADERS ARE AVAILABLE ON AFDIS)FXX5). NHC TROPICAL CYCLONE BULLETINS ARE RE-TRANSMITTED FOR ALL DOD UNITS BY NAVLANTMETOCCEN (NLMOC). NLMOC WILL ALSO ISSUE SPECIFIC RECOMMENDATIONS TO SHIPS FOR EVASION OF ADVERES WEATHER.

F. HAITI DMSP AND NOAA SATELLITE PICTURES CURENTLY LOADED IN AFDIS CAN BE PULLED UP UNDET THE FOLLOWING HEADERS: F10I75, F10I75, F10I76, F11I76, N11I75 AN N11I76 FOR IR PICTURES. F10V75, F11V75, F10V76, F11V76, N11V75 AND N11V76 FOR VISUAL PICTURES.

G. RE-LOCATABLE WINDOW MODEL (RWM): THESE PRODUCTS HAVE BEEN REPLACED BY MM5 MODEL OUTPUT PRODUCTS.

H. NAVLANTMETOCCEN NORFOLK IS THE COORDINATING METOC CENTER SUPPORTING THE JMFU. NLMOC WILL ALSO PROVIDE QUALITY CONTROL AND COORDINATION FOR ALL OPAREA FORECASTS.

I. ALL BULLETINS AND ANY SPECIAL PRODUCTS WILL BE AVAILABLE ON THW AWN / MIST AND AFDIS. ACTION ADDRESSES OF THIS MESSAGE WILL ALSO RECEIVE THE JMFU FORECASTS PRODUCTS VIA AUTODIN MESSAGE. THE BULLETINS AND SPECIAL PRODUCTS WILL ALSO BE BROADCAST ON THE ELKHORN HIGH FREQUENCY RADIO BROADCAST (HFRB). ATTEMPTS TO GET HEMESTEAD HFRB UP AND RUNNING ARE UNDER WAY IF OPERATIONAL.

J. NAVLANTMETOCCEN WILL ALSO TRANSMIT DATA PACKAGES VIA THE NAVY HF FAX.

K. THE FOLLOWING KQ-IDENTIFIERS ARE ASSIGNED TO THE FOLLOWING K. THE FOLLOWING KQ-IDENTIFIERS ARE ASSIGNED TO THE FOLLOWING UNITS:

JSOTF - KQGF	TALCE -1 - KQUE
3 SFG FOB - KQGG	TALCE-2 - KQUW
D MAIN - KQGD	AVN BDE - KQGH
FT DRUM - KQGC	

DEPLOYED UNITS THAT TAKE OBSERVATIONS WILL PASS THESE OBSERVATION USING THEIR ASSIGNED KQ VIA COMM LINES OR HF BACK TO THE JMFU FOR INCLUSION IN THE AWN / MIST. ONLY 2 GOLDWINGS ARE BEING DEPOLYED -- THE JSOTF AND FOB.

L. FLENUMMETOCCEN WILL PROVIDE DETAILED BATHYMENTRIC AND BEACH DATA AS CENTERED ON OPAREA. FILDS WILL BE AVAILABLE VIA NITES AND NODDS.

M. NAVOCEANO WILL PROVIDE DETAILED BATHYMETRIC AND BEACH DATA AS REQUIRED. REQUEST SHOULD BE COORDINATED THROUGH NLMOC.

8. REPORTS. SEND SITUATION REPORTS OF PERSONNEL AND EQUIPMENT STATISTIC TO THE JTF-180 METOC OFFICER, LT SHANNON, ABOARD THE USS MT WHITNEY. HE WILL IN TURN COMPILE THE INFORMATION FOR THE FTF COMMANDER AND PASS THE INFOR BACK TO THE JMO FOR INCULSION IN JMO SITREP TO USACOM.. IF YOU CAN NOT REACH THE USS MT WHITNEY, ATTEMPT TO PASS THE INFO TO THE JMFU WHO WILL RELAY IT TO THE JMO.

9. SECURITY. ALL PARTCIPANTS MUST ADHERE TO SOUND SECURITY PRACTICES. FAILURE TO DO SO COULD RESULT IN CASUALTIES. PROTECT ALL CLASIFIED MATERIAL. USE COVERSHEETS AND MARK OR STAMP ALL CLASSIFIED. DO NOT TALK AROUND CLASSIFIED AND USE THE STU-III AT ALL TIMES. REMEMBER, THIS IS NOT AN EXCERCISE AND LIVES DEPEND ON OUR KNOWLEDGE AND SAFEGUARD OF CLASSIFIED INFORMATION.

10. SAFETY. IT GOES WITHOUT SAYING THAT THE ENVIRONMENT COULD BE EXTREMELY DANGEROUS. LEARN ABOUT YOUR SURROUNDINGS IN DAY AND NIGHT. DO NOT TAKE CHANCES AND BE ALERT TO ALL KINDS OF SITUATIONS.

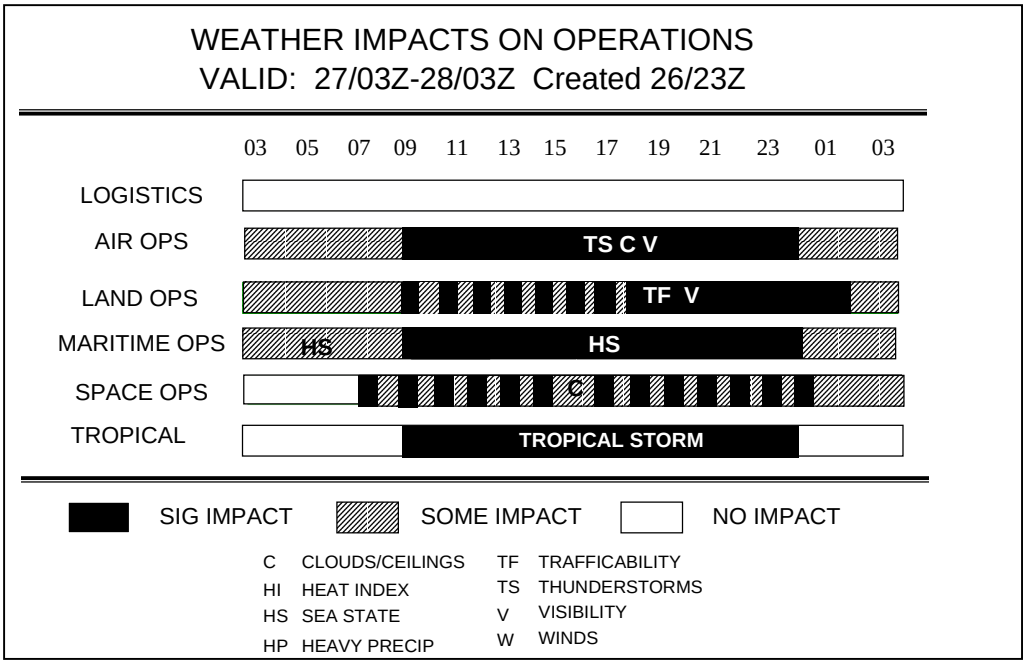
11. FOLLOW-ON OPERATIONS. IN THE EVENT THE SITUATION BECOMES SUCH THAT THE ENVIRONMENT BECOMES PERMISSIVE, USACOM OPORDS 2370-95 AND 2375-95 WILL NOT BE EXECUTED, AND THE 82D AIRBORNE DIVISION WILL NOT FORCIBLY ENTER. INSTEAD, USACOM OPORD 2380-95 (JTF-190 WILL BE EXECUTED AND THE 10TH MOUNTAIN DIVISION WILL ENTER HAITI. FT DRUM WEATHER PERSONNEL (2/10/6) WILL SUPPORT THE 10TH MTN DIV COMMANDING GENERAL WHO BECOMES THE JTF-190 COMMANDER. IN THE EVENT 2375-95 (JTF-180) DOES EXECUTE, THE 10TH MTN DIV WILL FOLLOW0ON AN DWILL RECEIVE THE HANDOFF FROM THE JTF-180 COMANDING GENERAL NLT D+14. THE JTF-180 METOC OFFICER AND 82D ABN AND AVN BDE METOC PERSONNEL WILL DEPART WITH THEIR CUSTOMERS. FT DRUM METOC PERSONNEL WILL FORM THE NEW JTF AND PROVIDE SUPPORT WHER NECESSARY. SOF AND AF METOC FORCES WILL REMAIN UNTIL MISSIONS ARE COMPLETE.

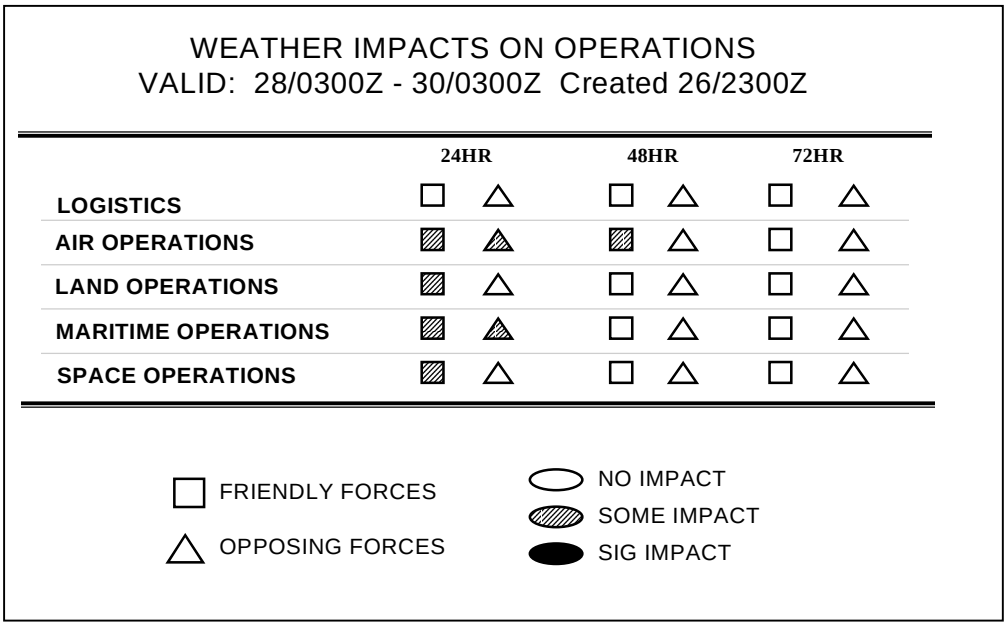
12. JMO SENDS/LTC STANLEY/

Appendix F - METOC Briefing Slides

Caution! Take care to ensure the definitions of red, yellow, and green are widely understood and properly annotated on all briefing packages. Also remember that graphics take a lot of bandwidth to transmit—beware of communications limitations.

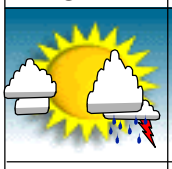
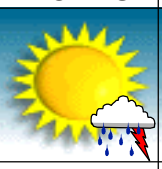
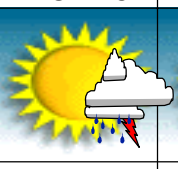
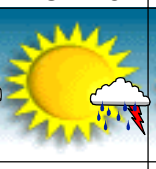
F.1 Joint Task Force Headquarters





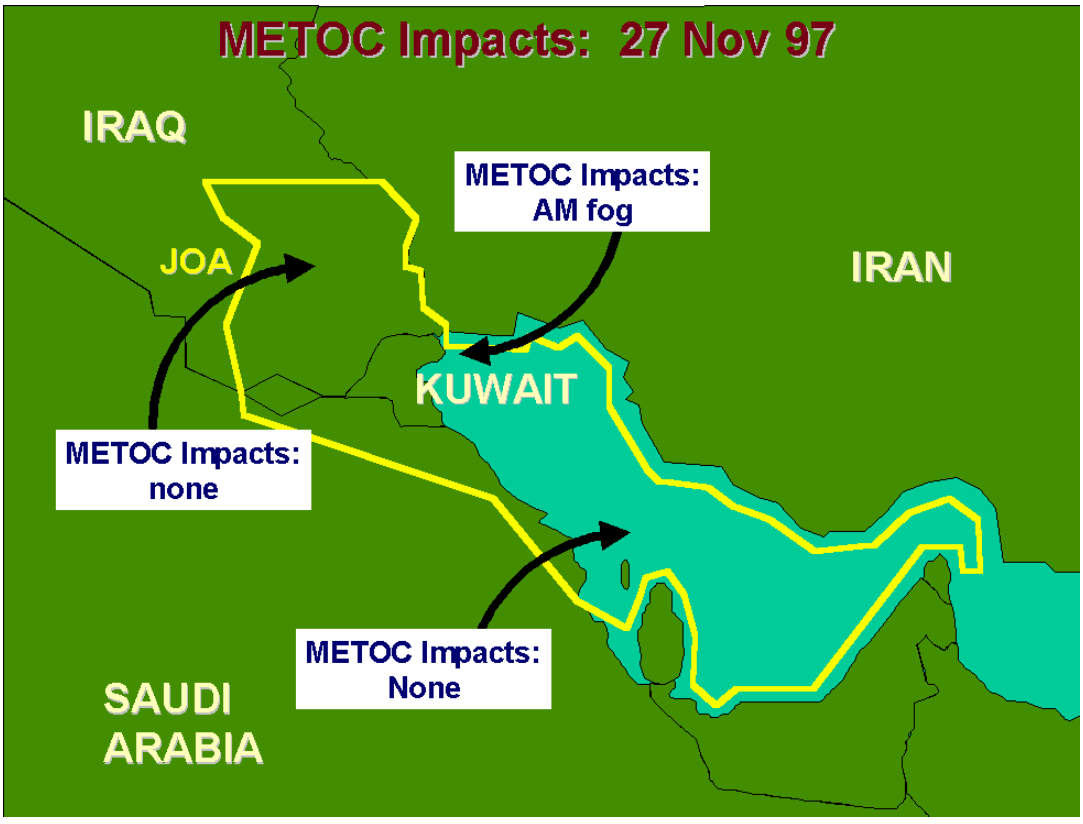
JOINT OPERATIONAL AREA

5-DAY WEATHER OUTLOOK

	Tue Nov 17	Wed Nov 18	Thu Nov 19	Fri Nov 20	Sat Nov 21
FORECAST					
TEMPS	HI: 84F LO: 74F	HI: 86F LO: 76F	HI: 85F LO: 76F	HI: 86F LO: 78F	HI: 86 F LO: 78F
WINDS	LESS THAN 10KTS	LESS THAN 10KTS	LESS THAN 10KTS	LESS THAN 10KTS	LESS THAN 10KTS
SKY/VIS/WX CONDITIONS	080-100BKN WITH PERIODS OF NO CEILINGS 4-6 NM SHWRS	PM: 030-080BKN IN TSTMS	PM: 030-080BKN IN TSTMS	PM: 100-120BKN IN TSTMS	PM: 100-120BKN IN TSTMS
AIRBORNE					
CAS OPS					
RECON					
HELO OPS					
SEA COND	1-3 FT	1-3FT	1-2FT	1-3FT	1-3FT

F.2 JTF / Components

This format is applicable to all slides in this category.



F.3 JFACC

METOC IMPACTS

Valid: 281000Z JUL 96

	28 JULY	29 JULY	30 JULY
OCA/DCA	⬭	⬭	⬭
STRIKE	⬭	⬭	⬭
STRIKE SUP	⬭	⬭	⬭
RECCE	⬭	⬭	⬭
CAS	⬭	⬭	⬭
SOF	⬭	⬭	⬭
LOG	⬭	⬭	⬭

C	Ceiling
P	Precipitation
I	Icing
F	Fog/Haze
V	Visibility
T	Temperature
TS	Thundertorm
WA	Winds Aloft
W	Surface Winds
S	Seas
SF	Surf

⬭ NO IMPACT
▨ SOME IMPACT
● MAJOR IMPACT

SR/SS	0635/1939E	0635/1939E	0636/1938E
MR/MS	1800/0431E	1857/0535E	1952/0641E
MOON ILLUM	92 %	97 %	100 %

BEDDOWN FIELD CONDITIONS

24 Hour Forecast Predominant Conditions

CECIL FIELD	◯	MACDILL	◯
JACKSONVILLE	◯	OPA LOCKA	◯
EGLIN	◯	HOMESTEAD	◯
PATRICK	◯	POPE	◯
KEY WEST	◯	BARKSDALE	◯

◯ VFR CONDITIONS
▨ IFR CONDITIONS
● BELOW FIELD MINS

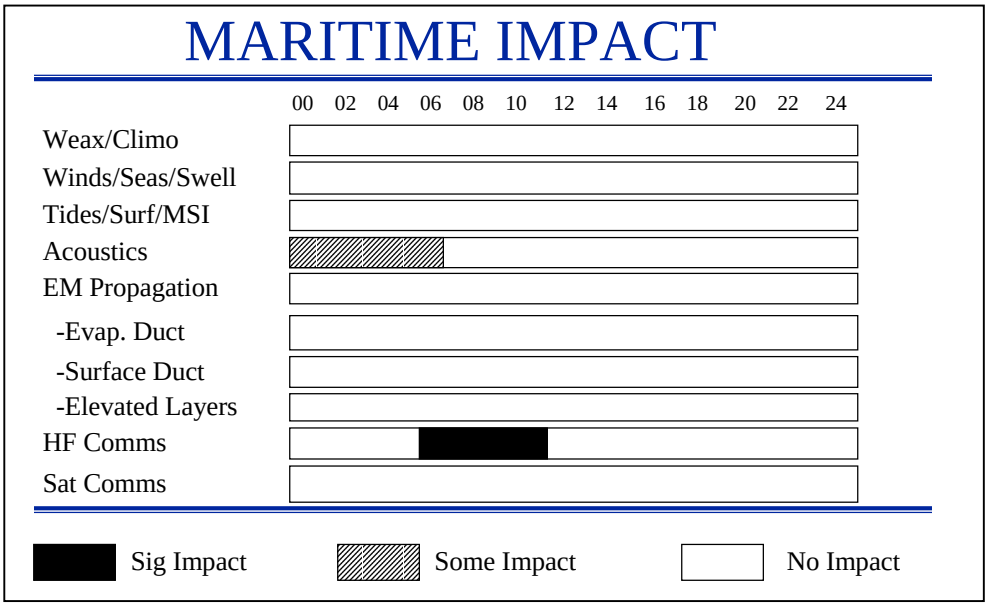
ELECTRO-OPTICS DATA UPDATE

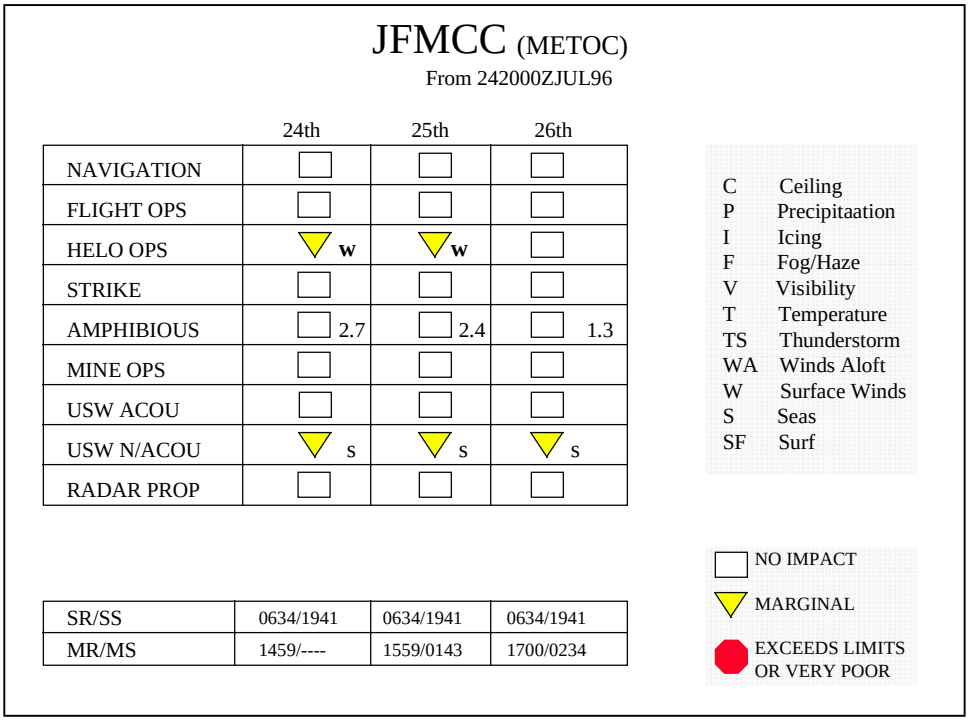
Location: **Target:**

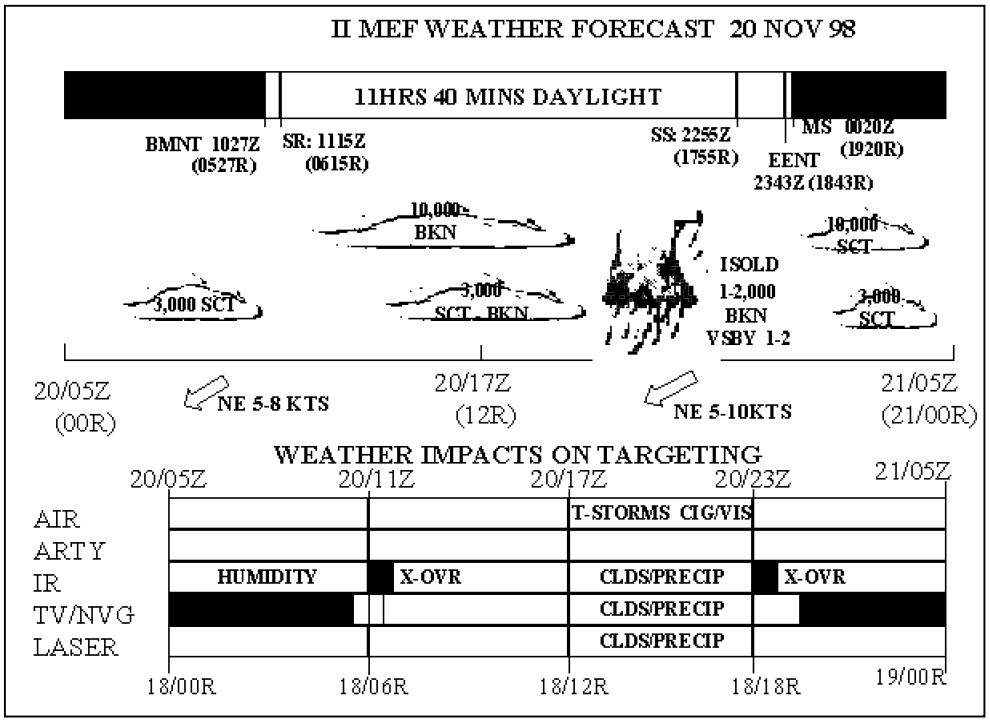
Absolute Humidity: 19 g/m^3
4 km TRANS: 77%

F.4 JFMCC / NAVFOR / MARFOR

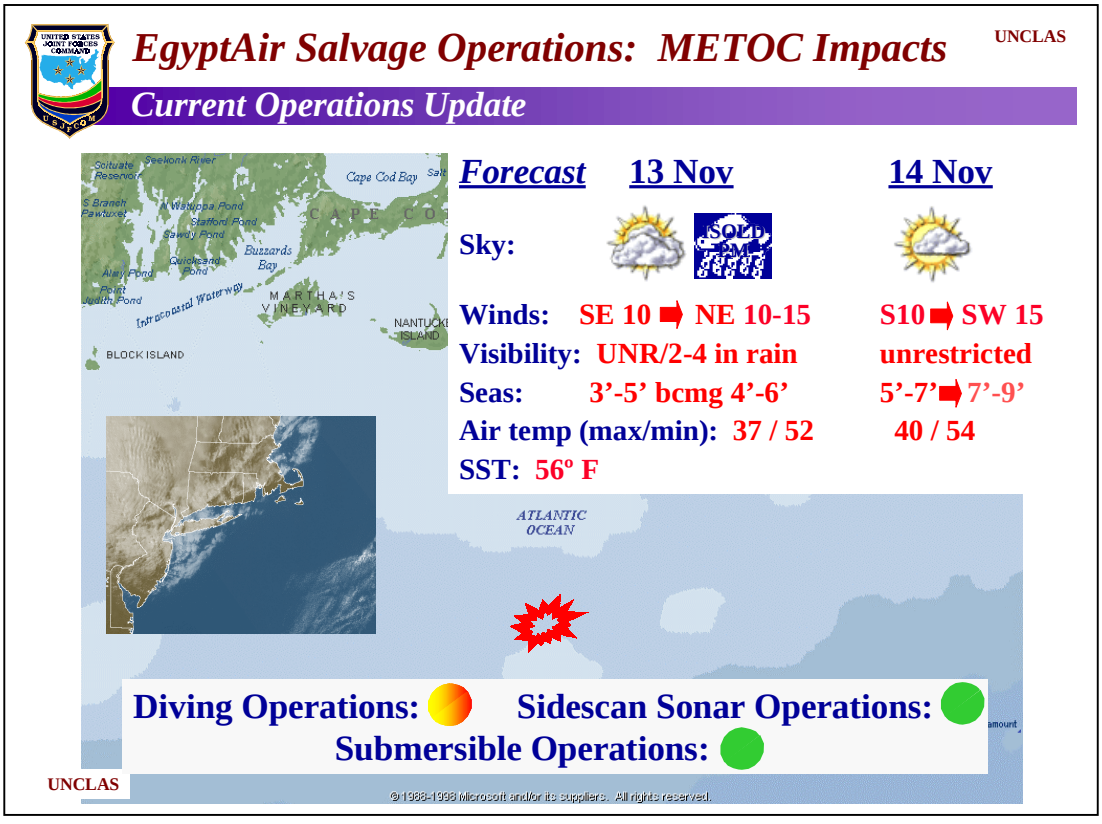
This format is applicable to all slides in this category.

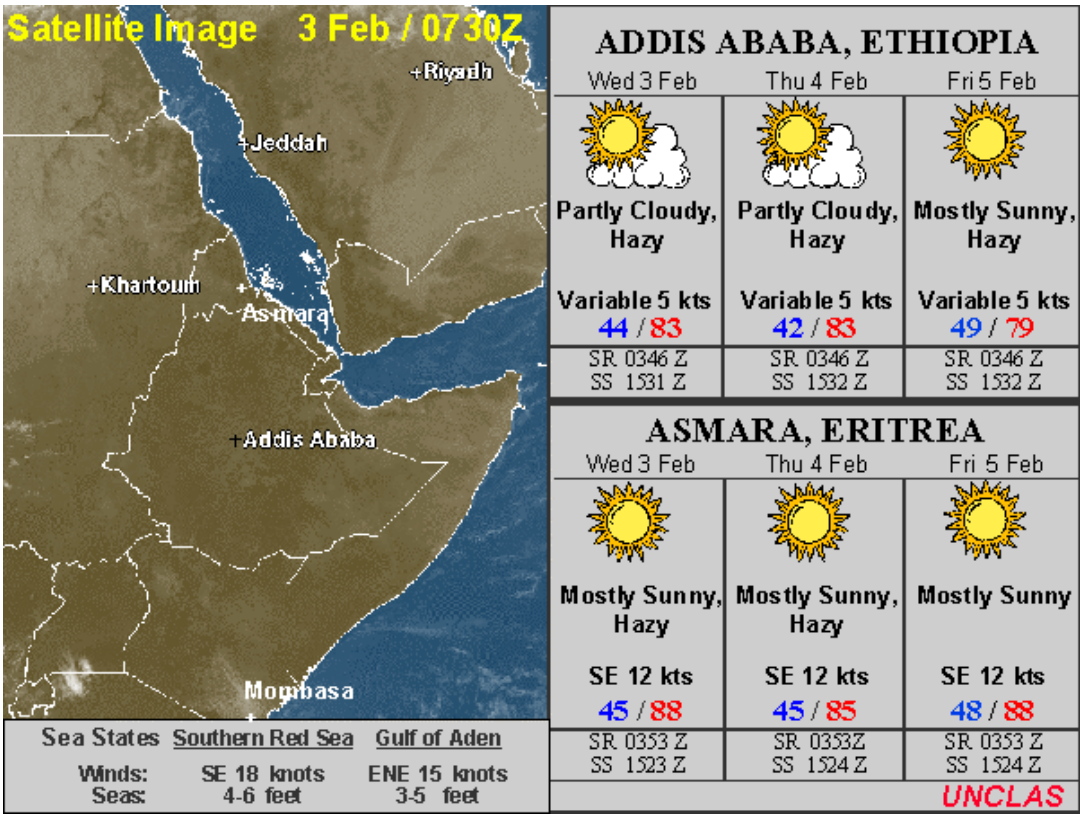


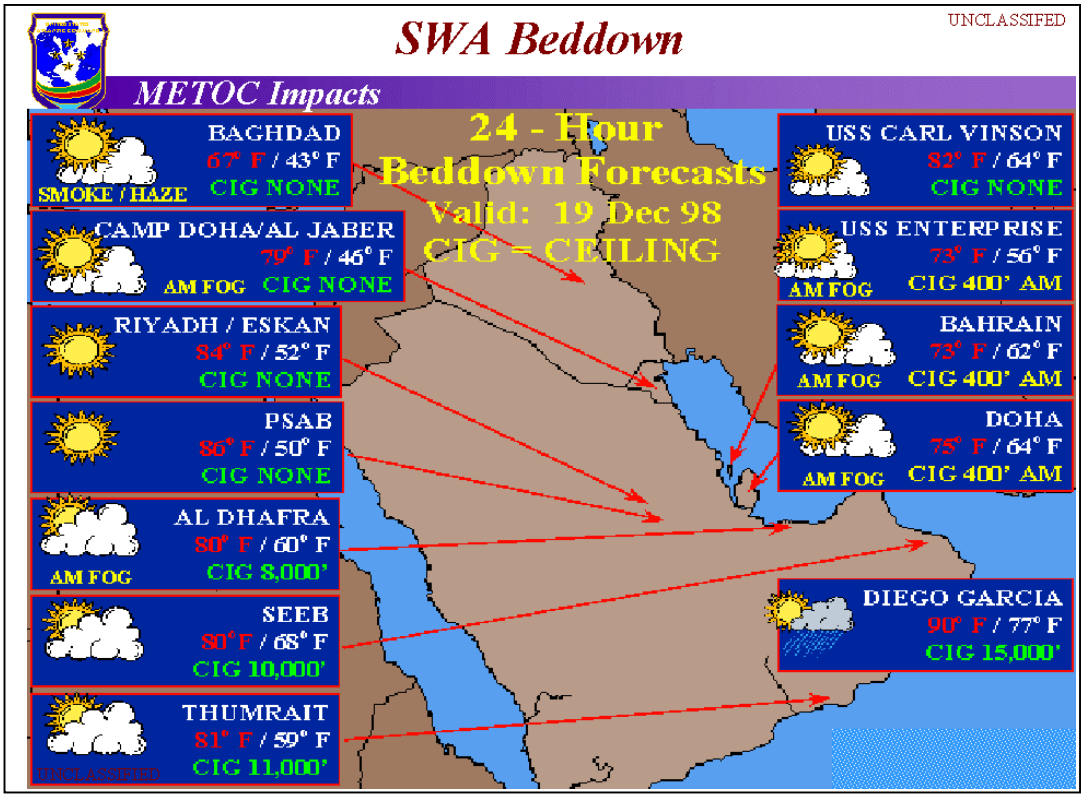


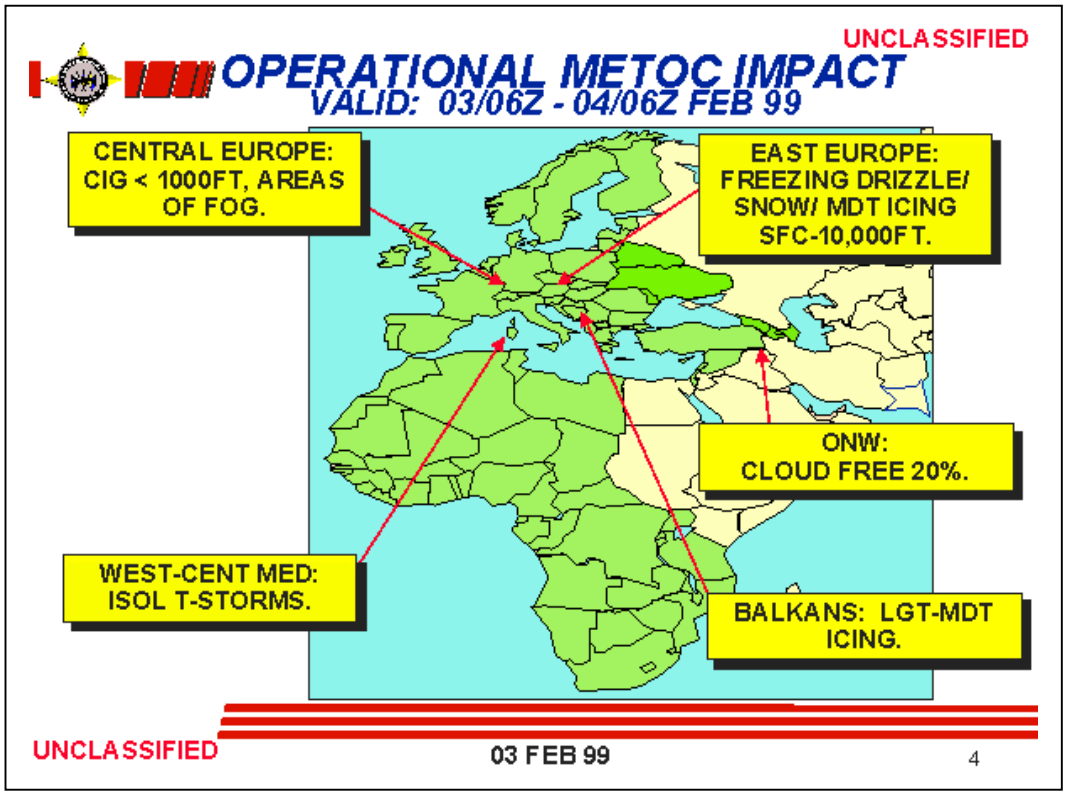


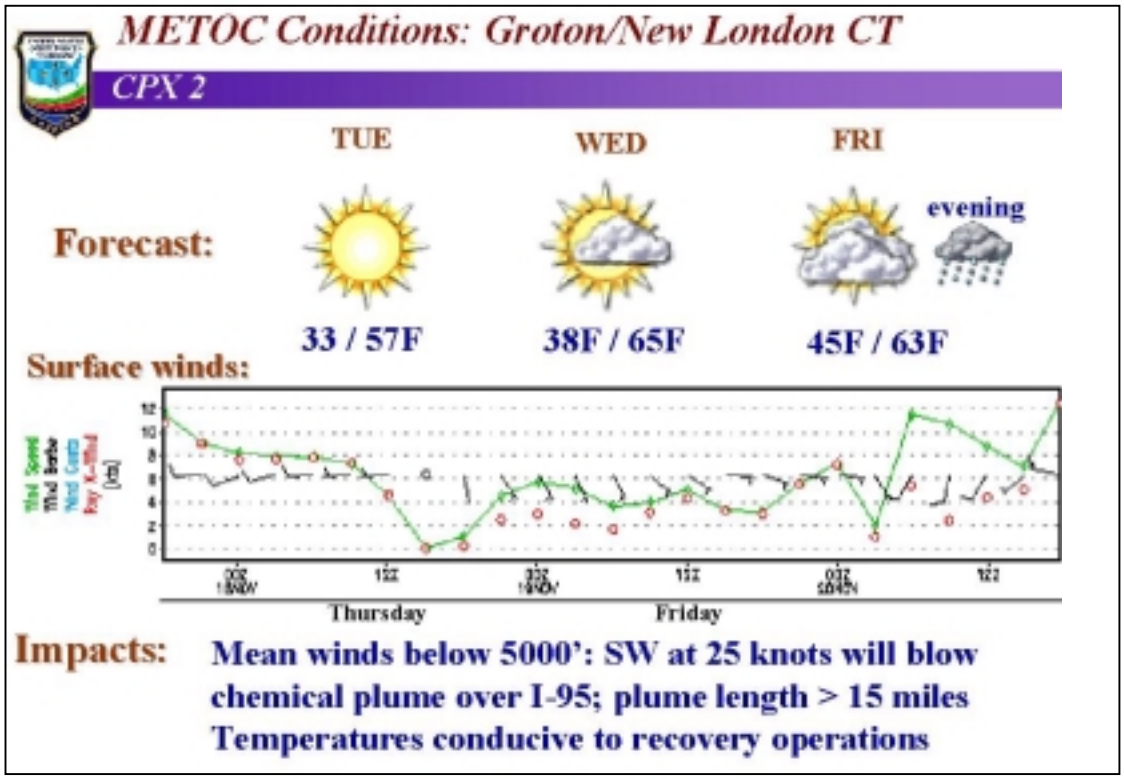
F.5 Supported CINC











F.6 Climatology

Dec/Jan Climatology: Washington, DC

JTF-CS

Typical 3-day pattern:

35% — 30 / 45F

33% — 45F / 55F

32% — 27F / 38F

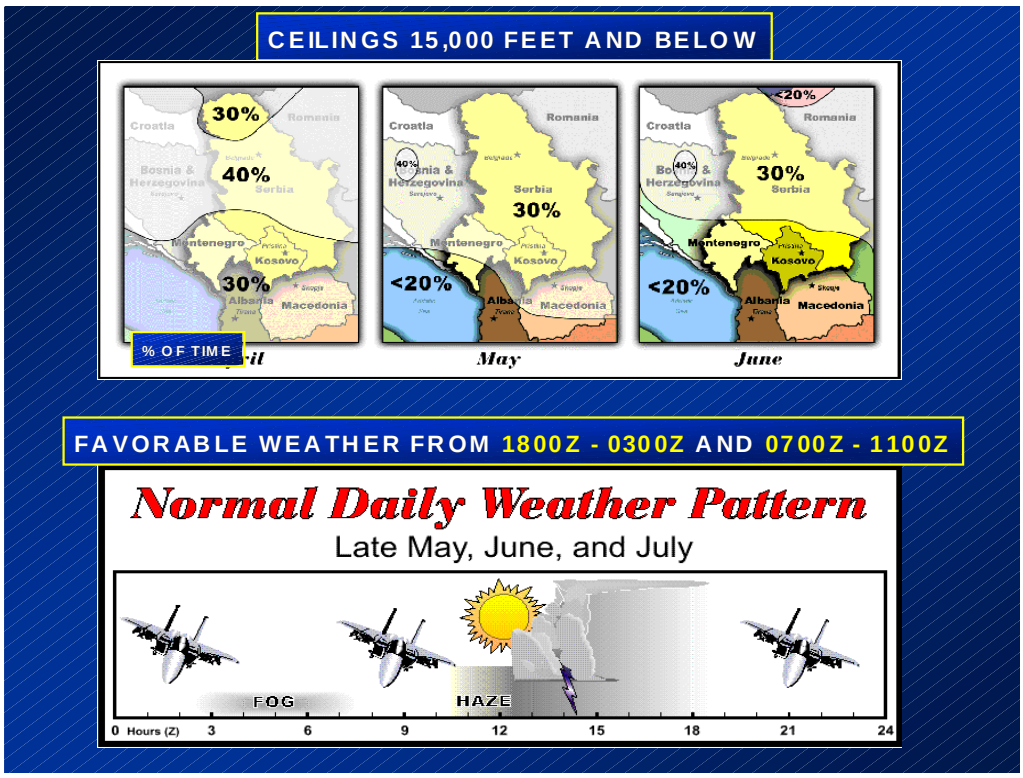
WINDY **Prevailing NW 12kts**

10 days

3 days *(of 31 days)*

Potential impacts:

- **Nighttime cold wx ops (temps < 32F, 60% of time)**
- **Anticipate agent runoff--42% chance any one day will be wet**
- **Probable agent drift to SE--prevailing winds from NW at 12 kts**
- **Significant drift spread likely due to wind speed/direction changes associated with frontal passage every 3-4 days**



Appendix G - Service Training Courses

This appendix describes available Service METOC tactical training.

G.1 Basic Soldiering Skills

Service responsibility.

- Self-Aid and Buddy Care (*i.e.*, First Aid)
- Small Arms Training (*i.e.*, M-9, M-16)
- Mission Oriented Protective Posture (MOPP)/Nuclear, Biological, Chemical (NBC) Training

G.2 Air Force

- Training slots are typically managed by the requesting unit's Major Command (MAJCOM). See paragraph 8.5.3 for a listing of USAF weather MAJCOMs

- Tactical weather training is available from the following USAF sources:
  - Weather Readiness Training Center (WRTC) at Camp Blanding (FL) Air National Guard Facility provides combat field skills training. Contact the WRTC at DSN 960-3107/3247 to arrange training
  - Weather Flight Course (WFC) in development by the 335th Training Squadron, Keesler AFB MS. Projected start date is 1 Oct 2001. Primary school for initial tactical and combat field skills training. All Air Force Weather personnel attend the WFC before assignment to a Combat Weather Team (CWT)

- Supplemental courses
  - AN/GRQ-27 Quick Reaction Communications Terminal (QRCT) III
  - Electro-Optical (EO) Systems Distance Learning Course
  - Combat Survival School
  - Water Survival School (parachuting)
  - Water Survival School (non-parachuting)

G.3 Army

- Army Staff Weather Officer Indoctrination Course at USAIC&FH, Ft Huachuca AZ
- Combat Weather Training Center (USAREUR)
- ANG Weather Readiness Training Center
- Army Airborne Parachutist

G.4 Navy

- Joint METOC Tactical Applications Course (JMTAC) - taught by the NAVOCEANO components at FLTASWTRACEN LANT (Norfolk) & PAC (San Diego). Focuses on support to maritime forces and maritime warfare with some limited discussion on joint METOC doctrine and METOC support to joint warfare.
- Joint Maritime Tactics Course (JMTC)
- Tomahawk Tactical Planners Course (TTPC)
- Joint Maritime Systems Course
- Tactical Oceanography Workshop
- Coordinated ASW
- Air/Antisubmarine Warfare Oceanography
- Tactical Oceanography

G.5 Marine Corps

- Weapons and Tactics Instructor Course

Appendix H - Reserve METOC Personnel

H.1 Air Force

H.1.1 Air National Guard (ANG).

The Air National Guard weather flight program supports Army, Army Reserve (USAR), ANG, and AF Reserve Component (AFRC) units with a full range of meteorological services. Thirty-three weather flights can deploy with their customers when required. Each flight has a full-time Meteorological Technician (MT) to run the unit during the week. Guard units have unique capabilities to deploy, operate, and communicate in tactical environments, especially during and after natural disasters. Taskings for ANG personnel should be directed to:Air Combat Command (ACC), ACC/XOWO, Langley AFB, VA (DSN 574-8445/8441, fax 574-8455). The ANG functional manager is ANG/DOOSW, located at the Air National Guard Readiness Center, Andrews AFB MD (DSN 327-3286/3256, fax 327-2833). A website for the National Guard Bureau is available at http://www.ngb.dtic.mil; Air National Guard websites are available at http://www.ang.af.mil and http://ga14.af.pentagon.smil.mil/ang/. The Air National Guard Weather Flight program website, http://airguard.ang.af.mil/DO/DOO/doos/weather/doosw.htm, has information about the ANG weather program.

H.1.2 Air Force Reserve (AFRES).

There are two components of AFRES that include METOC resources.

- The AFRES Individual Mobilization Augmentee (IMA) program supports gaining units for backfill and wartime mission needs. Individuals can volunteer for duty assignments, or be ordered to duty during a mobilization. IMAs are on twenty-four hour notice for call-up. Typical non-mobilization taskings include Operational Readiness Inspections (ORIs), backfill at a weather unit, and/or any active duty shortfall that creates a requirement. Reservists are normally permitted to be on extended active duty (EAD) 179 days each fiscal year. Information on the Air Force Reserve is available at http://www.afrc.af.mil.

- There are also several AFRES weather units, supplemented by civilian/contractor workers, that provide full aviation meteorological support to AFRES flying customers. Air Reserve bases with weather units include Dobbins (GA), Westover (MA), March (CA), Grissom (NY), and Homestead (FL).

- For availability and/or tasking of AFRES resources, contact the METOC office of the appropriate AF Major Command:

    - Air Combat Command (ACC), ACC/XOW, Langley AFB, VA (DSN 574-8452/8441, fax 574-8455)

- Air Mobility Command (AMC), AMC/DOW, Scott AFB, IL (DSN 576-4337/2922/5082, fax 576-5801)

- Air Force Special Operations Command (AFSOC), AFSOC/DOOW, Hurlburt Field, FL (DSN 579-5640, fax 579-2243)

H.2 Navy

- Navy METOC reservists include commissioned officers designated as 1805 (Restricted Line), Limited Duty Officers designated as 6465, and Aerographer's Mates. The officers and enlisted selected reservists (SELRES) drill in 12 Naval METOC Reserve Activities (NMORAs) that provide contributory support to gaining commands within the Naval Meteorology and Oceanography Command. A typical NMORA consists of 3 -5 officers and 20 -25 enlisted members.

- Qualified observers and forecasters can augment shipboard personnel during underway (deployed) periods, or serve at a Joint METOC Forecast Unit (JMFU) during a joint exercise or operation. To inquire about qualified augmentees for a specific exercise, the Senior METOC Officer can contact CNMOC (Code N434) at:

  Commander, Naval Meteorology and Oceanography Command
  Attn: Code N434
  1020 Balch Blvd.
  Stennis Space Center, MS 39529-5005
  DSN 485-4531

- Information on the Naval Reserve is available at http://www.navres.navy.mil/navresfor/.

H.3 Joint Reserve Units

The Joint Reserve Unit (JRU) at the U.S. Joint Forces Command consists of 600+ reservists in USAF, Navy, and Army detachments. METOC reservists assigned to the USJFCOM JRU help the SMO support the CINC's staff, assisting with daily operations and during USJFCOM training exercises. USJFCOM reservists could deploy to support joint training events. Information on USJFCOM's JRU is available on NIPRNET at http://137.246.33.101/jru/njru/index.html.

Appendix I - References

I.1 Joint

CJCSI 3810.01A	Joint METOC Operations
CJCS Manual 3122.03	Joint Operations Planning and Execution System Volume II, Planning Formats and Guidance
JP 3-59	Joint Doctrine for METOC Operations
JTF HQ MTG	Joint Task Force HQ Master Training Guide
215J	Develop Ops Estimate--METOC Support Ops
431	Control METOC Operations
AFSC Publication 1	Joint Staff Officer's Guide

I.2 Air Force

AFI 15-118	Requesting Specialized Weather Support
AF Series 10	Operations Planning
AFCCC/TN 95/005	Capabilities, Products and Services of the AFCCC
AFCCC/TN 96-001	Directory of Climatic Databases
ACCI 15-150	ACC Weather Operations
ACCM 15-151	ACC Weather Readiness
AMCI 10-404	Air Mobility Element/Tanker Task Force/ Tanker Airlift Control Element
AMCI 10-406	Tanker Task Force/Tanker Airlift Control Element
617 WSR 16-2	Weather Support
617 WSP 16-X	Weather Communications

I.3 Army

AR 115-10/AFJI 15-157	Meteorological Support for the U.S. Army
FM 1-230	Meteorology for Army Aviators
FM 3-3	Chemical Downwind Messages
FM 6-15	Field Artillery Meteorology
FM 34-81/AFJPM 15-127	Weather Support to Army Operations
FM 34-81-1	Battlefield Weather Effects
FM 34-130	Intelligence Preparation of the Battlefield (IPB)
FM 100-5	Operations
FM 100-16	Support Operations: EAC
FM 101-5	Staff Organization and Operations

I.4 Navy

RP 1	Environmental Effects on Naval Weapons Systems and Naval Warfare
RP 33	Fleet Oceanographic and Acoustic Reference Manual
RP 50	Catalog of Classified Naval Oceanographic Office Publications
RP 51	Catalog of naval Oceanographic Office Unclassified Publications
OPNAVINST 3710.7	Aviation Weather Briefs
NAVOCEANO (N03140)	METOC Products Available From Warfighting Support Center Classified Services Branch
FNMOD Asheville (3146)	Climatology Program Services and Publications
CNMOCINST 3140.1K	U.S. Navy Oceanographic and Meteorological Support System Manual
CNSL/CNSPINST 3840.1	Joint Surf Manual

I.5 Marine Corps

NAVAIR 19-25-158	Meteorological Mobile Facility
MCWP 3-35.7	Marine Corps Warfighting Publication; MAGTF Meteorological and Oceanographic Support

I.6 SOF

USSOCOM M 115-2	METOC Support to SOF Operations
USSOCOM M 525-6	Critical METOC Thresholds for SOF Operations

Appendix J - File o' Links

NIPRNET and SIRPNET web addresses, many times, are moving targets. The list below is current as of 1 May 2000.

J.1 Joint Staff and Unified Command Sites

Joint Chiefs of Staff (DSN 225-0581/2995)
SIPRNET: http://ga14.af.pentagon.smil.mil:8000/afog/wx/

USCENTCOM (DSN 968-6544/3021)
SIPRNET:
http://www.centcom.smil.mil/CCJ3/ccj3ops/weather/weather2.htm#USCENTCOM METOC PRODUCTS

USEUCOM (call USAFE, DSN 314-480-7001/7564/6209)
SIPRNET: http://www.eucom.smil.mil/ecj3/metoc/

USJFCOM (DSN 836-7852)
SIPRNET: http://157.224.120.250/weathr.nsf/metoc

USPACOM (DSN 315- 477-5740)
SIPRNET: http://164.213.23.19/j3/metoc.htm

USSOCOM (DSN 968-4295)
SIPRNET: http://soop.socom.smil.mil/html/weather.html

USSOUTHCOM (DSN 567-3712)
SIPRNET: http://scnet.hq.southcom.smil.mil/SCJ3/scj32/metoc/default.htm

USSPACECOM (DSN 692-3029)
SIPRNET: http://www.usspace.spacecom.smil.mil/sj3/j33/j33tw.htm

USSTRATCOM (DSN 271-5333/2510)
SIPRNET: http://www.gccs.stratcom.smil.mil/metoc_j3/sipr2.html

USTRANSCOM (DSN 576-8406)
SIPRNET: http://websvr1.transcom.smil.mil/j3/mcc/wx/wx.htm

J.1.1 Additional Joint and Interagency Sites

Joint Electronic Library (JEL)
NIPRNET: http://www.dtic.mil/doctrine
SIPRNET: http://nmcc20a.nmcc.smil.mil/users/dj9j7ead/doctrine/jel/index.html

Joint Warfighting Center (Joint Task Force (JTF) information)
NIPRNET: http://www.jtasc.acom.mil
SIPRNET: http://www.jtasc.acom.smil.mil

Armed Forces Staff College (AFSC) Publication 1 (The "Purple Book")
NIPRNET: http://www.afsc.edu/pub1/afsc0000.htm
SIPRNET: http://www1.eucom.smil.mil/eccs-or/library/ndu/afscpub1/

Office of the Federal Coordinator for Meteorology (OFCM) (DSN 851-1460)
NIPRNET: http://www.ofcm.gov

J.2 Air Force METOC sites (Operational Support)

11 OWS (Alaska, Arctic) (DSN 317-552-2719)
NIPRNET: http://weather.elmendorf.af.mil

15 OWS (north-central and northeast CONUS, Greenland) (DSN 576-4794)
NIPRNET: http://15ows.scott.af.mil
Tanker Airlift Control Center: http://tacc.scott.af.mil/directorates/xow/wxhome.asp

17 OWS (South and Southeast Asia, Pacific): IOC Jan 2001
Hickam Base Weather DSN (315) 449-6262
NIPRNET: http://www.hickam.af.mil/Weather/index.htmll

20 OWS (Japan): IOC Apr 2001
Yokota Base Weather DSN (315) 225-9005
NIPRNET: http://www.yokota.af.mil/weather/index.htm

25 OWS (SOUTHCOM, Mexico, western CONUS) (DSN 228-2027/2149)
NIPRNET: http://25ows.dm.af.mil (password required)
SIPRNET: http://204.20.143.163

26 OWS (JFCOM (Atlantic), south-central CONUS) (DSN 781-0209/4004)
NIPRNET: http://26ows.barksdale.af.mil

28 OWS (Southwest Asia, southeast CONUS) (DSN 965-0492)
NIPRNET: http://131.46.188.21 or http://28ows.shaw.af.mil
SIPRNET: http://204.20.12.198

55 Space Weather Squadron (55 SWXS) (DSN 560-6312)
NIPRNET: http://afwin.afwa.af.mil (password req'd; click a region, then "Space Weather")
SIPRNET: http://www.55swxs.spacecom.smil.mil/index.htm

607 WS (Korea) (DSN 315-725-6155/6158)
NIPRNET: http://607ws.yongsan.af.mil

ACC AOS/AOW (Weather Support Unit) (DSN 574-2007/2008)
NIPRNET: http://www.acc.af.mil/weather
SIPRNET: http://wwwacc2.langley.af.smil.mil/xo/ (link to Weather PPT presentation)

AF Combat Climatology Center (AFCCC) (DSN 673-9004)
NIPRNET: http://www.afccc.af.mil (password required)
SIPRNET address: http://afccc.asheville.af.smil.mil/index.html
AFW Technical Library: http://www.afccc.af.mil/afwtl/afwtl.html

AF Weather Agency (AFWA) (DSN 271-2586)
AFWA (FOA information): http://wwwmil.offutt.af.mil/afwa/
NIPRNET: AFWIN--http://www.afwin.afwa.af.mil (password required)
SIPRNET: SAFWIN--http://safwin.offutt.af.smil.mil

USAFE OWS (Europe, Africa, eastern Russia) (DSN 314-496-6114/6116)
NIPRNET: http://131.54.133.238/index.html or http://ows.sembach.af.mil
SIPRNET: http://204.21.12.42

J.2.1 Key USAF METOC Staff Organizations.

Air Combat Command (ACC/XOW) (DSN 574-8452/8456)
NIPRNET: http://xo.acc.af.mil/xow

Air Force Combat Weather Center (AFCWC) (DSN 641-2366/5700)
NIPRNET: http://www.hurlburt.af.mil/afcwc

Air Force Reserves (AFRES) (DSN 497-0306)
NIPRNET: http://www.afrc.af.mil

AF Space Command (AFSPC/DORW) (DSN 692-3143)
NIPRNET: http://midway.spacecom.af.mil/weather/index.htm
SIPRNET: http://www.vandenberg.af.smil.mil/recent.html

AF Special Operations Command (AFSOC/DOOW) (DSN 579-5640)

Air Mobility Command (AMC/DOW) (DSN 576-4794/4337)
NIPRNET: http://www.amc.af.mil/do/dow/dow.htm

National Guard Bureau (NGB) (DSN 278-8285/8278)
NIPRNET: http://www.ngb.dtic.mil
Air National Guard (ANG): http://www.ang.af.mil
Weather site: http://airguard.ang.af.mil/DO/DOO/doos/weather/doosw.htm

Pacific Air Forces (PACAF/DOW) (DSN 449-6174/8481)
NIPRNET: http://www2.cidss.af.mil/dow/dow_menu/index_dow.html

US Air Forces Europe (USAFE/DOW) (DSN 314-480-7001/7564)
NIPRNET: http://www.usafe.af.mil/direct/do/dow-miss.htm

US Air Forces Europe (USAFE) Weather Support Systems Cadre (WSSC)
Contact the USAFE WSSC by calling or emailing the USAFE OWS

Weather Support Systems Cadre (WSSC) East (DSN 468-5934)
NIPRNET: http://wssc.robins.af.mil

Weather Support Systems Cadre (WSSC) West (DSN 844-2246/2247)
NIPRNET: http://bncc.tinker.af.mil/wssc31/Wssc.htm

J.3 Army METOC Organizations

J.3.1 Key Army Organizations That May Form the Core for Joint Task Forces.

1st Weather Squadron (Ft Lewis WA) (DSN 357-7061/5967)
NIPRNET: http://www.lewis.army.mil/1WS

3rd Weather Squadron (Ft Hood TX) (DSN 738-1190/1313)
NIPRNET: http://www.hood-pao.army.mil/3dASOG_3dWS/wthr.htm

7th Weather Squadron (U.S. Army Europe, USAREUR) (DSN (314) 370-8653/8583)
NIPRNET: http://www.dcsintweb.hqusareur.army.mil/swo
SIPRNET: http://www.dcsintweb.hqusareur.army.smil.mil/swo

18th Weather Squadron (Ft Bragg NC) (DSN 239-3150/3151)
NIPRNET: http://www.bragg.army.mil/http://www-18ws/index.htm

J.3.2 Key Army Staff METOC Organizations.

Forces Command (FORSCOM) (DSN 367-5403/6570)
NIPRNET: http://www.forscom.army.mil/weathr/default.htm

Training and Doctrine Command (TRADOC) (DSN 680-2319)

U.S. Army Central Command (USARCENT) (DSN 367-4084/1686)
SIPRNET: http://arcent-86.arcent.army.smil.mil/sub/g2/swo/swo.html

U.S. Army Combined Arms Center (CAC) (DSN 552-4056)
NIPRNET: http://leav-www.army.mil/weather

U.S Army Intelligence Center (USAIC) (DSN 879-6647)
NIPRNET: http://huachuca-dcd.army.mil/WX_SPT/index.htm

J.4 Marine Corps METOC

II Marine Expeditionary Force (II MEF) (DSN 751-8558)

J.5 Navy METOC Sites

Commander, Naval METOC Center (CNMOC) (DSN 485-4582)
NIPRNET: http://www.cnmoc.navy.mil
SIPRNET: http://www.cnmoc.navy.smil.mil

Fleet Numerical METOC Center (FNMOC) (DSN 878-4325)
SIPRNET: http://www.fnmoc.smil.mil
NIPRNET: http://www.fnmoc.navy.mil

Naval Atlantic METOC Center (NLMOC) (DSN 564-7583/7750)
NIPRNET: http://www.nlmoc.navy.mil
SIPRNET: http://www.nlmoc.navy.smil.mil or http://206.36.246.98

Naval Central METOC Center (NCMOC) (DSN 318-439-4083)
NIPRNET: http://www.ncmoc.navy.mil
SIPRNET: http://www.ncmoc.navy.smil.mil

Naval European METOC Center (NEMOC) (DSN 314-727-2410)
NIPRNET: http://www.nemoc.navy.mil
SIPRNET: http://www.nemoc.navy.smil.mil or http://199.10.143.131

Naval Oceanographic Office (NAVO) (DSN 485-4357)
NIPRNET: http://www.navo.navy.mil
SIPRNET: http://www.navo.navy.smil.mil or http://199.208.205.50/index.html

Naval Pacific METOC Center (NPMOC) (DSN 471-4599/0004) / *Joint Typhoon Warning Center* (JTWC) (DSN 474-2320)
NIPRNET: http://www.npmoc.navy.mil (JTWC is link from NPMOC's page)
SIPRNET: http://www.npmoc.navy.smil.mil (JTWC is link from NPMOC's page)

Naval Pacific METOC Center-San Diego (NPMOC-SD) (DSN 735-2218)
NIPRNET: http://www.npmoc-sd.navy.mil
SIPRNET: http://www.npmoc-sd.navy.smil.mil

Naval Pacific METOC Center - West (NPMOC-W) (DSN 315-243-5595/7798)
NIPRNET: http://www.yoko.npmoc.nav.mil
SIPRNET: http://www.yoko.npmoc.navy.smil.mil

U.S. Naval Observatory (USNO) ((202) 762-1467)
NIPRNET: http://www.usno.navy.mil
Astrometry Department: http://aa.usno.navy.mil/ad/

Astronomical Applications: http://aa.usno.navy.mil/AA/
Earth orientation: http://maia.usno.navy.mil/
Time Service: http://tycho.usno.navy.mil

U.S. Navy Reserve (USNR)
NIPRNET: http://www.navres.navy.mil/navresfor/

Appendix K - Acronyms and Abbreviations

A/C	AIRCRAFT
AAR	AFTER ACTION REPORT
ABN	AIRBORNE
ACC	AIR COMBAT COMMAND
ACC	AIR COMPONENT COMMANDER
ACE	AVIATION COMBAT ELEMENT
ACR	ARMORED CAVALRY REGIMENT
ADDU	ADDITIONAL DUTY
ADP	AUTOMATIC DATA PROCESSING
AEF	AEROSPACE EXPEDITIONARY FORCE
AEG	AEROSPACE EXPEDTIONARY GROUP
AES	AEROSPACE EXPEDITIONARY SQUADRON
AEW	AEROSPACE EXPEDITIONARY WING
ASETF	AEROSPACE EXPEDITIONARY TASK FORCE
AFCCC	AIR FORCE COMBAT CLIMATOLOGY CENTER
AFDIS	AIR FORCE DIAL-IN SYSTEM (*discontinued*)
AFFOR	AIR FORCE FORCES
AFGWC	AIR FORCE GLOBAL WEATHER CENTRAL (*now AFWA*)
AFI	AIR FORCE INSTRUCTION
AFMAN	AIR FORCE MANUAL
AFMSS	AIR FORCE MISSION SUPPORT SYSTEM
AFRES	AIR FORCE RESERVE
AFSC	AIR FORCE SPECIALTY CODE (USAF)
AFSC	ARMED FORCES STAFF COLLEGE
AFSOC	AIR FORCE SPECIAL OPERATIONS COMPONENT
AFSPC	AIR FORCE SPACE COMMAND
AFWA	AIR FORCE WEATHER AGENCY (formerly AFGWC)
AFWIN	AIR FORCE WEATHER INFORMATION NETWORK
AFWTL	AIR FORCE WEATHER TECHNICAL LIBRARY
AGCCS	ARMY GLOBAL COMMAND AND CONTROL SYSTEM
ALSO	ARTILLERY LIMITED SURFACE OBSERVATION
AM	AMPLITUDE MODULATION
AMC	AIR MOBILITY COMMAND
AME	AIR MOBILITY ELEMENT
ANG	AIR NATIONAL GUARD
AOA	AMPHIBIOUS OBJECTIVE AREA
AOC	AIR OPERATIONS CENTER
AOR	AREA OF RESPONSIBILITY
API	APPLICATION PROGRAMMING INTERFACE
APOD	AERIAL PORT OF DEBARKATION
APT	AUTOMATIC PICTURE TRANSMISSION
AR	AIR REFUELING
ARC	ARMORED CAVALRY REGIMENT
ARCENT	ARMY CENTRAL COMMAND
ARFOR	ARMY FORCES
ARQ	AUTOMATIC RESPONSE TO QUERY
ARSPACE	ARMY COMPONENT, SPACE COMMAND
ARTYMET	ARTILLERY METEOROLOGY
ASNE	AIR AND SPACE NATURAL ENVIRONMENT
ASW	ANTI-SUBMARINE WARFARE
ATO	AIR TASKING ORDER
ATS	AIR TRAFFIC SERVICE

AUTODIN	AUTOMATED DIGITAL INFORMATION NETWORK
AVN	AVIATION
AWDS	AUTOMATED WEATHER DISTRIBUTION SYSTEM
AWN	AUTOMATED WEATHER NETWORK
AWP	ALLIED WEATHER PUBLICATION
AXBT	AIRBORNE EXPENDABLE BATHYTHERMOGRAPH
BBS	BULLETIN BOARD SYSTEM
BCIXS	BATTLECUBE INFORMATION EXCHANGE SYSTEM
BG	BATTLE GROUP
BN	BATTALION
BPS	BITS PER SECOND
BT	BATHYTHERMOGRAPH
BTXT	BT DATA EXTRACT
C2	COMMAND AND CONTROL
C4I	COMMAND, CONTROL, COMMUNICATIONS, COMPUTERS AND
CAFWSP	COMBAT AIR FORCES WEATHER SOFTWARE PACKAGE
CAP	CRISIS ACTION PLANNING
CAS	CLOSE AIR SUPPORT
CAS/CA	CLOSE AIR SUPPORT/COUNTER ARMOR
CAT	CRISIS ACTION TEAM
CCIR	COMMANDER'S CRITICAL INFORMATION REQUIREMENT
CDM	CHEMICAL DOWNWIND MESSAGE
CDM	CONFIGURATION DATA MANAGER
CE	COMMAND ELEMENT (USMC)
CENTAF	U. S. AIR FORCES, U. S. CENTRAL COMMAND
CES	COMMANDER'S ESTIMATE OF THE SITUATION
CFLOS	CLOUD FREE LINE OF SIGHT
CIG	CEILING
CINC	COMMANDER IN CHIEF
CJCS(I)	CHAIRMAN JOINT CHIEFS OF STAFF (INSTRUCTION)
CJTF	COMMANDER JOINT TASK FORCE
CM	COMMAND METEOROLOGIST
CMS	COMMUNICATIONS SUBSYSTEM (USMC TMQ-44A)
COA	COURSE OF ACTION
COAMPS	COUPLED OCEAN-ATMOSPHERE MESOSCALE PREDICTION SYSTEM
COB	COLLOCATED OPERATING BASE
COE	COMMON OPERATING ENVIRONMENT
COMNAVMETOCCOM	COMMANDER NAVAL METOC COMMAND
COMSEC	COMMUNICATIONS SECURITY
CONOPS	CONCEPT OF OPERATIONS
CONPLAN	CONCEPT PLAN
CONUS	CONTINENTAL UNITED STATES
CP	COMMAND POST
CRC	CRISIS RESPONSE CELL
CSAR	COMBAT SEARCH AND RESCUE
CSPDS	CENTRAL SITE PRODUCT DISPLAY SYSTEM
CSSE	COMBAT SERVICE SUPPORT ELEMENT
CTAPS	CONTINGENCY THEATER AUTOMATED PLANNING SYSTEM
CV	AIRCRAFT CARRIER
CVN	NUCLEAR AIRCRAFT CARRIER
CW	CONTINUOUS WAVE
CWT	COMBAT WEATHER TEAM
DAS	DIRECT AIR SUPPORT
DCA	DEFENSIVE COUNTERAIR
DCS	DEFENSE COMMUNICATIONS SYSTEM

DII	DEFENSE INFORMATION INFRASTRUCTURE
DISA	DEFENSE INFORMATION SYSTEMS AGENCY
DISN	DEFENSE INFORMATION SYSTEM NETWORK
DIVARTY	DIVISION ARTILLERY
DMS	DEFENSE MESSAGING SYSTEM
DMSP	DEFENSE METEOROLOGICAL SATELLITE PROGRAM
DOD	DEPARTMENT OF DEFENSE
DRP	DATA REQUEST PRODUCTS
DSCR	DEFENSE SUPPLY CENTER RICHMOND
DSCS	DEFENSE SATELLITE COMMUNCATION SYSTEM
DSN	DEFENSE SWITCHED NETWORK
DZ	DROP ZONE
EA	ELECTRONIC ATTACK
EAC	ECHELON ABOVE CORPS
EAD	EXTENDED ACTIVE DUTY
EAF	EXPEDITIONARY AIR FORCE
ECU	ENVIRONMENTAL CONTROL UNIT
EDM	EFFECTIVE DOWNWIND MESSAGE
EEI	ESSENTIAL ELEMENT OF INFORMATION
EHF	EXTRA HIGH FREQUENCY
EMC	EUROPEAN METOC CENTER
EMI	ELECTROMAGNETIC INTERFERENCE
ENVR	ENVIRONMENTAL LINES
EO	ELECTRO-OPTICAL
EOC	EXPEDITIONARY OPERATIONS CENTER
EOD	EXPLOSIVE ORDINANCE DISPOSAL
EOG	EXPEDITIONARY OPERATIONS GROUP
EOSS	EXPEDITIONARY OPERATIONS SUPPORT SQUADRON
EOTDA	ELECTRO-OPTICAL TACTICAL DECISION AID
EP	ELECTRONIC PROTECTION
ES	ELECTRONIC WARFARE SUPPORT
ESC	ELECTRONIC SYSTEMS COMMAND
ESK	ELECTRONIC SWO KIT
ESP	ENVIRONMENTAL SUPPORT PACKET
FALOP	FORWARD AREA LIMITED OBSERVATION PROGRAM
FAP	FLEET ASSISTANCE PROGRAM
FARP	FORWARD AND ARMING REFUELING POINT
FAX	FACSIMILE
FLENUMMETOCCEN	FLEET NUMERICAL METOC CENTER
FM	FIELD MANUAL
FM	FREQUENCY MODULATION
FMF	FLEET MARINE FORCE
FNMOC	FLEET NUMERICAL METOC CENTER
FOA	FIELD OPERATING AGENCY
FOB	FORWARD OPERATING BASE
FORSCOM	FORCES COMMAND
FTP	FILE TRANSFER PROTOCOL
GA	GLOBAL ATTACK
GAT	GUIDANCE AND APPORTIONMENT TARGETING
GBS	GLOBAL BROADCAST SYSTEM
GCCS	GLOBAL COMMAND AND CONTROL SYSTEM
GCCS-M	GCCS-MARITIME
GCSS	GLOBAL COMBAT SUPPORT SYSTEM
GCE	GROUND COMBAT ELEMENT
GEM	GENERAL ENVIRONMENTAL MESSAGE
GFMPL	GEOPHYSICAL FLEET MISSION PROGRAM LIBRARY

GIS	GEOSPATIAL INFORMATION SERVICES
GI&S	GEOSPATIAL INFORMATION AND SERVICES
GOES	GEOSTATIONARY ORBITING EARTH SATELLITE
GPS	GLOBAL POSITIONING SYSTEM
HAWK	TOMAHAWK SUPPORT MESSAGE
HDR	HIGH DATA RATE
HF	HIGH FREQUENCY
HFRB	HIGH FREQUENCY RADIO BROADCAST
HMMWV	HIGH MOBILITY MOTORIZED WHEELED VEHICLE
HQ	HEADQUARTERS
HRO	HUMANITARIAN RELIEF ORGANIZATION
HWD	HORIZONTAL WEATHER DEPICTION
IAS	INTELLIGENCE ANALYSIS SYSTEM
IER	INFORMATION EXCHANGE REQUIREMENT
IERS	INTERNATIONAL EARTH ROTATION SERVICE
IMA	INDIVIDUAL MOBILIZATION AUGMENTEE
IMETS	INTEGRATED METEOROLOGICAL SYSTEM
IMOSS	INTERIM MOBILE OCEANOGRAPHIC SUPPORT SYSTEM
INMARSAT	INTERNATIONAL MARITIME SATELLITE
INTSUM	INTELLIGENCE SUMMARY
IPB	INTELLIGENCE PREPARATION OF THE BATTLEFIELD
IPL	INTEGRATED PRIORITY LIST
IREPS	INTEGRATED REFRACTIVE EFFECTS PREDICTION SYSTEM
ISO	INTERNATIONAL ORGANIZATION FOR STANDARDS
ISS	INTERMEDIATE SERVICE SCHOOL
IWEDA	INTEGRATED WEATHER EFFECTS DECISION AID
JA/ATT	JOINT AIRBORNE/AIR TRANSPORTABILITY TRAINING
JAC	JOINT ANALYSIS CENTER
JAOC	JOINT AIR OPERATIONS CELL
JCCC	JOINT COMMAND, CONTROL, AND COMPUTERS
JCLL	JOINT CENTER FOR LESSONS LEARNED
JCS	JOINT CHIEFS OF STAFF
JCSE	JOINT COMMUNICATIONS SUPPORT ELEMENT
JDISS	JOINT DEPLOYABLE INTELLIGENCE SUPPORT SYSTEM
JF	JOINT FORCE
JFACC	JOINT FORCE AIR COMPONENT COMMANDER
JFC	JOINT FORCE COMMANDER
JFFC	JOINT FORCE AIR COMPONENT COMMANDER
JFLCC	JOINT FORCE LAND COMPONENT COMMANDER
JFMCC	JOINT FORCE MARITIME COMPONENT COMMANDER
JFSOCC	JOINT FORCE SPECIAL OPERATIONS COMPONENT
JIATF-EAST	JOINT INTERAGENCY TASK FORCE - EAST
JIB	JOINT INFORMATION BUREAU
JIC	JOINT INTELLIGENCE CENTER
JIPTL	JOINT INTEGRATED PRIORITIZED TARGET LIST
JJPRO	CLIMATOLOGICAL BT EXTRACT
JLOTS	JOINT LOGISTICS OVER THE SHORE
JMA	JOINT MISSION AREA
JMCIS	JOINT MARITIME COMMAND INFORMATION SYSTEM
JMCOMS	JOINT MARITIME COMMUNICATIONS STRATEGY
JMD	JOINT MANNING DOCUMENT
JMFC	JOINT METOC FORECAST CAPABILITY
JMFU	JOINT METOC FORECAST UNIT
JMO	JOINT TASK FORCE METOC OFFICER
JMS	JOINT METOC SEGMENT
JMTC	JOINT MARITIME TACTICS COURSE

JMV	JOINT METOC VIEWER
JOA	JOINT OPERATIONS AREA
JOAF	JOINT OPERATIONS AREA FORECAST
JOC	JOINT OPERATIONS CENTER
JOPES	JOINT OPERATION PLANNING AND EXECUTION SYSTEM
JP	JOINT PUBLICATION
JPEC	JOINT PLANNING AND EXECUTION COMMUNITY
JPG	JOINT PLANNING GROUP
JPME	JOINT PROFESSIONAL MILITARY EDUCATION
JPOTF	JOINT PSYCHOLOGICAL OPERATIONS TASK FORCE
JRC	JOINT RECON CENTER
JSAR	JOINT SEARCH AND RESCUE
JSCAP	JOINT STRATEGIC CAPABILITIES LIST
JSCP	JOINT STRATEGIC CAPABILITIES PLAN
JSO	JOINT SPECIALTY OFFICER
JSOSOC	JOINT SPECIAL OPERATIONS STAFF OFFICERS COURSE
JSOTF	JOINT SPECIAL OPERATIONS TASK FORCE
JTA	JOINT TECHNICAL ARCHITECTURE
JTCB	JOINT TARGETING CONTROL BOARD
JTD	JOINT TABLE OF DISTRIBUTION
JTF	JOINT TASK FORCE
JTF-CS	JOINT TASK FORCE - CIVIL SUPPORT
JTFST	JOINT TASK FORCE SATELLITE TERMINAL
JTMD	JOINT TABLE OF MOBILIZATION DISTRIBUTION
JTOC	JOINT TACTICAL OPERATIONS CENTER
JULLS	JOINT UNIFORMED LESSONS LEARNED SYSTEM
JV	JOINT VISION
KFU	KOREAN FORECAST UNIT
LAN	LOCAL AREA NETWORK
LANTFLT	ATLANTIC FLEET
LAWC	LOCAL AREA WORK CHART
LCC	AMPHIBIOUS ASSAULT SHIP
LCC	LAND COMPONENT COMMANDER
LDO	LIMITED DUTY OFFICER
LDR	LOW DATA RATE
LOS	LINE OF SIGHT
LPD	AMPHIBIOUS TRANSPORT DOCK
LPH	AMPHIBIOUS ASSAULT SHIP
LRC	LOGISTICS READINESS CENTER
LRF	LASER RANGE FINDER
LRSU	LONG RANGE SURVEILLANCE UNITS
LSB	LOWER SIDEBAND
LSS	LOCAL SENSOR SUBSYSTEM (USMC TMQ-44A)
LZ	LANDING ZONE
MAGTF	MARINE AIR GROUND TASK FORCE
MAJCOM	MAJOR COMMAND
MANOP	MANUAL OF OPERATIONS
MAR	METOC ASSISTANCE REQUEST
MARCENT	MARINE COMPONENT, US CENTRAL COMMAND
MARFOR	MARINE FORCES
MARFOREUR	MARINE FORCES EUROPE
MARFORLANT	MARINE FORCES ATLANTIC
MARFORPAC	MARINE FORCES PACIFIC
MARFORSOUTH	MARINE FORCES, SOUTHERN COMMAND
MAW	MARINE AIR WING
MC&G	MAPPING, CHARTING, AND GEODESY

MCAS	MARINE CORPS AIR STATION
MCC	MARITIME COMPONENT COMMANDER
MCC	MOBILITY CONTROL CENTER
MCF	MISSION CONTROL FORECAST
MCM	MINE COUNTERMEASURES
MCS	MANEUVER CONTROL SYSTEMS
MDR	MEDIUM DATA RATE
MEB	MARINE EXPEDITIONARY BRIGADE
MEF	MARINE EXPEDITIONARY FORCE
MEF	MISSION EXECUTION FORECAST
MET	MOBILE ENVIRONMENTAL TEAM
METMF	METEOROLOGICAL MOBILE FACILITY
METMF(R)	METEOROLOGICAL MOBILE FACILITY-REPLACEMENT
METOC	METEOROLOGY AND OCEANOGRAPHY
METSAT	METEOROLOGICAL SATELLITE
METT-T	MISSION ACCOMPLISHMENT/ENEMY/TERRAIN/TROOPS AVAILABLE - TIME AVAILABLE
METWATCH	METEOROLOGICAL WATCH
MEU	MARINE EXPEDITIONARY UNIT
MFC	METOC FORECAST CENTER
MIST	METEOROLOGICAL INFORMATION STANDARD TERMINAL
MM5	MESOSCALE MODEL VERSION 5
MOB	MAIN OPERATING BASE
MOPP	MISSION-ORIENTED PROTECTIVE POSTURE
MOS	MANUAL OBSERVING SYSTEM
MOS	MILITARY OPERATIONAL SKILL (USMC)
MOSS	MOBILE OCEANOGRAPHIC SUPPORT SYSTEM
MPF	MISSION PLANNING FORECAST
MRS	METEOROLOGICAL RADAR SUBSYSTEM (USMC TMQ-44A)
MRS	MINI RAWINSONDE SYSTEM
MSC	MILITARY SEALIFT COMMAND
MSE	MULTIPLE SUBSCRIBER EQUIPMENT
MSEA	MODELING AND SIMULATION EXECUTIVE AGENT
MSG	MESSAGE
MSI	MODIFIED SURF INDEX
MSS	METEOROLOGICAL SATELLITE SUBSYSTEM (USMC TMQ-44A)
MST	MEF WEATHER SUPPORT TEAM
MT	METEOROLOGY TECHNICIAN
MTG	MASTER TRAINING GUIDE
MTMC	MILITARY TRAFFIC MANAGEMENT COMMAND
MTP	MISSION TRAINING PLAN
MVOI	MULTI-VARIATE OPTIMAL INTERPOLATION
MWSG	MARINE WING SUPPORT GROUP
MWSS	MARINE WING SUPPORT SQUADRON
NAF	NUMBERED AIR FORCE
NAMIS	NATO AUTOMATED METEOROLOGICAL INFORMATION SYSTEM
NATO	NORTH ATLANTIC TREATY ORGANIZATION
NAVAF	NAVY/AIR FORCE
NAVCENT	NAVY COMPONENT, US CENTRAL COMMAND
NAVEUR	NAVY COMPONENT, EUROPEAN COMMAND
NAVEURMETOCCEN	NAVAL EUROPEAN METOC CENTER
NAVFOR	NAVAL FORCES
NAVICECEN	NAVAL ICE CENTER
NAVLANTMETOCCEN	NAVAL ATLANTIC METOC CENTER
NAVOCEANO	NAVAL OCEANOGRAPHIC OFFICE
NAVPACMETOCCEN	NAVAL PACIFIC METOC CENTER

NAVSPACE	NAVY SPACE COMMAND
NBC	NUCLEAR, BIOLOGICAL, CHEMICAL
NCA	NATIONAL COMMAND AUTHORITIES
NCEP	NATIONAL CENTER FOR ENVIRONMENTAL PREDICTION
NCO	NON-COMMISSIONED OFFICER
NEC	NAVY ENLISTED CODE
NGB	NATIONAL GUARD BUREAU
NGO	NON-GOVERNMENT ORGANIZATION
NIC	NETWORK INTERFACE CARD
NIPRNET	NON-SECURE INTERNET PROTOCOL ROUTER NETWORK
NITES	NAVY INTEGRATED TACTICAL ENVIRONMENTAL SUBSYSTEM
NOAA	NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NODDS	NAVAL OPERATIONAL DATA DISPLAY SYSTEM
NOGAPS	NAVAL OPERATIONAL GLOBAL ATMOSPHERIC PREDICTION
NORAPS	NAVAL OPERATIONAL REGIONAL ATMOSPHERIC PREDICTION
NPOESS	NATIONAL POLAR ORBITING ENVIRONMENTAL SATELLITE SYSTEM
NRL	NAVAL RESEARCH LAB
NSAR	NATIONAL SEARCH AND RESCUE
NSC	NATIONAL SECURITY COUNCIL
NSWC	NAVAL SPECIAL WARFARE COMMAND
N-TFS	NEW TACTICAL FORECAST SYSTEM
NTM	NATIONAL TECHNICAL MEANS
NTP	NETWORK TIME PROTOCOL
NVG	NIGHT VISION GOGGLES
NWS	NATIONAL WEATHER SERVICE
OA	OPERATIONS AEROGRAPHER
OA	OPERATIONS AREA
OCA	OFFENSIVE COUNTERAIR
OCCTC	OPERATIONS CONTROL CENTER TEAM CHIEF (AFWA)
OES	OCEANOGRAPHIC EXECUTIVE SUMMARY
OFCM	OFFICE OF THE FED COORDINATOR FOR METEOROLOGY
OIC	OFFICER IN CHARGE
OL	OPERATING LOCATION
OPAREA	OPERATIONS AREA
OPCON	OPERATIONAL CONTROL
OPG	OPERATIONS PLANNING GROUP
OPLAN	OPERATIONAL PLAN
OPORD	OPERATION ORDER
OPSEC	OPERATIONS SECURITY
OPTASK	OPERATIONS TASK
ORI	OPERATIONAL READINESS INSPECTION
OSD	OFFICE OF THE SECRETARY OF DEFENSE
OSS	OPERATIONAL SUPPORT SQUADRON
OTC	OFFICER IN TACTICAL COMMAND
OTIS	OPTIMAL THERMAL INTERPOLATION SYSTEM
OTSR	OPTIMAL TRACK SHIP ROUTING
OWS	OPERATIONAL WEATHER SQUADRON
PACAF	PACIFIC AIR FORCES
PACFLT	PACIFIC FLEET
PC	PERSONAL COMPUTER
PCS	PROCESSING SUBSYSTEM (USMC TMQ-44A)
PfP	PARTNERSHIP FOR PEACE
PGM	PRECISION GUIDED MUNITION
PIBAL	PILOT BALLOON
PIPS	POLAR ICE PREDICTION SYSTEM

PIREP	PILOT REPORT
PLAD	PLAIN LANGUAGE ADDRESS
PMS	PORTABLE METEOROLOGICAL SUBSYSTEM (USMC TMQ-44A)
PMSV	PILOT TO METRO SERVICE
PNTDT	POINT DATA EXTRACT
POC	POINT OF CONTACT
POD	POINT OF DEPARTURE
POE	PORT OF EMBARKATION
POTS	PLAIN OLD TELEPHONE SYSTEM
PPS	PRECISE POSITIONING SERVICE
PSBRT	PORTABLE SATELLITE BROADCAST RECEIVE TERMINAL
PSYOPS	PSYCHOLOGICAL OPERATIONS
QC	QUALITY CONTROL
QRCT	QUICK REACTION COMMUNICATIONS TERMINAL
RATT	RADIO TELETYPEWRITER
RDIT	RAPID DEPLOYABLE IMAGERY TERMINAL
RECCE	RECONNAISSANCE
RFI	REQUEST FOR INFORMATION
RIBS	REFRACTIVE DATA BY STATION
RSS	REMOTE SENSOR SUBSYSTEM (USMC TMQ-44A)
RTTY	RADIO TELETYPE
RWS	RAWINSONDE SUBSYSTEM (USMC TMQ-44A)
SAFWIN	SECURE AIR FORCE WEATHER INFORMATION NETWORK
SAR	SUPPORT ASSISTANCE REQUEST
SATCOM	SATELLITE COMMUNICATION
SCI	SPECIALIZED COMPARTMENTALIZED INFORMATION
SEAD	SUPPRESSION OF ENEMY AIR DEFENSE
SECAF	SECRETARY OF THE AIR FORCE
SECDEF	SECRETARY OF DEFENSE
SESS	SPACE ENVIRONMENTAL SUPPORT SYSTEM
SHF	SUPER HIGH FREQUENCY
SIPRNET	SECURE INTERNET PROTCOL ROUTER NETWORK
SITREP	SITUATION REPORT
SME	SUBJECT MATTER EXPERT
SMEB	SIGNIFICANT MILITARY EVENT BRIEF
SMO	SENIOR METOC OFFICER
SNDFO	SOUND FOCUSING
SOC	SPECIAL OPERATIONS COMMAND
SOCCENT	SPECIAL OPERATIONS COMMAND, CENTRAL COMMAND
SOCEUR	SPECIAL OPERATIONS COMMAND, EUROPEAN COMMAND
SOCJFCOM	SPECIAL OPERATIONS COMMAND, JOINT FORCES COMMAND
SOCPAC	SPECIAL OPERATIONS COMMAND, PACIFIC COMMAND
SOCSOUTH	SPECIAL OPERATIONS COMMAND, SOUTHERN COMMAND
SOF	SPECIAL OPERATIONS FORCES
SOF	SUPERVISOR OF FLYING (AIR FORCE)
SOFWOC	SPECIAL OPERATIONS FORCES WEATHER OPERATIONS CENTER
SOP	STANDARD OPERATING PROCEDURE
SOWT	SPECIAL OPERATIONS WEATHER TEAM
SPAWARSYSCOM	SPACE AND WARFARE SYSTEMS COMMAND
SPECAT	SPECIAL CATEGORY
SPOD	SEA PORT OF DEBARKATION
SPOUT	SPOUT OUTPUT
SPS	STANDARD POSITIONING SERVICE
SS	SEA STATE
SSMI	SPECIAL SENSOR MICROWAVE IMAGER
SSOB	SPECIAL SUPPORT OPERATIONS BRANCH (AFWA)

SSS	SENIOR SERVICE SCHOOL
SSS	SHELTER SUBSYSTEM (USMC TMQ-44A)
SST	SEA SURFACE TEMPERATURE
STACCS	STANDARD THEATER ARMY COMMAND & CONTROL SYSTEM
STELLA	SYSTEM TO ESTIMATE LATITUDE AND LONGITUDE ASTRONOMICALLY
STOIC	SPECIAL TACTICAL OCEANOGRAPHIC INFO CHART
STT	SMALL TACTICAL TERMINAL
SWI	SPECIAL WEATHER INTELLIGENCE
SWO	STAFF WEATHER OFFICER
SWXS	SPACE WEATHER SQUADRON
TA	TABLE OF ALLOWANCE
TACC	TANKER AIRLIFT CONTROL CENTER
TACFIRE	TACTICAL FIRE
TACMET	TACTICAL METEOROLOGY
TADIXS	TACTICAL DATA INFORMATION EXCHANGE SYSTEM
TAF	TERMINAL AERODROME FORECAST
TALCE	TACTICAL AIRLIFT CONTROL ELEMENT
TAMPS	TACTICAL AIRLIFT MISSION PLANNING SYSTEM
TARWI	TARGET AREA WEATHER INDICATOR
TAS	TACTICAL ATMOSPHERIC SUMMARY
TAWS	TARGET ACQUISITION WEATHER SOFTWARE
TBD	TO BE DETERMINED
TDA	TACTICAL DECISION AID
TBMCS	THEATER BATTLE MANAGEMENT CORE SYSTEM
TENCAP	TACTICAL EXPLOITATION OF NATIONAL CAPABILITIES
TESS/NC	TACTICAL ENVIRONMENTAL SUPPORT SYSTEM/NEXT CENTURY
T/O	TABLE OF ORGANIZATION (USMC)
TOAF	TACTICAL OPERATIONS AREA FORECAST
TOC	TACTICAL OPERATIONS CENTER
TOE	TABLE OF ORGANIZATION AND EQUIPMENT
TOPS	THERMODYNAMIC OCEAN PREDICTION SYSTEM
TPFDD	TIME-PHASED FORCE DEPLOYMENT DATA
TPFDDL	TIME-PHASED FORCE DEPLOYMENT DATA LIST
TS	TOP SECRET
TTF	TANKER TASK FORCE
TTPC	TOMAHAWK TACTICAL PLANNERS COURSE
T-VSAT	TACTICAL VERY SMALL APERATURE TERMINAL
TWR	TACTICAL WEATHER RADAR
TWSTT	TWO-WAY SATELLITE TIME TRANSFER
UAV	UNMANNED AERIAL VEHICLE
UCP	UNIFIED COMMAND PLAN
UGDF	UNIFORM GRIDDED DATA FIELD
UHF	ULTRA HIGH FREQUENCY
UJTL	UNIVERSAL JOINT TRAINING LIST
UNAAF	UNIFIED ACTION ARMED FORCES
USAFE	US AIR FORCES IN EUROPE
USAR	U.S. ARMY RESERVE
USAREUR	US ARMY FORCES, EUROPEAN COMMAND
USARPAC	US ARMY FORCES, PACIFIC COMMAND
USARSO	US ARMY FORCES, SOUTHERN COMMAND
USASOC	US ARMY SPECIAL OPERATIONS COMMAND
USB	UPPER SIDEBAND
USCENTCOM	US CENTRAL COMMAND
USEUCOM	US EUROPEAN COMMAND
USGS	US GEOLOGICAL SURVEY

USJFCOM	US JOINT FORCES COMMAND
USNO	US NAVAL OBSERVATORY
USPACOM	US PACIFIC COMMAND
USSOCOM	US SPECIAL OPERATIONS COMMAND
USSOUTHAF	US AIR FORCES, US SOUTHERN COMMAND
USSOUTHCOM	US SOUTHERN COMMAND
USSPACECOM	US SPACE COMMAND
USSTRATCOM	US STRATEGIC COMMAND
USTRANSCOM	US TRANSPORTATION COMMAND
USW	UNDERSEA WARFARE
UTC	UNIT TYPE CODE
UUV	UNMANNED UNDERWATER VEHICLE
VCLOS	VISUAL CLEAR LINE OF SIGHT
VDS	VIDEO SUBSYSTEM (USMC TMQ-44A)
VHF	VERY HIGH FREQUENCY
VSAT	VERY SMALL APERTURE TERMINAL
WAM	NAVY WAVE MODEL
WAN	WIDE AREA NETWORK
WEAX	WEATHER
WEFAX	WEATHER FACSIMILE
WMD	WEAPON OF MASS DESTRUCTION
WMO	WORLD METEOROLOGICAL ORGANIZATION
WS	WEATHER SQUADRON
WSC	WARFIGHTING SUPPORT CENTER
WSU	WEATHER SUPPORT UNIT
WTI	WEAPONS AND TACTICS INSTRUCTOR
WX	WEATHER
WX	WEATHER
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