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Volume 2. Management of Weather Operations

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Author: MSgt Walter L. Chumney
335th Training Squadron
Joint Weather Training Facility
335TRS/UOAA
700 H. Street Bldg 4332
Keesler Air Force Base, Mississippi, 39534-2499
DSN: 597-0316
E-mail address: walter.chumney.1@us.af.mil

Instructional Systems Specialist: Kenith Israel

Editor: Sherie Davis

Air Force Career Development Academy (AFCDA)
Air University (AETC)
Maxwell-Gunter Air Force Base, Alabama 36118–5643

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CONGRATULATIONS on completing volume 1 and welcome to the second volume of CDC 1W071 Weather Craftsman course. Volume 2 has two units. The first unit covers Meteorological and Oceanographical (METOC) doctrine, the mission of Air Force Weather, and weather services provided by other METOC units. The second unit goes over the programs and management functions involved with running a weather unit. After this volume you will have a more thorough understanding of joint METOC doctrine, worldwide weather services and weather station management.

A glossary of terms, abbreviations, and acronyms is included for your use.

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This volume is valued at 9 hours and 3 points.

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NOTE:

In this volume, the subject matter is divided into self-contained units. A unit menu begins each unit, identifying the lesson headings and numbers. After reading the unit menu page and unit introduction, study the section, answer the self-test questions, and compare your answers with those given at the end of the unit. Then do the unit review exercises.

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Unit 1. Military Weather Concepts and Principles

METEOROLOGICAL and oceanographic (METOC) operations is an essential concept to winning a battle or conflict. The concept of METOC operations starts with the highest level of meteorological support in the Department of Defense and filters downward to the lowest level of weather support. Joint Publication (JP) 3–59, *Joint Doctrine for Meteorological and Oceanographic Support*, is the governing document that gives operational guidance on METOC operations and its application. Simply put, Air Force weather personnel have increasingly participated in joint military operations around the world. In order to support a joint military operation you must understand the doctrine, the support requirements, and weather communications flow. The lessons in this unit will familiarize you with the terminology associated with joint operations and how METOC operations are integrated into the overall concept of such joint forces operations.

1–1. Meterological and Oceanographic Operations Doctrine

Joint Publication 3–59 was produced under the direction of the Chairman of the Joint Chiefs of Staff (CJCS). METOC is a term used to convey all meteorological, oceanographic, and space environmental factors as provided by the services, support agencies and other sources. METOC includes the whole range of atmospheric, oceanographic, and space environment phenomena from the bottom of the earth's oceans into the space environment (space weather).

201. Meteorological and oceanographic operations doctrine

Purpose

The intent of JP 3–59 is to set guidelines for tactics, techniques, and procedures to use whenever armed forces work together in a joint operations situation. In short, the document streamlines the levels of authority and methods of communications that are used to provide commanders at each military echelon with the METOC information they need to make strategic, operational, and tactical decisions. METOC doctrine ensures coordination exists among weather products created at each level.

An additional provision of JP 3–59 is that it gives guidance for military weather units from all service branches to produce joint and individual weather products to support joint forces at each level of command. For example, if a commander requests weather information from a lateral military unit, the result is three different weather opinions. While any one of the forecasts will do the trick, if each service branch issues a separate forecast and none of them jive, you can see that there's definitely a problem. To avoid such a dilemma and duplication, METOC doctrine outlines the principles necessary to avoid miscommunication and confusion.

Impact on military capability

In order to anticipate and exploit the best windows of opportunity when engaged in battle, accurate, timely, and reliable weather information is a must. Commanders use weather information to plan, execute, support, and sustain specific military operations. In exploiting METOC data, commanders and their staff try to optimize how sensors, weapons, logistics, equipment, and personnel can best be used. Often, commands combine METOC data with military strategies and tactics to achieve the element of surprise.

When used wisely, METOC data can provide the conditions necessary to act and react to enemy forces in ways that they might otherwise expect. For example, when weather conditions such as heavy fog causes poor visibility, careful timing of an attack on adversaries to capitalize on the poor conditions may cause a loss of unit cohesion among the adversary force. Coordinating assaults and attacks by exploiting weather conditions can give any force the element of surprise. Likewise, a failure to consider METOC data could end with disastrous results. Even the most technologically advanced weapons systems can be affected by the weather. When METOC data is carefully considered, the loss of, and failure of equipment can be avoided.

Application

The doctrine and guidance found in JP 3–59 applies to the commanders of combatant commands, subunified commands, joint task forces, and subordinate components of these commands. Additionally, the principles and guidance also apply when significant forces of one service are attached to forces of another service or when significant forces of one service support forces of another service. In either case, joint operations are occurring.

In recent years, METOC operations have become very important because US military operations have increasingly become joint operations and are frequently combined (multinational) operations. The increase and frequency of joint and combined missions requires that METOC communities have a pool of expertise and resources that are capable of operating in the joint or combined arena.

Key functions

To get the most out of METOC information specific processes must be followed. A complete and thorough use of all METOC information is essential to the success of joint operations. Failing to consider the effects of METOC conditions can put lives and resources at risk. The two key functions are characterization of the environment and exploitation of the environment as shown in figure 1–1.

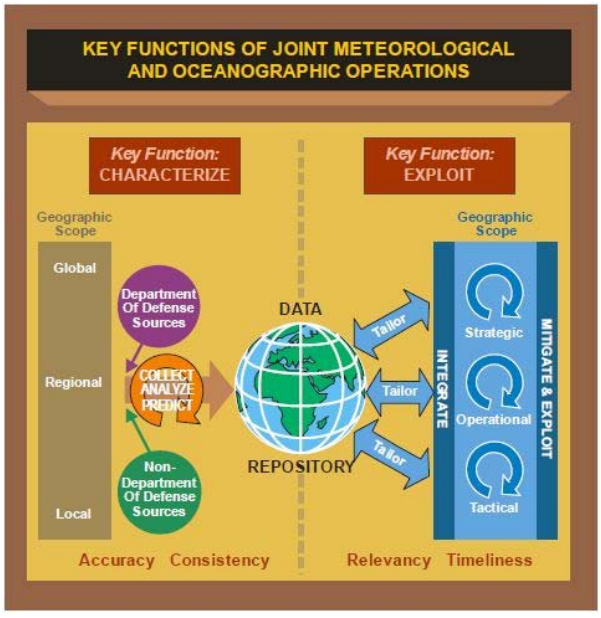

Figure 1–1. Key functions.

Characterization

Characterizing the environment is a three step process. The first step is to collect information or data. The second step is analyzing current and past conditions from the data. The last step is predicting future METOC conditions.

Collect

This is the ability to sense, acquire and observe meteorological, oceanographic, and space data. It includes satellite sensing, ocean buoys, and automated observing just to name a few. Data retrieved from collection goes into theater, regional, and global databases. These databases are used to develop the METOC predictions that are used in all aspects of mission planning and execution.

An important part of collection is the sensing strategy and collection plan. In developing this plan, strategic locations are picked to place sensing instruments or retrieve data from indigenous people and friendly forces. For example, a mountain pass may need an automated weather sensing device or a live individual to relay back information that an automated device cannot sense. The key ingredient to a good sensing strategy and collection plan is to utilize all available resources.

Analyze

This is the ability to transform meteorological, oceanographic, and space environmental data into METOC information. Raw data is interpreted and evaluated to develop forecasts and recommendations based upon operational requirements. Most analysis is accomplished at the weather hub or regional METOC center; however, analysis can be done at any level. Analysis is a required component for determining mission impacts.

Predict

This is the ability to the anticipated future state of the meteorological, oceanographic, and space environment. Through the use of computer modeling and human judgment, you will make predictions on the future state of the environment. Prediction can make or break you as a forecaster. Get it right most of the time and people will trust you. Get it wrong a lot and most folks won't want to hear what you have to say.

With the advent of computer modeling a lot of the guesswork has been removed from weather forecasting. This does not mean that you take a model forecast as absolute truth. You must look hard at model data to determine if it is correct. If you change something, coordinate with other forecasters; this way the forecast will remain consistent at all levels of an operation. Be sure and use sound meteorological reasoning to make any changes.

Exploitation

Exploitation is where METOC personnel aligned with a mission or joint force comes into play. There are two parts to exploitation. Taking the environmental data and tailoring it to a mission or the operational requirements of a joint force and integrating this information into the planning process to include command and control systems (C2). This is the main part of your job; the ability to tailor and integrate into a mission will determine your success.

Tailor

This is the ability to derive relevant information from environmental parameters for decision making. A key role for METOC personnel is to support the decision-making process of the commander. You do this by tailoring your forecast to the operational requirements. You need to know the mission thresholds for the platforms and personnel as well as the terrain.

Integrate

This represents the ability to enable decision makers to anticipate environmental impacts on planned operations and then mitigate or exploit these conditions. Integration is getting involved in the entire planning and decision-making process. Know the timeline, the main route as well as alternates, any terrain influences, the angle of the sun, and the lunar illumination. Identify the targeting, timing,

tactics, techniques, and procedures. Be ready to take all the different mission impacting parameters and offer the commander different windows of time or the best routes to use based upon conditions. This is especially important for the on-site weather forecaster, where you will be briefing and sometimes accompanying the operational personnel on a mission.

Principles

While we are discussing doctrine, we will review the four METOC principles. The principles of METOC doctrine incorporate all facets of all service branches meteorological, oceanographic, and space environment programs. The four principles are accuracy, consistency, relevancy, and timeliness.

Accuracy

METOC information must be measurably correct. You must make the best possible forecast or prediction of future weather events based on sound meteorological judgment. Joint forces depend on accurate METOC information to plan and conduct their operations. Inaccurate information can cost lives, resources, and undermine the mission.

Consistency

METOC personnel should provide operational forces at all levels consistent environmental information. This is done using the "one operation, one forecast" concept. This unity of effort will require you to communicate with other METOC personnel to ensure that each of you is briefing the same message. This can be especially important for an operational unit to support a larger operation.

Relevancy

In order to keep METOC information relevant METOC personnel absolutely must communicate with their J3 (operations) and J35 (operational plans) sections. Take a look at their different weapons systems, identify how often planners will require information. In short know the mission, know the equipment, and know the units capabilities.

Timeliness

METOC operations are most effective when the combatant commander receives accurate METOC information in a timely manner. METOC information is of a perishable nature. The older the forecast or the data that a forecast is made from the less accurate it will be.

202. Meteorological and oceanographic organizational support structure

The combatant commander is ultimately responsible for all assets including METOC assets in their area of responsibility. The joint force commander (JFC) under the combatant commander normally directs METOC forces under their control to ensure a unity of effort. The one operation–one forecast concept falls in line with this organizational unity of effort.

Senior METOC officer

Combatant commanders normally designates a senior METOC officer (SMO). The SMO coordinates all METOC activities with their area of responsibility (AOR). For example the SMO will be the liaison between the combatant commander's staff, command components, and all assigned or attached METOC forces. The SMO supports the combatant commander as the lead METOC officer for all deployed forces. The SMO's primary responsibility is to develop a concept of operations for all METOC forces. The concept must identify theater weather support requirements to include weather product information, communication responsibilities, and operational functions between deployed units, military services, and allied nations. The SMO also coordinates weather support from various METOC forecast centers to ensure unity of effort between deployed and nondeployed assets.

Joint METOC officer

The JFC normally designates a joint METOC officer (JMO) upon initiation of planning for an operation. The JMO will serve on the JFC staff as the lead METOC advisor. The JMO will support all aspects of planning and placement of METOC forces by interacting with the JFC's staff, and all

components of the joint, regional or coalition forces. The JMO is responsible for ensuring that appropriate METOC support is provided to all subordinate joint forces and components for the entire range of military operations. The JFC also provides overall direction and guidance to unify METOC support efforts. Support includes the provision for information concerning the past, present, and future states of the space, air, and ocean environments. This allows commanders to determine the impact of these environments on personnel, weapons, sensors, and system performance. Component-specific METOC support is generally provided by assigned or attached component METOC assets using guidance provided by the JMO. Although METOC information may flow downward or upward, because of the highly perishable nature of METOC data, support effectiveness depends greatly on timely, reliable, and interoperable communications among METOC service components at all levels.

METOC operations support community

The METOC operations support community (MOSC) is a list of all the units or organizations available to the SMO or JMO. This includes METOC forecast centers, oceanographic teams and operational weather squadrons. Figure 1–2 shows an example of organizations in the METOC operation support community.

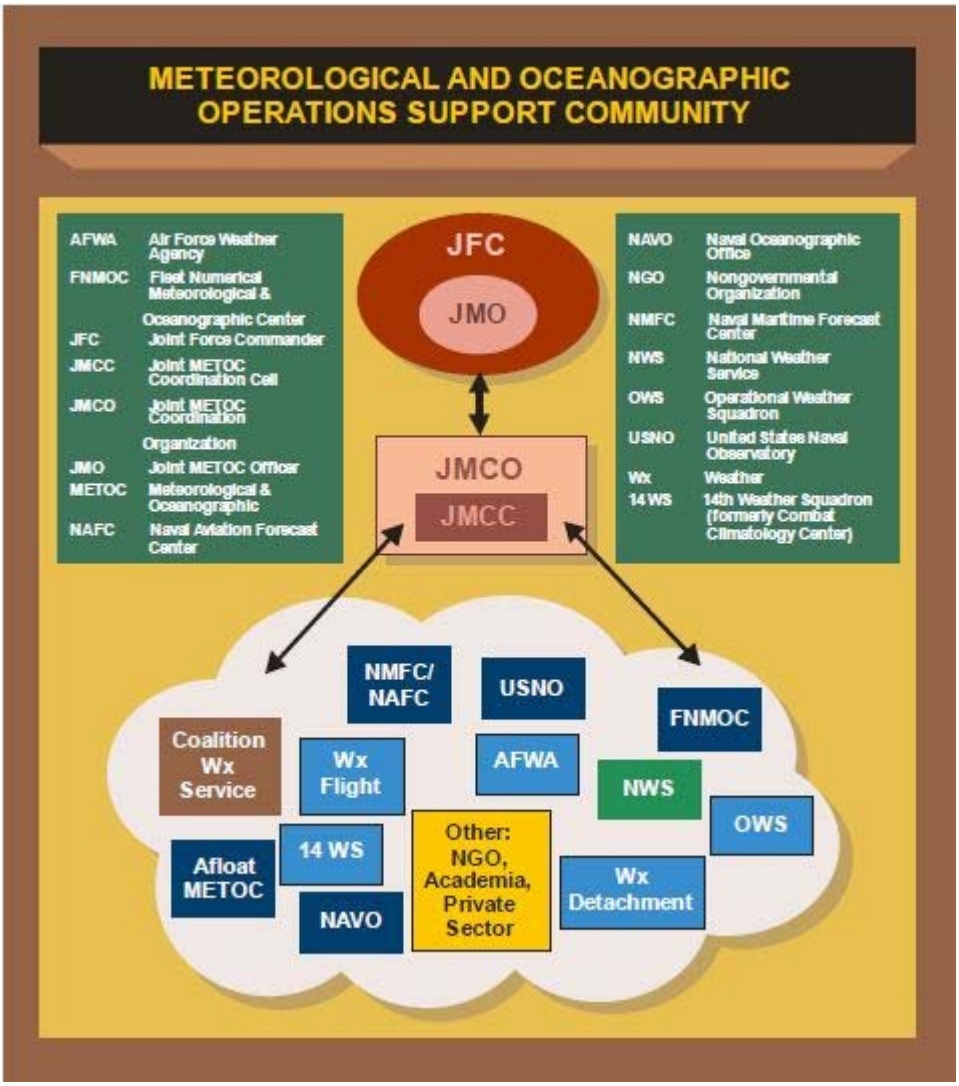

Figure 1–2. METOC operations support community.

Joint METOC Coordination Organization

The Joint METOC Coordination Organization (JMCO) is an organization that is directed to support the Joint Task Force (JTF). Now think back to volume one and the operational order (OPORD) and annex H (Weather annex). The JMCO is normally designated as the lead METOC organization in annex H of the OPORD.

METOC forces need flexibility and mobility to ensure uninterrupted support to achieve unity of effort. The Joint Forces Commander designates the location and composition of the JMCO and its staff (The JMCO may exist inside or outside of the theater of deployment.). Under the JMO's guidance, the JMCO is responsible for official joint force forecasts that can be tailored for use at all levels.

Joint METOC Coordination Cell

The JMCO will designate or form a subordinate section called the Joint METOC Coordination Cell (JMCC). The Joint Functional Component Command (JFCC) will provide METOC support to the JTF on a daily basis. A Joint METOC Coordination Cell (JMCC) is the cornerstone of METOC operations support.

The JMCC staff is composed of forces drawn from all the military services participating in the operation to ensure that quality service-unique METOC support is provided. The composition of the JMCC staff should be tailored to support the concept of operations of the joint mission and composition of assigned forces The JFCC staff then tailors the composition of the multiservice weather teams to support the concept of operations of the joint mission and the military needs of the joint forces involved (that is, maritime, amphibious, special operations, ground, air, space, etc.).

When the JMCC is deployed in theater, the JMCC becomes a joint task force (JTF) command-level function, and therefore, falls under the operational control of the JFC. The JMCC may be fixed or mobile and may change as operational conditions dictate. It ideally receives support and data from other organizations as required. Early identification and sourcing of the JFC, JMO, JMCO, and JMCC assists the military services in programming sufficient personnel and equipment to meet JFC requirements. Figure 1–3 shows the METOC hierarchy in support of a JTF.

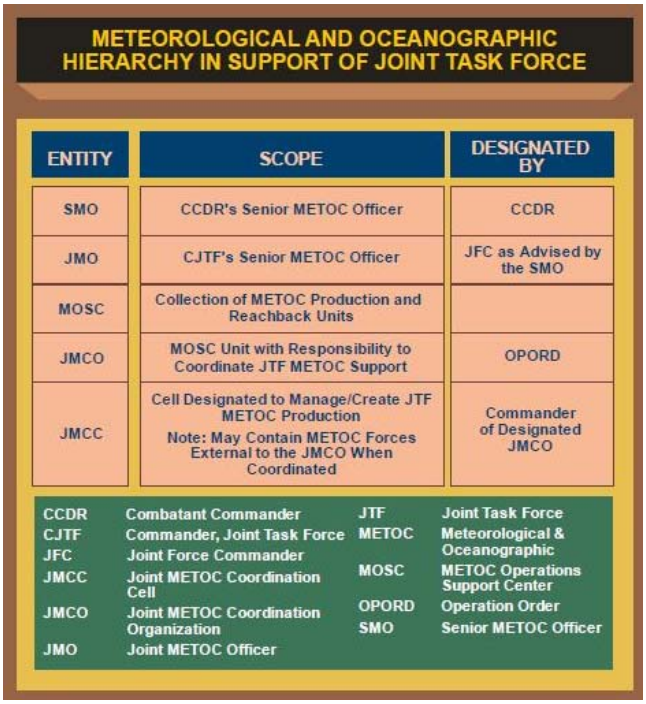

Figure 1–3. METOC hierarchy in support of a JTF.

Support force structure/characteristics

The METOC concept ensures that weather support exists at every level of command throughout the strategic, operational, and tactical tiers. Although there are some variables in the levels of support, the one thing that remains constant is that weather support does not collapse. The following portion of this lesson describes the echelons of METOC.

METOC forecast centers

The centralized METOC forecast centers (MFC) are staffed and operated by one of the services (usually the Navy or Air Force). Air Force MFCs are known during peacetime as our operational weather squadrons (OWS). These worldwide centers make products beyond the capabilities of component level or on-scene tactical units supporting local operations. Examples of centralized products include:

- Current analysis for global and hemispheric scales.
- Forecast products for extended time periods and large geographic areas.
- Point-specific data.
- Climatological analyses for long-range operational and contingency support planning.
- Space environmental products.

Intermediate levels of command

Some component organizations are considered operational levels of command. A joint service commander is responsible for the service component and its primary mission. For example, the joint forces air component commander (JFACC) is responsible for the commanding air maneuvers from multi-services. Likewise, the joint forces land component commander (JFLCC) is responsible for land operations. These commanders are considered dual-hatted as they also serve as service component commanders at the tactical level of command. In this sense, the JFACC may also serve as the commander of Air Force Forces.

Component level (Army, Navy, Air Force, Marine Corps, special operations forces)

Subordinate component level commands are named after the military service that they represent. The Commander of Air Force Forces (COMAFFOR) is responsible for all of the Air Force units that fall under their command. Similarly, the other military services have comparable titles (e.g., Commander of Army Forces [COMARFOR], etc.).

At this level a METOC officer serves as the liaison between the military service commander and the lower level wing, division, and so forth. As required, the METOC officer keeps the military service commander informed with weather information. Additionally, if required a staff weather officer (SWO) may be assigned to the COMAFFOR or COMARFOR to advise them of service-unique weather matters.

Component level organizations receive products from centralized sites such as the METOC Forecast Center, as well as data from subordinate units. They provide tailored METOC support to component command and control activities and to subordinate units. Component command support activities also provide tailored support to the JFC, combatant commander as required.

During a crisis and/or when a JTF is established, component command activities may be designated as the JMCO. Although they may require personnel and/or equipment augmentation, they still function in support of the JTF. However, special operations forces (SOF) METOC support requirements must be established and satisfied separately. SOF METOC support forces may include representation from all services to ensure quality, service-unique support is provided.

Tactical operations (wing, squadron, corps, division, carrier battle group, Marine air-ground task force, Surface Action Group)

These organizations take local observations, generate local analyses and forecast products, and use centrally prepared products to provide support specifically tailored to operational mission requirements in the tactical area of operations. Tactical-level support activities may also provide tailored support to the JFC as required. During a crisis and/or when a JTF is established, tactical-level activities may be designated as the JMCO or JMCC and, although they may require personnel and/or equipment augmentation, should function in support of the JTF. The lead weather officers at wing and squadron (corps and division) levels are called the SWO.

Climatology

During the planning phase of any operation, knowledge of the historical and regional METOC conditions provides invaluable insight into the possible impacts on operations. Knowledge of historical METOC conditions for a region is obtained through the 14th Weather Squadron (formerly known as Air Force Combat Climatology Center). Any service can request data or support from 14th Weather Squadron for joint operations. The 14th Weather Squadron has climatological databases that are unmatched by other countries.

Observations

Support to current operations depends on comprehensive METOC observations derived from land and ship reports, upper-air soundings, satellite sensors, weather radars, lightning detection systems, profilers, solar telescopes, ionospheric sensors, buoys, and aircraft. These observations support local missions and are part of a worldwide database of products that are derived to support operational commanders at all levels. A theater or AOR sensing strategy should be developed that fully integrates the individual components' METOC observation networks and exploits all the reliable sources of foreign data. This ensures a unity of effort while optimizing data collection, dissemination, and integration into support forecast products.

Forecasts

To support all operational activities effectively, forecast products need to cover global, regional, and tactical scales. The geographical area and time frame that a forecast product covers is often referred to as a window. These forecasts vary from generalized planning forecasts issued several days before an operation, to forecasts issued to support the execution of a specific mission or operation. Specific JMCC forecasts accordingly are considered official forecasts and are used by all agencies in the joint force area of operations. Weather personnel coordinate significant deviations from official forecasts by subordinate activities with the JMCC.

Joint Operational Area Forecast

The primary product that is produced by the JMCC is the joint operations area forecasts (JOAF). The JOAF is produced under the premise of "One Theater, One Forecast" and is considered the official forecast. It provides a discussion and rationale for expected conditions. It's a product whose format, content, and duration are determined by operational requirements.

The JOAF typically has sub areas identified within the joint area of operations. It specifies time of occurrence, duration, and intensity of weather conditions when they impact operations. The format may be any combination of text and graphics as determined by the SMO/JMO. In addition, JMCC coordinates the JOAF among METOC elements within the JTF. Figure 1–4 outlines parameters addressed within the JOAF.

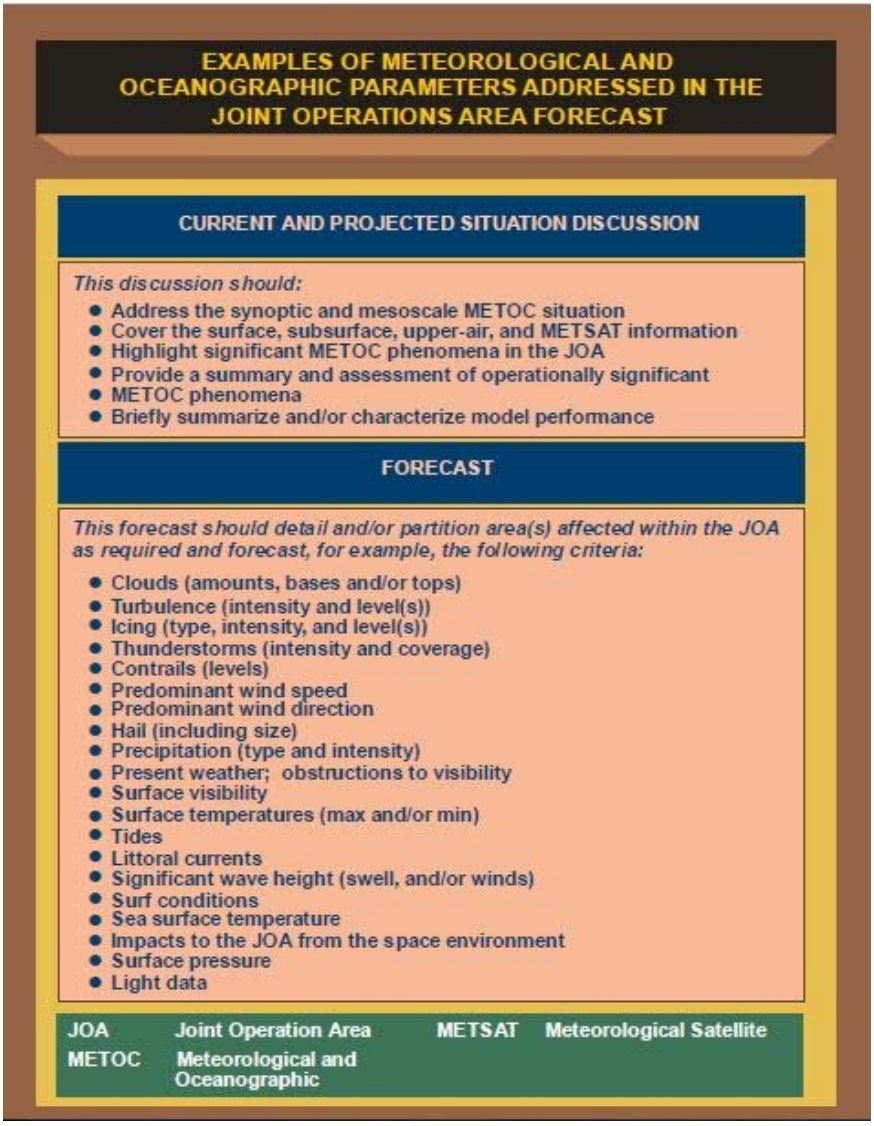

Figure 1–4. JOAF METOC parameters.

203. Data and communications requirements

Communications are an essential element for METOC support. Because METOC data is extremely perishable, effective METOC services depend on timely, reliable communications support. The joint communications architecture supports the collection or interception, storage and retrieval, dissemination, quality control, and processing of large amounts of data. High-speed communications are required to rapidly transmit and receive real-time global scale METOC information between the METOC forecasting centers, JMCO/JMCC, component, and field units. Planning includes timely movement and establishment of necessary equipment to support METOC communications.

Initial communications

Early-in or initial communications must be capable to sustain METOC force capability until more robust communications are available. Some examples are Iridium satellite phones, international maritime satellite terminals, and high-performance waveform (HPW) satellite systems. HPW is a secure satellite data communication system that uses e-Mail and graphics to communicate with forward personnel.

Planning responsibilities

Early identification of specific support, including transportation and logistics sustainment requirements for all levels is required to ensure the availability of necessary information and resources. Integrate the METOC communication needs into the planning, command and control process as early as possible. This will involve talking with the J6 section and making your communication needs known.

Early identification of JMCO/JMCC sourcing also assists the services in programming sufficient personnel and equipment to meet JFC requirements. The size, structure, and content of support are dependent on the JFC's operational needs. METOC support is provided by integrating a mix of global, regional, and locally produced METOC products as well as data and products received from reliable foreign sources. METOC services support long-range planning, mission planning, and operational execution.

Training

METOC concepts developed to support joint operations should be exercised and evaluated in realistic training scenarios to ensure they are feasible and can support the overall mission at all levels. Conducting joint exercises trains assigned forces, enhances interoperability, and confirms the feasibility of communications and operational plans. Service components should state their training requirements for inclusion in combatant commander-sponsored and CJCS–sponsored exercises through the combatant commanders' senior METOC officer.

Nontraditional sources of meteorological and oceanographic data

METOC personnel need to consider every available source to obtain information. The following is an outline of some of the nontraditional sources you should consider. There is a lot of potential data out there; it just takes a little work or communication on your part to obtain it.

Air traffic control

Air traffic control (ATC) from any service can usually provide surface pressure, temperature and surface wind direction and speed. Tower personnel can also estimate horizontal visibility and obstructions to vision. In addition they can also keep a watch for lightning, thunderstorms, and tornadoes.

Terrain analysis team

These army engineering teams provide hydrological data. Data includes flow measurement and predictions of river stages and floods.

Imagery intelligence sections

Each service has an intelligence imagery section. Most deployment situations you will be allied either by duty position or by briefing schedule with the intelligence section. Utilize the imagery section for general info on visibility, cloud cover, trafficability, and flooding.

Forward Area Limited Observing Program

Army brigade and battalion intelligence officers may be tasked to provide supplemental weather observations. Forward Area Limited Observing program (FALOP) is a program in which weather data is collected by forward area intelligence personnel and relayed back to METOC personnel.

Aviation squadrons or brigades

Aircrews from all services are a valuable tool for weather data within the Pilot Reports (PIREPS) they provide. Remotely piloted aircraft can also provide data via downlink or from visual imagery.

Space support teams

The Army, Navy, and Air Force have space personnel. They provide space environmental information on impacts to operations.

Chemical, biological, radiological, and nuclear reconnaissance units

Army and Marine Corps chemical, biological, radiological, and nuclear (CBRN) reconnaissance units have vehicles that can provide data. This data includes temperature, humidity, wind speed, and wind direction.

Artillery meteorology

Artillery meteorology (ARTYMET) teams can provide data from army as well as the Marine Corps. They provide upper-air as well as limited surface weather observations.

Field sanitation teams

Even the teams that gather garbage and raw sewage can provide data. Look to them for temperature, wet bulb, and globe temperature as required to monitor heat stress. The marine corps has this data with the Navy medical teams assigned to them.

Surface ships

All Navy surface ships provide weather observations of some scope. Some can even provide oceanographic data such as depth and temperature profiles.

Special operations forces

Special operations forces (SOF) specializes in providing information from data denied areas. SOF has Air Force and army aviation units for pilot reports as well as sensors on manned and unmanned aerial platforms.

Limited forward weather observations can be taken by special operations forces on an as required basis. You must be sensitive to OPSEC considerations when using data received from SOF.

Special operations weather teams

Special operations weather teams (SOWT) can be tasked to provide data as part of the collection strategy. This can be mission specific or for an entire operation. SOWT personnel provide river information, avalanche assessments, terrain reports, upper air observations, as well as detailed surface based weather observations. Location may be included as part of the observation.

204. Meterological and Oceanographic in Joint and Multinational Operational Planning

Now let's discuss two items under joint and multinational planning. At the top we have the Joint Operational Planning and Execution System (JOPES). Second is the Joint Operational Planning Process (JOPP), which is a less formal analytical process than JOPES. Last are multinational operations and some of the differences you'll see in these operations. We'll discuss these more in detail as we move on.

Joint Operational Planning and Execution System

JOPES is the primary system for military operational planning and execution, including requests for forces. JOPES is broken down into three operational activities: situational awareness, planning, and execution. Planning is divided into four steps—strategic guidance, concept development, plan development, and plan assessment.

Strategic guidance

When an event occurs that has the potential to affect national security a combatant commander's assessment is needed. This is where the SMO/JMO comes into play. The SMO/JMO will provide the combatant commander with:

- Current METOC conditions (air, land, maritime, and space).
- Climatology.
- Forecast weather.
- Potential METOC impact on the event.

- Site suitability for locating forces.
- Degree of accuracy and limitations of forecast products.
- METOC impacts on communications, radar, sensors and personnel.

Concept development

When the CJCS assesses an event, they will review the combatant commanders as assessment. METOC will support the decision on whether to initiate military action and will provide METOC impacts to military operations.

Plan development

With the arrival of a CJCS warning order the SMO/JMO ensures that METOC information is linked with the different Courses of Action (COA). The SMO/JMO tasks subordinates to provide input; this provides another layer of METOC personnel to improve the METOC database. In this step, the SMO/JMO will also review the sensing strategy so they can draft a METOC collection plan.

Collection planning

The SMO is responsible for planning the sensing strategy based on METOC collection requirements to support the operation. Part of this is conducting a climatological and terrain analysis to determine where the best places are to place METOC sensors or personnel. The SMO/JMO also determines the force requirements for all different phases of an operation. The SMO/JMO submits a requirement for METOC forces based on operational requirements to the combatant commander.

During plan development the METOC requirements will be placed in annex H of the appropriate plan. In doing this the SMO/JMO will coordinate with the intelligence collection manager to integrate METOC with the intelligence, surveillance, and reconnaissance (ISR) collection plan. An example of this in action is using SOWT's for intelligence collection along with their METOC collection as part of the reconnaissance mission. Another would be to use remotely piloted aircraft to determine surface or atmospheric parameters.

Plan assessment

The SMO/JMO continuously communicates with the different service component METOC planners. This ensures that any changes needing to be made to refine the plan are made as quickly as possible. The goal is to support the planned operation.

Joint Operational Planning Process

JOPP is a planning model. It establishes procedures for analyzing and developing a mission as well as comparing different courses of action to determine success. Commanders use JOPP to organize their planning activities. It fosters a common understanding of the mission and the commander's intent.

METOC and its effects is critical to the success of JOPP. It allows commanders to take advantage of METOC conditions and minimize the impacts of adverse conditions to gain an advantage. Upon receipt of a mission the SMO or JMO will look for lessons learned from past operations of a similar nature. This may form a template to use in forming the sensing strategy and METOC collection plan.

In analysis of the mission the SMO or JMO coordinates with the different components of the JTF to determine the mission impacts as well as address any specific needs from the components of the command.

Multinational

Multinational is a term used to describe military actions conducted by forces of two or more nations. You may also see this referred to as combined. The Multinational Force Commander (MNFC) should designate a lead METOC officer. This officer will coordinate METOC support and interoperability of equipment. Just like joint operations, the "one operation, one forecast" rule applies in multinational operations.

Some of the challenges you will face include differences in language, techniques, data formats, and communications. All of these challenges must be worked out before an operation is executed. An example of the multinational command in action is the North Atlantic Treaty Organization (NATO) operation in Afghanistan. In this example lead METOC officers rotated between NATO member nations. Different NATO members had different sub region METOC responsibility as well.

In essence the multinational operations work similar to joint operations. Due to different countries being involved however the approval process may be higher than on a joint operation. Some things may be approved at the national or interagency level.

Whenever working with a multinational force keep in mind the cultural differences. Educate yourself about the cultures of the personnel you will be working with. The Joint Special Operations University offers classes to assist you with this. The cross cultural communication courses, as well as regional familiarization courses, are great tools to use in preparation for a multinational deployment.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

201. Meteorological and oceanographic operations doctrine

1. What is the intent of Joint Publication 3–59, Joint Doctrine for Meteorological and Oceanographic Support?

2. Briefly state how commanders use METOC data.

3. In recent years, why has METOC doctrine become so important?

4. How many steps are there in characterization?

202. Meteorological and oceanographic support requirements

1. Who supports the combatant commander as the lead weather person for all deployed forces?

2. Who ensures that METOC support is provided to all subordinate joint forces and components for the entire range of military operations?

3. During peacetime, the Air Force METOC forecast center is known as?

4. At the component level, what is the role of the METOC officer?

5. What organization provides requesting agencies knowledge of historical METOC conditions for a region?

6. Name five types of METOC observation data that are integrated into METOC networks.

7. Once the official forecast is produced, with whom must subordinate weather personnel coordinate significant forecast deviations?

8. Name the forecast product that the JMCC produces.

203. Data and communications requirements

1. Why is high-speed communications important for METOC services?

2. In planning METOC support, describe the integration necessary to create an effective database.

3. Identify the 11 different nontraditional sources of weather information.

204. Meterological and oceanographic in joint and multinational operational planning

1. What is the primary system for requesting forces?

2. On the warning order, the SMO ensures that METOC data is linked with what?

3. Name some of the challenges you will face in multinational operations.

1–2. Mission of Air Force Weather

Air Force weather (AFW) is a combat force multiplier consisting of active duty, Air National Guard (ANG) and Air Force Reserve Command (AFRC). Personnel are organized, equipped, and trained to enhance combat operations. AFW personnel provide tailored weather decision aids which play a crucial role in all military activities. Accurate weather predictions enable the commander to direct combat forces at the right time, with the appropriate effort, in support of tactical, operational, and strategic operations.

America's national security environment and its corresponding defense planning guidance (DPG) often change. As an example, the military recently made a significant change from a global, cold war strategy to a regional strategy that relies on a smaller US-based contingency force. Technology, at the same time, provides constant change to military capabilities supporting the DPG.

What does not change is that virtually all forces are influenced by the weather—warfighting more often adapts to the weather rather than it surmounts it, just as it adapts to terrain and sea conditions. Weather asserts constant influence on the readiness, morale, and effectiveness of military forces; the choice of military strategy and tactics; and the performance and useful life of military weapons systems. Remember, even the most advanced, high-cost weapon systems are affected by the air and space environment. Weather must therefore be considered in every facet of military force planning deployment, and employment, and system design and evaluation.

Weather impacts a large range of military operations. Because the list of operations is so lengthy, only a few are presented here. Moreover, with the increasing number of joint operations that WFs may support, it's nearly impossible to list every operation from service branches that you may support. First, let's look at some of the terms that are used when describing military operations.

205. Support force structure

Structures, procedures, and capabilities are established and maintained to support the weather principles and accomplish the weather functions. The overall AFW organization for military operations is based on wartime effectiveness as well as peacetime efficiency. AFW needs to be integrated in the full range of operations that may be directed by the national command authorities.

Organization

AFW functions are conducted at the tactical, operational, and strategic levels to enhance wartime operations of combat forces, operations short of war, and peacetime operational requirements and training.

Tactical level

At the tactical level, weather units collect and disseminate weather information, generate analysis and forecast products, and use centrally prepared products normally produced by strategic level organizations to provide tailored information to enhance the execution of specific operational missions.

Operational level

At the operational level, OWSs build and maintain regional weather databases and provide tailored area and target information to command and control activities and tactical level weather forces operating in a specific geographic AOR. To do this, these units rely on weather data from tactical level units and products from centralized sites at the strategic level. These units may function as joint weather units in the theater in which they are located.

Strategic level

At the strategic level, strategic weather centers use resources to build and maintain a variety of worldwide meteorological and space environmental databases. Then they generate products not produced at the tactical and operational level weather units. Centralized products provide data and guidance from which mission-tailored products are derived. Strategic weather centers may function as joint or theater weather units when required for joint operations.

Continuous operations

Air Force weather forces and organizations need the flexibility and mobility required to ensure uninterrupted information to military forces regardless of the operating conditions or location. To ensure this continuity at all echelons, weather organizations, and their supporting communication architectures, must be enacted as soon as possible after employment to allow for data collection and analysis, operational product preparation, and dissemination. If the constitution of this infrastructure

is delayed, weather information for operational and tactical planning, and the conduct of operations may not be adequate.

Preparation and training

Weather personnel are professionals who are able to provide quality tailored battlespace weather information to the warfighters. They must, therefore, possess both technical proficiency and military skills. This requires aggressive and realistic training that fully exercises tactical equipment capabilities and procedures. Training includes and simulates many of the uncertainties expected during contingencies of war; for example, communication outages, lack of data, and so forth. Training must be evaluated to determine its value and to assess current capabilities. As the military develops and integrates sophisticated new technologies, continued technical education and realistic training are even more essential to the professional growth and overall capability of weather personnel.

Relationship with joint and combined operations

In a contingency or war, military weather systems are most likely the only assured source of weather information. In a crisis environment, reliance on other sources of weather information may result in a degraded quality of weather information. In order to be effective, Air Force weather personnel must think and train from a joint perspective as detailed in joint doctrine and joint tactics, techniques, and procedures for METOC operations. This maximizes the effectiveness of available resources during theater operations and ensures maximum interoperability and unity of effort of component forces. Additionally, Air Force weather personnel need to consider and exploit capabilities of allied weather forces during combined operations.

206. Organization of weather operations

There are many different roles and responsibilities associated with weather support. It's important to understand the relationship between the various organizations at different levels as well as the responsibilities associated with each level. Whether it's at the strategic, operational, or tactical level, weather personnel are directly embedded in the day-to-day operations of various missions spanning the globe.

Weather Operations Organization

Air Force Doctrine Document 2-9.1, *Weather Operations*, states, "Air Force weather operations with global, regional, and local scopes provide direct support to strategic, operational, and tactical decision-makers through a combination of reachback and distributed operations (e.g., on-site)."

Air Force weather personnel characterize the environment on *global, regional, and local scales,* developing information primarily for exploitation by weather forces embedded in operational units. Weather forces directly support decision-makers' requests for assistance at the *strategic, operational, and tactical levels* to include the intelligence community; joint force, functional component, and Air Force and Army commanders and staffs; Air and Space Operations Centers; expeditionary Air Force units; Army combat arms, combat support, and combat service support; and Air Force and Army special operations units.

Global and regional operations

Global weather centers collect, compile, process, and format weather and space observations from commercial, civil, and military sources. They generate computerized real-time analyses, forecasts, long-range outlooks, and climatological assessments of the global natural environment for use at the regional and local levels.

The 2nd Weather Group at Offutt AFB, Nebraska, and the 14th Weather Squadron at Ashville, North Carolina, are the primary global weather centers within Air Force weather operations.

Regional weather centers then refine and prepare higher resolution analyses and forecasts, where weather personnel with appropriate regional expertise adjust the outputs to enhance the products produced by computer models and algorithms.

Regional weather operations are conducted at operational weather squadrons. An operational weather squadron's area of operations is generally aligned with a combatant command's area of operations. Support to continental United States (CONUS) operations are organized under the 1st Weather Group at Offutt AFB, Nebraska. There are operational weather squadrons in several major commands (MAJCOM) to support operations outside the CONUS and specialized global operations. OWS's products range in scale from the operational to the tactical level. The following table outlines the different regional weather centers.

Air Force Weather Regional Weather Centers			
Location	**Area Of Responsibility**		**Command & Control Authority**
21st Operational Weather Squadron, Sembach AB, GE	USEUCOM		USAFE
17th Operational Weather Squadron, Hickam AFB, HI	USPACOM		PACAF
25th Operational Weather Squadron, Davis-Monthan AFB, AZ	USNORTHCOM	Western US	1st Weather Group
26th Operational Weather Squadron, Barksdale AFB, LA.		South Central and Southern US	1st Weather Group
15th Operational Weather Squadron, Scott AFB, IL		North Central and Northeastern US	1st Weather Group
Det 1, 623 AOC, Hurlburt Field, FL	USSOCOM		AFSOC
28th Operational Weather Squadron, Shaw AFB, SC	USCENTCOM		ACC
Global Weather Operations Directorate, Scott AFB, IL	USTRANSCOM		AMC
AFSOUTH Weather Flight, Davis-Monthan AFB, AZ	USSOUTHCOM		ACC

Local operations

At the local level, weather personnel collect detailed measurements of the natural environment, which are input into the global database and are the crucial foundation required to develop environmental products suitable for all levels of warfare. Air Force weather operations also process and analyze historical weather data at each level to determine normal seasonal weather patterns, averages, probabilities and effects of specific weather elements on operations. These weather forces generate specific mission-execution analyses and forecasts for air, space, and surface missions by integrating and tailoring global, regional, and local-scale environmental information.

At the base/post level, weather forces are normally organized as a weather flight in an operations support squadron for Air Force operations or a weather squadron (including subordinate detachments, flights, and operating locations) for Army operations. Air Force weather personnel are integrated into the warfighting headquarters, Air Operations Centers (AOCs), flying wing/group/squadron mission planning cells and the Army warfighting headquarters. For conventional forces, direct support is normally provided down to the Air Force squadron level or the Army brigade combat team/support

brigade level. In contrast, direct support to Army and Air Force special operations forces is normally provided as needed, even to a small, forward-deployed team.

Air Force Weather Agency

Part of understanding METOC doctrine and its support structure is being familiar with the organization of the Air Force Weather Agency (AFWA). AFWA is a field operating agency (FOA) of the United States Air Force, reporting to the Director of Weather, Deputy Chief of Staff for Air and Space Operations.

Headquarters AFWA is located at Offutt AFB, Nebraska. AFWA is comprised of staff functions (e.g., the A-Staff), the Air Force Combat Weather Center at Hurlburt Field , FL, and operational units, 1st Weather Group and 2nd Weather Group at Offutt AFB, NE. AFWA has over 1,400 personnel assigned.

The mission of AFWA is to maximize America's power through exploitation of timely, accurate, and relevant weather information; anytime, everywhere. AFWA is the keystone for weather operations, training, and acquisition for the career field.

The responsibilities of AFWA include planning and providing for centralized weather and climatological services to the Joint Chiefs of Staff, Air Force, Army, designated unified commands, and other federal agencies as directed by the Chief of Staff, Headquarters United States Air Force.

The FOA also develops and fields tactics, techniques, and procedures to improve the effectiveness of Air Force weather forces. The agency fields and sustains standard weather sensing and data systems for the active and reserve components of the Air Force and Army.

1st Weather Group

The 1st Weather Group is responsible for characterizing the environment for Total Force military decision makers in the Unites States Northern Command AOR. They produce and disseminate mission planning and execution weather analyses, forecasts, and briefings for Air Force, Army, Guard, Reserve, United States Strategic Command, United States Joint Forces Command, and United States Northern Command forces operating at 348 installations and sites within the CONUS. They provide installation commanders advanced warning of severe weather to protect personnel and multibillion-dollar weapon systems and infrastructure as well as train, qualify, and upgrade the skill level of commissioned officers and enlisted personnel at their first duty assignment. Squadrons under the 1st Weather Group include the 15th Operational Weather Squadron, Scott AFB, IL; the 25th Operational Weather Squadron, Davis-Monthan AFB, AZ; and the 26th Operational Weather Squadron, Barksdale AFB, LA.

2nd Weather Group

The 2nd Weather Group delivers reliable and timely global environmental intelligence products and services in support of the Joint Chiefs of Staff, Air Force, Army, unified commands, the Intelligence Community, and programs as directed by the United States Air Force Chief of Staff. Squadrons under the 2nd Weather Group include the 2nd Systems Operations Squadron, Offutt AFB, NE; 2nd Weather Squadron, Offutt AFB, NE, and 14th Weather Squadron, Asheville, NC.

The 2nd System Operations Squadron provides reliable and timely global environmental intelligence products and services for the defense of the United States of America and its global interests through sustainment and maintenance of Air Force Weather's strategic center computer complex, production network, and applications 24 hours a day, 365 days a year.

The 2nd Weather Squadron provides continuous weather support to joint warfighters and DOD decision-makers to include the national intelligence community and space operators with accurate, relevant, timely, and specialized global terrestrial and space observations, analyses, forecasts, and alerts. The 2nd Weather Squadron also administers a network of five solar observing sites: Detachment 1, Learmonth, Australia; Detachment 2, Sagamore Hill, MA; Detachment 4, Holloman

AFB, NM; Detachment 5, Palahua, HI; and San Vito, Italy. Detachment 3 at Wright-Patterson AFB, OH provides tailored environmental support to Air Force Research Lab, Air Force Systems Command, and Air Force weather.

The14th Weather Squadron provides customized atmospheric and space weather information and services to include special weather impact information. This is accomplished to maximize the combat effectiveness of DOD personnel and weapon systems through expert receipt, quality control, storage, and tailoring of earth and space climatological data. The 14th Weather Squadron also maintains the Air Force Weather Technical Library (AFWTL).

Air Force Combat Weather Center

The Air Force Combat Weather Center (AFCWC) supports weather flights and battlefield weather teams through investigation, integration and development, test and evaluation, and exploitation and training of new and existing systems and processes. One of the AFCWC's *specific* duties is deploying equipment and/or expertise to solve critical wartime shortfalls. Another is evaluating and exploiting new tactics and techniques to enhance the effectiveness of combat operations. AFCWC develops, maintains and conducts, in conjunction with AFWA's Operations Training and Evaluation Directorate, a just-in-time training (JITT) capability for all tactical communication and weather systems supporting deployed operations. Additionally, AFCWC performs deployed weather support training and maintenance on tactical weather communications and weather-sensing equipment.

The Total Force

AFW, like the rest of the Air Force couldn't meet its many mission requirements without its Total Force partners: the Air Force Reserve Command (AFRC) and Air National Guard (ANG). Members of the Reserve and Guard work side-by-side with active duty members in accomplishing the goals and mission of AFW. In fact, many members of the two reserve components are employed in meteorological occupations in the civilian world. As such they can be an invaluable resource to active duty weather units. Members of the AFRC and ANG attend the same basic military training at Lackland AFB and technical training at Keesler AFB as their active duty counterparts. Let's examine the AFRC's and ANG's contributions to Air Force Weather in greater detail.

Air National Guard Weather flights

The ANG is an Air Reserve Component (ARC) of the Air Force, and Air National Guard Weather Flights are a vital part of the Total Force triad that makes up Air Force Weather. The ANG weather program consists of 33 weather flights located in 26 states, a training center at Camp Blanding, Florida and a headquarters-level function located at the Pentagon under the National Guard Bureau. ANG WFs are not under the direct control of the Air Force except when mobilized. ANG WFs are called into active federal service by order of the president, upon declaration of war by Congress, or when otherwise authorized by law.

ANG weather personnel have been mobilized for the Pueblo Incident and the Cuban Missile Crisis in the early 60s, and have served in Vietnam, Haiti, Central America, Desert Storm, and Deny Flight, to name just a few. They continue to provide vital manpower augmentation to many MAJCOMs. In 1998 alone the ANG provided approximately 2500 man-days of support to active duty missions.

Except when mobilized for federal service, ANG weather flights (WF) are under command authority of the governors of the states in which they are located. The ANG maintains a state of readiness for effective augmentation of active Air Force commands in the event of mobilization. By federal law, it is an active duty responsibility to equip and train ANG units to the same standards as the active duty component. Gaining commands provide advice and inspection services to assigned ANG units to assist in maintaining training standards for their integration into the commands' organization structures when mobilized. The primary mission of the ANG WFs is to train to support their wartime tasked customers. Current missions of the ANG WFs include support to ANG and AFRC flying units, Army National Guard and US Army Reserve Divisions, Brigades, Regiments, and Special Operations and to backfill selected active duty Air Force weather units.

Air Force Reserve Command Weather Reservists

The AFRC uses only 6 percent of the Air Force budget but provides 20 percent of total force support. The AFRC supports the AFW mission with enlisted and officer personnel called Individual Mobilization Augmentees (IMA). IMAs primarily support Air Force Reserve Command tactical flying units. IMAs also support other functions within AFW, including serving as key advisors to key staff principals or as technical specialists under the provisions of AFI 38–204, Chapter 3. IMAs supporting tactical flying units are sometimes assigned to an OWS, but serve their training time and wartime commitment as part of a WF/detachment. The senior IMA assigned to each OWS also serves in an advisory capacity to the commander of the OWS, and monitors the training for the other IMAs assigned against that OWS. The senior IMA monitors incoming taskings for IMAs, ensures the taskings are filled appropriately, and that the required support is provided. MAJCOMs retain overall functional management of their respective IMA programs.

The 53rd Weather Reconnaissance Squadron (AFRC) also known as the "Hurricane Hunters" based at Keesler AFB, Mississippi perform 100 percent of the Air Force's aerial reconnaissance of tropical weather systems in the western Atlantic Ocean, Caribbean Sea, Gulf of Mexico and even the eastern Pacific Ocean.

From June 1st through the 30th of November this unit stands ready to interrogate tropical weather systems for the National Hurricane Center (NHC). From November 1st through April 15th the squadron supports the National Center for Environmental Prediction (NCEP) by gathering information on winter storms off both east and west coasts of the United States. The 53 WRS operate WC–130 J model aircraft from Keesler and forward deployed locations in the United States, Caribbean Sea, and Atlantic Ocean. Information and data gathered by the "Hurricane Hunters" is transmitted by satellite link directly to the NHC or NCEP.

The data gathered by this reserve unit is critical to meteorologists making decisions on the track and intensity of tropical and extra-tropical storms. Each aircraft crew contains an AFRC weather officer and AFRC enlisted dropsonde operator. Using computerized telemetry equipment they gather the critical atmospheric data needed by meteorologists to make critical forecasts that save untold lives and billions of dollars in property. These reservists perform a unique mission that no other military organization does which adds to the security and protection of the nation.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

205. Support force structure

1. Air Force Weather functions are conducted to enhance?

2. What happens if communications infrastructure is delayed?

206. Organization of Air Force weather

1. Air Force Weather characterizes the environment on what scales?

2. On what three levels do weather forces directly support decision-makers' requests for assistance?

3. Who generates long-range outlooks and climatological assessments for use at the regional and local levels?

4. Which Operational Weather Squadron's AOR includes USCENTCOM?

5. Identify the operational weather squadrons that support U.S. Northern Command.

6. Where is Headquarters AFWA located?

7. What type of organization is AFWA?

8. What is the mission of AFWA?

9. What are the responsibilities of the AFWA?

10. Who is responsible for characterizing the environment for Total Force military decision makers in the United States Northern Command AOR?

11. Which three Operational Weather Squadrons fall under the command and control of the 1st Weather Group?

12. The solar observatory at Sagamore Hill falls under which weather unit?

13. Who performs deployed weather support training and maintenance on tactical weather communications and weather sensing equipment?

1–3. Responsibilities and Services of other METOC Organizations

AFW is one of three government weather agencies that provide weather observations, weather forecasts, and produce weather products in the US. The Naval Meteorology and Oceanographic Command and the National Weather Service are the other two. There are also several private companies that supply weather data that we won't discuss here. Let's first look at our sister service; the United States Navy.

207. United States Navy

The United States Navy plays a pivotal role in providing atmospheric and environmental conditions to organizations operating around the world. It employs a vast network of personnel and systems to meet this challenge.

United States Navy mission and services

The Naval Meteorology and Oceanography Command's (NMOC) mission is to collect, interpret, and apply global data and information for safety at sea, strategic and tactical warfare, and weapons system design, development, and deployment. The command provides meteorological, oceanographic, and mapping, charting and geodetic services to increase the effectiveness of the Navy in peacetime and in war.

This worldwide organization comprises some 3,000 officer, enlisted, and civilian personnel at two master computer centers as well as a number of theater centers, facilities, detachments, and aboard ships and aircraft used in conducting oceanographic surveys. The Naval Oceanographic Office (NOO) is the largest single element of the command and one of the two master computer centers. Its primary mission is to conduct oceanographic multidisciplinary surveys. The office is located at the John C. Stennis Space Center near Bay St. Louis, Mississippi and collects hydrographic, magnetic, geodetic, chemical, navigation, and acoustic data using ships, aircraft, spacecraft, and other platforms.

The Fleet Numerical Meteorology and Oceanography Center (FNMOC) is the other primary production center. It produces global and regional scale meteorological and oceanographic prediction products, including analyses, forecasts, and tactical decision aids for direct operational use by Navy ships and aircraft.

Theater centers provide services to naval and other Department of Defense (DOD) forces operating in their respective theaters. These centers are generally located with, or in proximity to, major fleet or joint force commanders. The facilities manage detachments, provide local support and some provide specialized functional tasks. The detachments throughout the world provide local meteorologicaloceanographic services.

Along with the support products by the various centers, the NMOC provides on-scene services. Teams of skilled personnel from the centers and facilities embark on board combatants for specific operations, exercises, or deployments. They assist in the interpretation of products received from the centers ashore and generate tactical support products using on-scene observations of air and ocean conditions.

Oceanography

Oceanography is the investigation of the nature and behavior of the oceans—the Navy's operating environment. Temperature, salinity, and pressure influence the path sound takes as it moves through the water. This information is used to locate and track submarines of potential adversaries, as well as to conceal our own. Sea ice influences ocean acoustics and presents a hazard to navigation. Personnel at the Naval Ice Center observe and record sea ice ridges, water openings, and thickness. Satellite imagery is used to determine sea height, sea-surface temperature, ocean current, upwelling, water masses in the sea and frontal boundaries that separate them, and the swirling eddies that spiral off from them.

Mapping, charting, and geodesy

NMOC surveys measure water depths, variations in the earth's magnetic field, determine gravity anomalies and define the shape and texture of the ocean floor. Hydrographic surveys are conducted to measure and describe the physical natures of the ocean. The information is required to ensure the safe navigation of all US ships outside our national territorial waters. The data is provided to the National Imagery and Mapping Agency (NIMA) for processing and printing of nautical charts. The result of these efforts promotes efficiency and safety for all who use the world's ocean highways.

US Marine Corps mission and services

The Marine Corps is responsible for meteorological support to the Marine Air-Ground Task Force (MAGTF). MAGTF support varies between the operational and tactical level and between the combat element, the ground combat element (GCE), the aviation combat element (ACE), and the combat service support element (CSSE). At the operational level, the requirement exists for forecasts of critical weather and oceanographic elements (such as flying conditions, surf, current, and tide conditions, as well as weather warnings) at least 72–96 hours in advance of an operation.

Because the Marine Corps warfighting doctrine stresses expeditionary operations and is heavily maneuver warfare oriented, the GCE requires weather and oceanographic support that can be used for briefings and decision aids. The ACE units require typical aviation weather support (such as takeoff weather, destination weather, etc.). The CSSE support, although not as weather sensitive, as ground and air operations, can be heavily influenced by extreme weather conditions such as extreme heat and cold. Currently the NMOC provides comprehensive meteorological and oceanographic support to the Marine Corps weather units.

208. Civilian agencies

Military weather personnel are a small part of the world's weather community. The community is designed around trust and cooperation in products and services. No matter where you find yourself, some weather agency is there or has been there before. These agencies might provide valuable assistance.

National Oceanic and Atmospheric Administration

The National Oceanic and Atmospheric Administration (NOAA) is part of the Department of Commerce. NOAA's mission is to describe and predict changes in the earth's environment and to conserve and manage wisely the nation's coastal and marine resources. NOAA administers five agencies that collect data from, predict changes in, and conduct research of the earth's atmosphere and oceans.

The three agencies that you need to be aware of as a weather journeyman are the National Weather Service, National Environmental Satellite, Data and Information Service (NESDIS), and Office of Oceanic and Atmospheric Research (OAR). On a daily operational basis, you will become most familiar with NWS and NESDIS. Let's take a look at these agencies and what their responsibilities are.

National Weather Service

The NWS is headquartered in Silver Springs, Maryland. It provides weather, hydrologic, and climate forecasts and warnings for the US, its territories, adjacent waters and ocean areas, for the protection of life and property and the enhancement of the national economy. NWS data and products form a national information database and infrastructure that can be used by other governmental agencies, the private sector, the public, and the global community. It serves as the primary backup source of weather data if the AFW data system is unavailable to supply weather information.

The NWS is composed of headquarters offices, national centers, regional centers, and field offices for meteorological and hydrological services. Its mission is supported through the activities of these offices 24 hours a day, 7 days a week. Many of the regional offices maintain web sites that can provide information about themselves and their products. Typical products provided on the web sites

include alphanumeric observations, forecasts, warnings and advisories covering their geographical areas of responsibility.

The NWS is divided into six geographical regions and has a headquarters component in each region. The regional headquarters directly support weather and river forecasting functions at local NWS forecast offices. The agency operates approximately 130 Weather Service Forecast Offices (WSFO) which provide 24-hour weather observation, forecast, warning, rawinsonde, and radar support throughout the US and its territories in the Atlantic and Pacific Oceans. Many of the offices maintain Internet sites where current meteorological and climatological data can be reviewed. The NWS has five major operating centers in support of the NWS mission. These centers directly support the forecast offices by providing resources and products required by all of the regional offices, US government agencies, and in support of US international commitments.

The six centers are the NCEP, Radar Operations Center, Hydrologic Information Center (HIC), National Operational Hydraulic Remote Sensing Center, Office of Operational Systems, and the National Weather Service Training Center (NWSTC).

National Centers for Environmental Prediction

Formerly established in 1958 as the National Meteorological Center, the NCEP is today a group of nine specialized centers for analyzing and forecasting the atmosphere on a global scale. NCEP also operates remote centers having a specialized focus on portions of the overall national warning and forecasting process. Seven of the nine centers provide direct products to users, while two of the centers provide essential support through developing and running complex atmospheric models. NWS field offices, military weather agencies, and private meteorological services rely on NCEP's products. The nine centers that make up NCEP are the Aviation Weather Center, Climate Prediction Center, Environmental Modeling Center, Hydrometeorological Prediction Center, NCEP Central Operations, Space Weather Prediction Center, Storm Prediction Center, Tropical Prediction Center, and the Ocean Prediction Center. Let's take a look at eight of these centers in more detail.

Aviation Weather Center

The Aviation Weather Center (AWC) located in Kansas City, Missouri, enhances aviation safety by issuing accurate warnings, forecasts, and analyses of hazardous weather for aviation interests. The AWC identifies existing or imminent weather hazards to aircraft in flight and creates warnings for transmission to the aviation community. The AWC also originates operational forecasts of weather conditions that will affect domestic and international aviation interests out to two days. The AWC collaborates with universities, governmental research laboratories, Federal Aviation Administration (FAA) facilities, international meteorological watch offices, and other National Weather Service components to maintain a leading edge in aviation meteorology hazards training, operations and forecast techniques development. Three collaborating National Weather Service offices formerly handled these functions. Warnings of flight hazards, such as turbulence, icing, low clouds and reduced visibility remain most critical for the protection of life and property over the US from the earth's surface up to 24,000 feet. Above 24,000 feet, the AWC provides warnings of dangerous wind shear, thunderstorms, turbulence, icing, and volcanic ash for the Northern Hemisphere from approximately 40° W to 180° W. Additionally, above 24,000 feet, the AWC forecasts jet stream cores, thunderstorms, turbulence.

Climate Prediction Center

The Climate Prediction Center (CPC) is located at the World Weather Building near Washington, D.C. The CPC's mission is to maintain a continuous watch on (and diagnose and predict) short-term climate fluctuations such as El Niño and La Niña. These efforts are designed to assist agencies both inside and outside the federal government in coping with such climate related problems as food supply, energy allocation, and water resources.

The CPC issues many analyses and forecasts for several atmospheric parameters. Some examples of CPC products are 30, 60, 90 day and seasonal temperature and precipitation prognoses for the CONUS, sea surface temperature and anomaly, ultraviolet indices, drought status and forecast, atmospheric ozone amount and distribution, heating and cooling degree day analysis and forecasts and climatic summaries for different areas of the US.

The CPC operates six climate centers that are aligned geographically throughout the CONUS. The six climate centers are Western Regional Climate Center in Reno, Nevada; High Plains Regional Climate Center in Lincoln, Nebraska; Northeast Regional Climate Center in Ithaca, New York; Southern Regional Climate Center in Baton Rouge, Louisiana; Southeastern Regional Climate Center in Columbia, South Carolina; and Midwestern Climate Center in Champaign, Illinois.

The six regional climate centers archive regional climatic data, provide climatic data and informational services to federal, state, and local agencies and the general public. They also perform applied climatic research. The regional centers interact with the individual state climatology agencies in the area where they are located.

Environmental Modeling Center

The Environmental Modeling Center (EMC) is located in the World Weather Building in Washington D.C. The EMC improves numerical weather; marine and climate predictions at the NCEP through a broad program of research in data assimilation and modeling. The EMC develops, improves, and monitors data assimilation systems and models of the atmosphere, ocean and air-sea interface using advanced methods developed within EMC as well as from universities, other government agencies, including AFWA and the international scientific community. The center has four operational branches—Ocean Modeling, Mesoscale Modeling, Global Modeling, and Climate Modeling. Advances in atmospheric modeling made at EMC benefits all operational meteorologists and forecasters in more detailed and accurate model output which leads to more accurate forecasts and better customer support.

Hydrometeorological Prediction Center

The mission of the Hydrometeorological Prediction Center (HPC) is to produce weather analyses and forecast products that are transmitted to National Weather Service Forecast Offices and River Forecast Centers (RFC) and other users in the meteorological community, in support of public weather forecasts. The HPC has four major functions. The first major function is producing a manual analyses of surface fronts and pressure systems over North America and adjacent oceans every three hours and the North Pacific Ocean every 12 hours. The center's second function is preparing and issuing forecasts of accumulating (quantitative) precipitation, heavy rain and heavy snow and identifying areas with potential for flash flooding. The remaining two functions for the center are issuing short-range and medium-range public forecasts.

Space Weather Prediction Center

The Space Weather Prediction Center (SWPC) located in Boulder, Colorado is one of 9 NOAA Prediction centers. The SWPC provides real-time monitoring and forecasting of solar and geophysical events, conducts research in solar-terrestrial physics, and develops techniques for techniques for forecasting solar and geophysical disturbances. The primary mission of the SEC is to serve as the nation's official source of space weather alerts and warnings. The center has 55 employees working in three divisions; Space Weather Operations, Research and Development, and Systems.

Jointly operated by NOAA and the US Air Force, SWPC forecasts the environment between the sun and earth. The Forecast Center receives solar and geophysical data in real time from a large number of ground-based observations and satellite sensors around the world. SWPC forecasters use this data to predict solar and geomagnetic activity and issue worldwide alerts of extreme events. You learn more about the space environment in a later volume in this career development course. The Center continually monitors and forecasts earth's space environment; provides accurate, reliable, and useful solar-terrestrial information; and leads programs to improve services. Another mission of the center is

to attempt to reduce adverse effects of space weather disturbances on human activities. The SWPC synthesizes and disseminates information about past, present, and future conditions in the space environment for space weather users and private industry vendors. The center leads in development and implementation of programs in solar-terrestrial physics and space environment services by conducting research and developing techniques that improve monitoring and forecasting. SWPC uses its expertise to advise and educate those who operate systems affected by disturbances in the space environment and those who have a general interest in our science.

Storm Prediction Center

The Storm Prediction Center (SPC) is located in Norman, Oklahoma home of the National Severe Storms Laboratory and the University of Oklahoma School of Meteorology. The SPC monitors and forecasts severe and nonsevere thunderstorms, tornadoes, winter storms, extreme winds, heavy rain, and other hazardous weather phenomena across the continental US every hour of the day and night, every day of the year. The SPC's tornado and severe thunderstorm watches are well-known public forecasts that are broadcast on NOAA weather radio, the Weather Channel and other national and local radio and television broadcast stations. The severe weather watches are also available via the Internet.

The staff of meteorologists at the SPC is trained in the latest forecasting techniques and is active in severe weather research. SPC forecasters have a huge variety of tools at their disposal. Foremost is their formal training and experience with severe storms forecasting. SPC forecasters use satellite imagery, Doppler radar data, surface weather observations, rawinsonde data, and wind profiler data to monitor potential severe weather areas.

Products issued by the SPC include convective outlooks, mesoscale discussions, severe thunderstorm watches, and tornado watches. Convective outlooks are forecasts of where both severe and nonsevere thunderstorms are expected to occur around the country. Areas of possible severe thunderstorms are classified according to risk; slight, moderate, or high depending upon expected coverage and intensity. Many NWS offices use this outlook to make emergency duty staffing decisions before severe weather begins.

Mesoscale Discussions are issued to describe an evolving severe weather threat and also advise of possible watch issuance. Mesoscale Discussions are also issued for weather hazards such as very heavy rain, heavy snow, and general thunderstorm trends. These discussions describe the atmospheric dynamics and mechanisms causing the severe weather threat and help forecasters prepare for the onset of severe weather.

A severe thunderstorm watch or tornado watch is issued when the development of severe weather is imminent or likely to occur in the next several hours. Such watches alert the public, aviators and local NWS offices to the increasing danger of severe weather.

Tropical Prediction Center

The Tropical Prediction Center (TPC) is collocated with the National Weather Service Miami Weather Forecast Office on the campus of Florida International University in Miami, Florida. The mission of the TPC is to save lives and protect property by issuing watches, warnings, forecasts, and analyses of hazardous weather conditions in the tropics. The TPC is comprised of the National Hurricane Center (NHC), Tropical Analysis and Forecast Branch (TAFB), and Technical Support Branch (TSB).

The NHC is probably the most familiar branch of the National Centers for Environmental Prediction and the National Weather Service. The NHC maintains a continuous watch on tropical cyclones over the Atlantic Ocean, Caribbean Sea, Gulf of Mexico, and the Eastern Pacific from 15 May through 30 November each year. The center prepares and distributes hurricane watches and warnings for the general public, marine interests, and many federal agencies including the military services. The NHC issues the official forecast track for hurricanes. During the "off-season" NHC provides training for US emergency managers and representatives from many other countries affected by tropical cyclones.

NHC also conducts applied research to evaluate and improve hurricane forecasting techniques and involved in improving public awareness of the dangers of tropical cyclones.

The TAFB provides year-round products involving marine forecasting, aviation forecasts and warnings (significant meteorological warnings [SIGMET]), and surface analyses. The unit also provides satellite interpretation and satellite rainfall estimates for the international community. TAFB provides support to NHC through manpower and tropical cyclone intensity estimates from the Dvorak technique.

The TSB provides support for TPC computer and communications systems, including the Man computer Interactive Data Access System (McIDAS) satellite data processing systems, the National Advanced Weather Interactive Processing System (N-AWIPS) workstations and the weather surveillance radar (WSR–88D) computer systems. TSB also maintains a small applied research unit that develops tools for hurricane and tropical weather analysis and prediction. TSB also has a storm surge group that provides information for developing evacuation procedures for coastal areas, and an oceanography unit that produces ocean current and sea surface temperature analyses.

Ocean Prediction Center

The Ocean Prediction Center (OPC) is an integral component of the NCEP located at Camp Springs, Maryland. The center's primary mission is to issue marine warnings and guidance in text and graphical format for maritime users. The OPC's warnings support the civilian maritime community, recreational boaters, and various government agencies including the US Coast Guard. Also the center quality controls marine observations globally from ship, buoy, and automated marine observations for significant errors prior to being incorporated into the computer model guidance. The OPC originates and issues marine warnings and forecasts, continually monitors and analyzes maritime data, and provides guidance of marine atmospheric variables for purposes of protection of life and property, safety at sea, and enhancement of economic opportunity. In emergency situations the OPC acts as backup to the TPC taking over the marine functions of TPC. In addition to being available via the Internet, the OPC products are transmitted directly to vessels at sea and coastal interests by high frequency (HF) shortwave radio facsimile through US Coast Guard transmitters in Massachusetts and California.

Radar Operation Center

The Radar Operation Center (ROC), located at Norman, Oklahoma is managed by the NWS. The ROC employs nearly 200 people. They provide centralized support for all WSR–88D radar systems. This facility trains all NWS forecasters and maintains the life-cycle enhancement responsibilities, that is software and hardware changes for the system.

National Environmental Satellite, Data and Information Service

The NESDIS is located at the World Weather Building in Washington DC. NESDIS administers an integrated program for the development and use of all operational civilian satellite-based environmental remote sensing systems, such as the NOAA and geostationary operational environmental satellite (GOES) weather satellites, and the national and international acquisition, processing, dissemination, and exchange of environmental data.

National Climatic Data Center

The National Climatic Data Center (NCDC) is a component of NESDIS. NCDC is tasked to describe, monitor, assess, and support efforts to predict climatic changes. Their mission is global in nature and is coordinated with the World Meteorological Organization (WMO).

Office of Oceanic and Atmospheric Research

The OAR is the primary research and development unit of NOAA. Through its scientific excellence and technical leadership, OAR enables improvements in NOAA's services. OAR conducts and directs research programs in atmospheric and space sciences through its own laboratories as well as through

many universities. Areas on-going research work include atmospheric modeling, environmental observations, and outreach efforts that relate to weather and climate.

FAA

The FAA is responsible for the safe conduct of civilian aviation. FAA weather services focus on providing flight service briefings and products. Their web sites are valuable tools for CONUS-based weather information. The FAA represents the Department of Transportation as one of the three partners in the WSR88D cooperative. The other two are the National Weather Service under NOAA within the Dept of Commerce and the USAF within the DOD.

WMO

The WMO is a specialized agency of the United Nations (UN). The WMO is the voice for the UN on the earth's atmosphere, oceans, climate, and water resources. Founded in 1950, the WMO came under the UN umbrella in 1951. It originated from the International Meteorological Organization, which was founded in 1873.

The WMO mission is to facilitate international cooperation in meteorology, operational hydrology, and related geophysical sciences. The WMO contains 189 member nations that provide a worldwide network of reporting stations. One major goal of the WMO is to facilitate the free and unrestricted exchange of information through standardized codes and publications. The WMO runs a multitude of programs, listed below is the one most important to AFW.

World Weather Watch

This is the backbone of WMO activity. Established in 1963 the watch program combines telecommunications and weather forecasting centers operated by the member nations to make meteorological and environmental information available for all. This program ensures up-to-the-minute weather information is available as needed.

Global Observing System

The Global observing system (GOS) is a system of facilities owned and operated by WMO member nations that make meteorological and environmental observations on a global scale. The GOS is comprised of observing facilities on land, sea, air and in space.

Global Telecommunication System

The Global Telecommunication System (GTS) is a system of facilities owned and operated by WMO member nations that make the sharing of meteorological and environmental observations on a global scale possible. The GTS is comprised of land- and space-based telecommunication systems.

Data Management

Management of codes and terms used in meteorology is essential for communicating across political boundaries. The WMO manages data by keeping a manual on codes which lists all of the WMO international codes that represent weather, water, climate data, and other geophysical data. Each member nation of WMO must follow WMO code format.

Weather services in other countries

Most nations provide some kind of weather service. These services typically consist of a minimum of two programs: forecast and warnings. Hydrology and climatology services may also be available to the general populace. Some more services would be aviation and oceanography products in countries where we have a large military presence the local governments make their models and products available to United States forces.

During your career in AFW you will serve in countries outside the United States. You need to know that communications are fragile and weather data and products from dedicated military sources can be interrupted or be unavailable for a number of reasons. Even though communications may be *down* and you can't obtain weather data, the mission must go on. You must continue to provide weather

information to your customer, the warfighter, as best you can. Using tactical communications equipment is one way but you should also try to obtain weather data from the host nation if possible. Keep in mind that data from sources outside the military should be considered suspect at times. The US is not the only country in the world where you have access to weather data from national weather agencies. It's helpful to understand a little about the host nation weather services where you are stationed. Most of the weather agencies mentioned have Internet web sites that can be accessed using a PC or other computer system with a web browser.

Universities

Universities throughout the US can provide a variety of services to AFW. The main service they provide is support to the Air Force Institute of Technology (AFIT) program. Most universities maintain outstanding meteorological internet home pages. Finally, the Air Force Weather Agency (AFWA) may require research and development support from the universities. Normally, one of the key target systems is the enemy's command and control (C2) system. Regardless of the nature of the adversary, disrupting the ability to communicate can be a critical step toward achieving strategic paralysis and disunity by cutting off the enemy's political/military leadership from the civilian populace (or in case of nonstate adversaries, their clandestine base of support) and fielded force. Whether one uses aircraft, missiles, or information attack, the enemy's C2 should always be a target of particular focus in strategic attack.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

207. United States Navy

1. What is the largest element of NMOC?

2. Which element of the NMOC observes and records sea ice ridges, water openings, and thickness?

3. What are hydrographic surveys and why are they important?

208. Civilian agencies

1. Which weather agency serves as a primary backup source of weather data if the Air Force Weather data system is unavailable?

2. Name two major operating centers that support the NWS mission?

3. Name the NCEP specialized center that provides flight hazards information for aircraft?

4. Which NCEP specialized center issues a 90-day seasonal temperature prognosis?

5. Which NCEP center improves numerical modeling?

6. Identify which NCEP specialized center prepares and issues quantitative precipitation forecasts.

7. Which NCEP center is jointly operated by the USAF and NOAA?

8. Name the NCEP center which monitors and forecasts severe and non-severe thunderstorms.

9. Which NCEP center issues official forecast track for hurricanes?

10. Which NCEP center issues marine warnings?

11. Name the NOAA agency that manages remote sensing systems such as weather satellites.

12. Which agency is responsible for the safe conduct of civilian aviation?

13. What is the backbone of WMO activity?

14. Most nations provide which two weather services?

Answers to Self-Test Questions

201

1. To set guidelines for tactics, techniques, and procedures to use whenever armed forces work together in a joint operations situation.
2. Commanders use weather information to plan, execute, support, and sustain specific military operations.
3. Because US military operations have increasingly become joint operations and are frequently combined (multinational) operations.
4. There are three steps in characterization.

202

1. Senior METOC Officer (SMO).
2. Joint METOC Officer (JMO).
3. Operational Weather Squadrons (OWS).
4. To serve as the liaison between the military service commander and the lower level wing, division, and so forth.
5. Through the 14th Weather Squadron formerly known as Air Force Combat Climatology Center.
6. Any 5 of the following: land and ship reports, upper-air soundings, satellite sensors, weather radars, lightning detection systems, profilers, solar telescopes, ionospheric sensors, buoys, or aircraft.
7. Joint METOC Coordination Cell.
8. Joint Operations Area Forecasts (JOAF).

203

1. To rapidly transmit and receive real-time global scale METOC information between the METOC forecasting centers, Joint METOC Coordination Organization (JMCO)/Joint METOC Coordination Cell (JMCC), component, and field units.
2. Early identification of specific support, including transportation and logistics sustainment requirements for all levels is required to ensure the availability of necessary information and resources.
3. Any of the 11 listed: Air Traffic Control (ATC), Terrain Analysis Team, Imagery Intelligence Sections, Forward Area Limited Observing Program (FALOP), Aviation Squadrons or Brigades, Space Support Teams, Chemical, Biological, Radiological, and Nuclear (CBRN) Reconnaissance Units, Artillery Meteorology (ARTYMET), Field Sanitation Teams, Surface Ships, Special Operations Forces (SOF) or Special Operations Weather Teams (SOWT).

204

1. Joint Operational Planning and Execution System (JOPES).
2. With the different Courses of Action (COA).
3. Include differences in language, techniques, data formats, and communications.

205

1. To enhance wartime operations of combat forces, operations short of war, and peacetime operational requirements and training.
2. Weather information for operational and tactical planning, and the conduct of operations may not be adequate.

206

1. On global, regional, and local scales.
2. Strategic, operational, and tactical levels.
3. Global weather centers.
4. 28th Operational Weather Squadron, Shaw AFB, SC.
5. 26th Operational Weather Squadron, Barksdale AFB, LA.
6. Offutt AFB, Nebraska.

7. Field operating agency (FOA).
8. To maximize America's power through exploitation of timely, accurate, and relevant weather information; anytime, everywhere.
9. Planning and providing for centralized weather and climatological services to the Joint Chiefs of Staff, Air Force, Army, designated unified commands, and other federal agencies as directed by the Chief of Staff, Headquarters United States Air Force.
10. 1st Weather Group.
11. 15th OWS, Scott AFB, IL; the 25th OWS, Davis-Monthan AFB, AZ; 26th OWS, Barksdale AFB, LA.
12. 2nd Weather Squadron.
13. Air Force Combat Weather Center (AFWC).

207

1. Naval Oceanographic Office (NOO).
2. Naval Ice Center.
3. They are surveys conducted to measure and describe the physical natures of the ocean. The information is required to ensure the safe navigation of all United States' ships outside our national territorial waters.

208

1. National Weather Service (NWS).
2. Any two of the six listed: NCEP, Radar Operations Center, Hydrologic Information Center, National Operational Hydraulic Remote Sensing Center, Office of Operational Systems, and the National Weather Service Training Center.
3. Aviation Weather Center (AWC).
4. Climate Prediction Center (CPC).
5. Environmental Modeling Center (EMC).
6. Hydrometeorological Prediction Center (HPC).
7. Space Weather Prediction Center (SWPC).
8. The Storm Prediction Center (SPC).
9. National Hurricane Center (NHC).
10. Tropical Analysis and Forecast Branch (TAFB).
11. National Environmental Satellite, Data and Information Service (NESDIS).
12. Federal Aviation Administration (FAA).
13. World Weather Watch.
14. Forecast and Warnings.

Do the unit review exercises before going to the next unit.

Unit Review Exercises

Note to Student: Consider all choices carefully, select the *best* answer to each question, and *circle* the corresponding letter. When you have completed all unit review exercises, transfer your answers to the Field-Scoring Answer Sheet.

Do not return your answer sheet to the Air Force Career Development Academy (AFCDA).

1. (201) One purpose of Meteorological and Oceanographic (METOC) doctrine is to
   a. ensure coordination exists among weather products created at each level.
   b. encourage each unit to create weather products independent of lateral commands.
   c. provide exclusive guidance for METOC personnel at the operational and tactical echelons.
   d. provide exclusive guidance for METOC personnel at the strategic and operational echelons.

2. (201) The principles of Meteorological and Oceanographic (METOC) doctrine incorporate *all* facets of
   a. Air Force and Navy METOC programs.
   b. all service branches METOC programs.
   c. Air Force and Navy METOC, and space environment programs.
   d. all service branches METOC, and space environment programs.

3. (201) *All* of the following are steps in the characterization process *except*
   a. predict.
   b. collect.
   c. analyze.
   d. integrate.

4. (202) Who is responsible for making sure that the appropriate Meteorological and Oceanographic (METOC) support is provided to all subordinate joint forces and components for the entire range of military operations?
   a. The Joint METOC Officer (JMO).
   b. The Joint Task Force (JTF) commander.
   c. METOC forecast center (MFC) through the JMO.
   d. Joint METOC Coordination Organization (JMCO) through the JMO.

5. (202) Who or what is the cornerstone of Meteorological and Oceanographic (METOC) support?
   a. The Joint METOC Officer (JMO).
   b. The Joint Task Force (JTF) commander.
   c. Joint METOC Coordination Cell (JMCC).
   d. Joint METOC Coordination Organization (JMCO).

6. (202) The composition of the Joint Meteorological Coordination Cell (JMCC) staff should be tailored to
   a. reflect all the operations involved in the joint mission.
   b. reflect the percentages of the different services involved in the joint operation.
   c. support the concept of operations of the joint mission and composition of assigned forces.
   d. mirror the staff of the major services involved and operated by service-unique organizations.

7. (202) Weather personnel *must* coordinate significant forecast deviations from the official forecast with the
   a. Joint Forces Commander (JFC).
   b. METOC Forecast Center (MFC).
   c. Joint Operations Area Forecast (JOAF).
   d. Joint METOC Coordination Cell (JMCC).

8. (202) Which level in the Meteorological and Oceanographic (METOC) support force structure takes observations uses centrally prepared products to provide tailored mission support?
   a. Tactical operations.
   b. Component command.
   c. Intermediate command.
   d. Joint METOC Coordination Cell (JMCC).

9. (203) *All* of the following are nontraditional sources of meteorological and oceanographic (METOC) data *except*
   a. submarine forces.
   b. space support teams.
   c. air traffic control (ATC).
   d. artillery meteorology (ARTYMET).

10. (203) What can Special Operations Weather Team (SOWT) personnel provide for an operation?
   a. River assessments, avalanche assessments, and terrain reports only.
   b. River information, avalanche information, and upper air observations only.
   c. River assessments, avalanche information, terrain observations, and upper air reports.
   d. River information, avalanche assessments, terrain reports, and upper air observations.

11. (204) A planning model that establishes procedures for analyzing and developing a mission describes
   a. Joint Planning Process (JPP).
   b. Joint Operational Mission Process (JOMP).
   c. Joint Operational Planning Process (JOPP).
   d. Joint Operational Planning and Execution System (JOPES).

12. (204) The challenges of multinational operations include
   a. tactics, techniques, and procedures.
   b. language, directives, and communications.
   c. language, equipment design, and communications.
   d. language, techniques, data formats, and communications.

13. (205) At the operational level, the Operational Weather Squadron (OWS) builds and maintains
   a. regional weather databases.
   b. analysis and forecast products.
   c. worldwide meteorological databases.
   d. worldwide meteorological and space environmental databases.

14. (205) Weather supporting communications *must* be enacted as soon as possible to allow for
   a. quality weather databases.
   b. data collection and analysis.
   c. detailed information to the warfighters.
   d. quality tailored, battlespace weather information.

15. (205) To be effective, Air Force Weather (AFW) personnel *must*
   a. tailor weather products, tactics, techniques, and procedures.
   b. train with all joint weather forces before a contingency.
   c. think and train with Air Force doctrine in mind.
   d. think and train from a joint perspective.

16. (206) Which agency is the global weather center in the Air Force weather operations?
    a. Naval Oceanographic Office (NOO).
    b. Air Force Weather Agency (AFWA).
    c. 2nd Weather Group.
    d. 1st Weather Group.

17. (206) What is the range in scale of the products that an Operational Weather Squadron (OWS) creates?
    a. Global to strategic levels.
    b. Strategic to tactical levels.
    c. Global to operational levels.
    d. Operational to tactical levels.

18. (206) Which agency is responsible for characterizing the environment for the total force?
    a. Air Force Combat Weather Center (AFCWC).
    b. Air Force Weather Agency (AFWA).
    c. 2nd Weather Group.
    d. 1st Weather Group.

19. (206) Which agency is responsible for providing reliable and timely global environmental intelligence products and services to the Joint Chiefs of Staff?
    a. 2nd Weather Group.
    b. Air Force Directorate of Weather (AF/DOW).
    c. Air Force Weather Agency (AFWA).
    d. Air Force Combat Weather Center (AFCWC).

20. (206) Which Air Force Weather Agency (AFWA) unit develops and produces special weather impact information?
    a. Air Force Weather Agency(AFWA)/operations directorate.
    b. Air Force Weather Technical Library (AFWTL).
    c. Air Force Combat Weather Center (AFCWC).
    d. 14th Weather Squadron.

21. (206) What is a *specific* duty of the Air Force Combat Weather Center (AFCWC)?
    a. Providing meteorological products to enhance the nation’s combat capability.
    b. Developing field techniques to improve the effectiveness of Air Force Weather.
    c. Deploying equipment and/or expertise to solve critical wartime shortfalls.
    d. Providing space weather modeling and simulation data.

22. (206) Evaluating and exploiting new tactics and techniques to enhance the effectiveness of combat operations is a mission of the
    a. Air Force Directorate of Weather (AF/DOW).
    b. Air Force Weather Agency (AFWA).
    c. Air Force Combat Weather Center (AFCWC).
    d. 14th Weather Squadron.

23. (206) Which Total Force partner operates 33 weather flights?
    a. Air Force Reserve Command.
    b. Air National Guard.
    c. Civil Air Patrol.
    d. Coast Guard Reserve.

24. (206) Which Total Force partner performs weather reconnaissance for the National Hurricane Center?
    a. Air Force Reserve Command.
    b. Coast Guard Reserve.
    c. Air National Guard.
    d. Civil Air Patrol.

25. (207) Which United States Navy meteorological unit collects, interprets and applies global data and information for safety at sea, strategic and tactical warfare, and weapons system design, development and deployment?
    a. Naval Ice Center.
    b. Naval Oceanographic Office (NOO).
    c. Naval Meteorology and Oceanography Command (NMOC).
    d. Fleet Numerical Meteorology and Oceanography Center (FNMOC).

26. (207) Which agency is responsible for printing nautical charts developed from the US Navy surveys?
    a. National Imagery and Mapping Agency (NIMA).
    b. United States Geological Survey (USGS).
    c. Soil Conservation Service (SCS).
    d. Army Corps of Engineers.

27. (207) The Marine Corps ground control element (GCE) requires
    a. comprehensive meteorological and oceanographic support.
    b. weather and oceanographic support that can be used for briefings and decision aids.
    c. typical aviation weather support (such as takeoff weather, destination weather, etc.).
    d. forecasts of critical weather and oceanographic elements (such as surf, current, and tide conditions, etc.) at least 72–96 hours before an operation.

28. (208) What organization provides weather, hydrologic, and climate forecasts and warnings for the United States?
    a. Naval Meteorology and Oceanography Center (NMOC).
    b. National Centers for Environmental Prediction (NCEP).
    c. Air Force Weather Agency (AFWA).
    d. National Weather Service (NWS).

29. (208) What organization serves as the *primary backup* source of weather data if the Air Force Weather (AFW) data system is unavailable to supply weather information?
    a. National Oceanic and Atmospheric Administration (NOAA).
    b. Naval Meteorology and Oceanography Center (NMOC).
    c. National Weather Service (NWS).
    d. Office of Operational Systems.

30. (208) Which specialized National Center for Environmental Prediction (NCEP) provides warnings of dangerous wind shear and thunderstorms above 24,000 feet?
    a. Storm Prediction Center (SPC).
    b. Aviation Weather Center (AWC).
    c. Environmental Modeling Center (EMC).
    d. Space Weather Operations Center (SWOC).

31. (208) Which specialized National Center for Environmental Prediction (NCEP) produces forecasts for sea surface temperature and anomalies?
    a. Marine Prediction Center (MPC).
    b. Climate Prediction Center (CPC).
    c. Tropical Prediction Center (TPC).
    d. Hydrometeorological Prediction Center (HPC).

32. (208) Which specialized National Center for Environmental Prediction (NCEP) prepares and issues forecasts of quantitative precipitation, heavy rain, or snow and identifies areas with potential flash flooding?
    a. Marine Prediction Center (MPC).
    b. Climate Prediction Center (CPC).
    c. Tropical Prediction Center (TPC).
    d. Hydrometeorological Prediction Center (HPC).

33. (208) Which specialized National Center for Environmental Prediction (NCEP) prepares and issues forecasts of solar and geophysical events?
    a. Space Weather Operations Center (SWOC).
    b. Space Weather Prediction Center (SWPC).
    c. Environmental Modeling Center (EMC).
    d. Aviation Weather Center (AWC).

34. (208) Which specialized National Center for Environmental Prediction (NCEP) prepares and issues convective outlooks?
    a. Storm Prediction Center (SPC).
    b. Aviation Weather Center (AWC).
    c. Tropical Prediction Center (TPC).
    d. National Severe Storms Center (NSSC).

35. (208) Which specialized National Center for Environmental Prediction (NCEP) mission is to save lives and protect property by issuing watches, warnings, forecasts, and analyses of hazardous weather conditions in the tropics?
    a. Storm Prediction Center (SPC).
    b. Aviation Weather Center (AWC).
    c. Tropical Prediction Center (TPC).
    d. Joint Typhoon Warning Center (JTWC).

36. (208) What agency administers the operations of Geostationary Operational Environmental Satellite (GOES) and National Oceanic and Atmospheric Administration (NOAA) weather satellites?
    a. National Centers for Environmental Prediction (NCEP) central operations.
    b. National Environmental Satellite, Data, and Information Service (NESDIS).
    c. Space Weather Operations Center (SWOC).
    d. Space Environment Center (SEC).

Please read the unit menu for unit 2 and continue ➔

Student Notes

Unit 2. Administration of Weather Processes and Programs

CAN YOU PROGRAM speed density fuel injection WITHOUT the fuel tables? How about overhaul a transmission without a repair manual? Even if you can, would you want someone to perform crucial tasks that you were responsible for with little or no guidance? Standard operating procedures (SOP) and operating instructions (OI) provide specific guidance for the unit. They are the mechanisms that get business conducted in a specific way. OIs and SOPs provide tailored guidance to your unit. As managers, we must ensure that our troops have the best possible guidance. When we review and write OIs and SOPs, we need to consider accuracy, effectiveness, and the troops themselves. Mission success depends on it!

2–1. Weather Support Instructions Plans and Agreements

OIs and SOPs are two different ways to clearly inform unit personnel on how to do something or how something or some program works. All weather flights or exploitation units are required to have OIs and SOPs for important elements of their respective operations or mission.

209. Definitions

First let’s define what OIs and SOPs are.

OI

An OI provides guidance on specific topics that apply to a whole unit. It often reflects a commander’s slant on general guidance from the higher ups. OIs typically cover military topics instead of job specific topics. OIs typically cover topics such as leave policy, equal opportunity and treatment, Inspector General (IG) complaint system, attack alarm or threat condition responses, and awards programs.

SOP

An SOP provides step-by-step task guidance that applies to a specific functional area within the unit. SOPs cover tasks or operations performed by a duty specific area within the unit, such as forecasting or observing sections. As the name implies, SOPs ensure that all personnel use standardized procedures while performing specific duties. They also MUST ensure compliance with Air Force

instructions (AFI). Some examples are local observations, weather station evacuation, lightning warnings, pilot to metro service (PMSV) contacts, flight weather briefings, forecast reviews, and functional area mishap/emergency procedures (fire, bomb threat, aircraft mishaps/emergencies). For mandatory items to cover with SOPs, refer to Air Force Manual (AFMAN) 15–129, Volume 2, *Air and Space Weather Operations-Exploitation*. Also, remember that some tasks may be common but performed differently or to a different level. Pilot to Metro Service (PMSV) and radar would be examples of this.

210. Creating operating instructions and standard operating procedures

Topic selection is based on unit or work center discretion. To look and see if there are any mandatory items look in AFMAN 15–129. Select both routine and non-routine tasks that make up normal duties; group tasks by duty section or functional area, such as forecasting, observing, or radar operator. Tailor selections to meet local needs. After topic selection is complete, begin to gather the necessary information.

Gather data

The first step in gathering data is to review current publications and applicable guidance. You need to be as comprehensive as possible. Do this by comparison to what you already know. Become familiar with new guidance or changes, this will facilitate writing the most accurate and up-to-date procedures.

Always review current procedures and information for accuracy. Try to work or assess the procedure on a variety of shifts. You must get a good feel for how well current instructions and procedures actually work. Be sure to ask about any discrepancies you find. Your workers may have valid reasons for performing duties in the current manner. Also, your major command (MAJCOM) or next higher support level may provide information that is “hot off the press.” Keep in mind that it is vital to keep SOPs and OIs horizontally consistent with all governing directives and instructions. Once your homework is done, you can begin writing the OI or SOP.

Gauge the difficulty

There’s plenty to consider when writing the OI or SOP. One important consideration is the level of difficulty and complexity of the task or duty. As you might guess, complex tasks often require more detailed guidance. Make sure the OI or SOP is clear and effective. Also consider the experience level of your personnel; inexperienced workers require more detailed guidance. Therefore, always write to the lowest possible level. This prevents rewrite with every personnel change. It also enables the OI and SOP to be clear and effective for everyone.

Determine the format

Task difficulty and worker experience determines the format. Format consists of two basic choices. OIs are in letter format; SOPs are either multipage numbered documents or a numbered quick-reference card. If task difficulty and worker experience allow the creation of quick-reference cards, use them. In addition, extracting key steps from the multipage SOP and incorporating them onto a quick-reference card that guides most personnel to accomplishment is another variation. In this case, the SOP is actually a multipage document while the card acts as an aide. Personnel are still accountable for the information in the SOP. Quick-reference cards are often easier to integrate on the job. With a format in mind, it’s time to write. Let the format develop as you firm up all necessary procedural steps.

Writing procedures

SOPs need to be instructional guidance that is clear, concise, and effective. Consider involving unit personnel in the writing of SOPs. It’s a good idea to allow your people to write SOPs, they will gain a thorough working knowledge of the procedure. They also gain experience for future leadership roles. Besides, they are the ones who have to live and work directly with the new procedure. After the procedures are written, it’s time to put them to work.

Implementing the procedures

Before the OI and SOP are final, ensure all personnel are aware of the changes or the new policy. It's probably a good idea to utilize your read file. With new procedures comes a learning curve. Conduct any necessary training.

Checking the OI and SOP

Check the new procedure soon after implementation. This can be accomplished by working a variety of shifts and by questioning your workers and the customer.

Updates

OIs and SOPs can be updated as often as necessary. Updates are often triggered by reviews or changes. Consider involving unit personnel with your updates. Remember, involving your personnel increases their knowledge and prepares them for future leadership roles.

Administrative control

At a minimum SOPs and OIs must be reviewed annually for accuracy and currency. The current version of AFMAN 15–129, Volume 2, *Air and Space Weather Operations-Characterization,* says that OIs and SOPs must be reviewed within 90 days of a change in leadership, when changes occur in the unit, and annually from date of publication. The bottom line is to review as often as necessary to ensure the procedures remain effective. Equipment changes, mission changes, personnel changes, and new ideas are all keys that OIs and SOPs need reviewing. Maintain SOPs in the appropriate work area. There's nothing worse than having to hunt all over the station for the SOPs. All stations must prepare master lists.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

209. Definitions

1. What is an OI?

2. What is a SOP?

210. Creating operating instructions and standard operating procedures

1. When writing an OI or SOP, to what level do you write?

2. What determines the format?

3. Why is it a good idea to have the people who are actually doing the task to write the SOP?

211. Weather support plans and instructions

Providing Air Force weather support and receiving support from other units is no different than most service-related industries that require some sort of written contract. Formal contracts

establish the terms of service that both the servicing and supported party can agree on. Unlike the business world; however, since no money is exchanged, two government agencies are more likely to agree on most things and, as a result, meet in the middle. Overall, to get people, products, and services to the right place at the right time, clearly defined responsibilities are absolutely necessary. The Air Force documents these responsibilities using weather support plans (WSP) and instructions.

Terms and definitions

When deciding what type of document to agree to use between one agency and another, weather commanders and supported agencies must consider intent, needs, and flexibility of the agreement that is used. Weather support plans and instructions contain the same information and serve the same purpose; the one to use is determined locally.

Plans are only guidance, where an instruction would be directive in nature. However, most plans are guidance signed by someone such as an installation commander. Making changes to a plan is a matter of coordination and revision. Changing an instruction, on the other hand, requires coordination and revision as well as high-level approval. You'll probably see more plans than instructions used, but the choice is up to you. There is a plus and minus side to each. The next few lessons define and explain some of the instructions, plans and agreements that are used between weather units and their customers.

Weather support documents

Weather support documents (WSD) in general outline the responsibilities and support that a weather unit provides to its installation customer. A WSD contains detailed weather products and services, such as weather warnings, weather advisories, and desired lead times that each customer requires.

Once developed, a WSD remains in effect for the weather unit and its customers, regardless of changes in command or leadership. The document is reviewed annually for changes. Weather support documents may be developed in one or two formats—as a weather support instruction or as a weather support plan.

Weather support instruction

A weather support instruction (WSI) is the easier of the two documents to write and use as it requires fewer pages. One of the advantages of using a WSI is that it is easier to handle and maintain. A disadvantage of the WSI is that it usually takes longer to publish changes because each change must be coordinated and printed through base administration.

Weather support plan

A weather support plan (WSP) is more difficult to write and usually requires more pages than the WSI. In addition, it can also be more difficult to maintain for the other base agencies. Coordinating administrative approval is less complex with a WSP; this is because the WSI requires administrative approval at the wing level or equivalent. So, an advantage to using a WSP is that it is easier to coordinate and publish changes, and can include off-base support agreements.

Memorandum of agreement

A memorandum of agreement (MOA) is different from a WSI and WSP primarily because a MOA defines how one weather unit supports another weather unit. For example, when an operational weather squadron supports a weather flight, the MOA defines the requirements and limitations of support. MOAs must be reviewed with each change of weather commander or weather chief.

Sometimes, MOAs are used in another way. One example of the use of a MOA is to include installation agencies that are not supported by a weather support document. In other words, if a base agency needs recurring weather support but was not included in either a WSI or a WSP, a separate MOA satisfies the need for support.

Reciprocal agreements

The wing plans office is normally responsible for documenting reciprocal support agreements between the weather unit and off-base customers. However, when a wing plans office isn't available to satisfy the requirements, then the weather unit is encouraged to include reciprocal agreements within the WSD. This is normally done at Army support weather units.

212. Customer needs and required support

Before any weather unit chooses one weather support document over the other, the unit must first identify its customers. During the opening phase of developing the WSP, your customers must be identified. Common sense dictates that if your unit is involved with writing a document that states how you support your customer, it only makes sense that you find out just what type of support they need.

Primary customers

While the flight commander or chief and the unit leadership provide and arrange weather support to include WSPs and WSIs, it's important to remember that with any service-oriented agency, there are internal and external customers. External customers are customers that are not part of your organization, for example civil engineering or a base tenant unit. Internal customers, in a broad sense, are part of your organization. An easy way to differentiate between the two is that internal customers generally speak the same language. For example, when an operational weather squadron supports a weather flight, both speak the same weather language in terms of acronyms, policies, and nicknames. In this case, although both organizations are separate, in a broader sense both are weather units with each supporting the other. With external customers, we often have to be more understanding of the differences in the technical language and acronyms of both organizations.

Normally, the primary customer with Air Force support is the wing. With Army support, the primary customer is the division. It's important to identify the needs of external customers so that a weather commander can develop a weather support document that will support your customer in the most efficient way possible.

Concept of operations

Weather commanders develop WSDs to support day-in and day-out needs, as well as recurring needs of the weather unit's customers. The best way to determine the concept of operations is for the commander to conduct several meetings and interviews with their supported agencies. The weather commander should ask as many pertinent questions as possible about the customer's needs, such as:

- What is the customers' mission?
- Do aviators fly only during the day? Or are operations 24/7?
- How often are nighttime missions conducted?
- How often are field-training exercises conducted?

Scope of services

During the process of determining the scope of services, the commander or chief must coordinate procedures with customers and identify facility and equipment needs. Once the concept of operations is determined, the weather commander must next determine how the weather unit will support the requirements. This can also be termed as the scope of services. In order to determine the scope of services that the weather unit can provide, the commander must ask some very important questions such as:

- Can mass briefings be conducted twice per day to take care of mission requirements?
- How many over-the-counter briefings are needed to support the operation?
- Is special or routine support required from the Air Force Weather Agency?

Normally, these types of questions are answered via a WSD checklist.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

211. Weather support plans and instructions

1. How often is a weather support document reviewed?

2. Which office is responsible for documenting reciprocal support agreements between weather units and their supported customers?

212. Customer needs and required support

1. Briefly explain the differences between internal and external customers.

2. What is the best way to determine a weather customer's concept of operations?

3. Name the tool that is used to identify a weather unit's scope of services, such as how the unit conducts and delivers weather briefings.

2–2. Technical Health Programs

Information on the past, present, and predicted states of the atmosphere and space environment, when effectively applied, enhances the abilities of our armed forces. Weather support providers should possess an understanding of the effects of the air and space environment on military systems, strategies, and tactics. Understanding is just a start. Weather support providers need awareness of how well processes and products support military systems, strategies, and tactics. The Air Force Weather (AFW) Technical Health Program is a formal and informal metric that identifies weaknesses and leads to the continuous improvement of all aspects of weather support.

Each MAJCOM is unique in the requirements they place upon the weather flight. You will have to follow the MAJCOM guidance for all of your weather warning as well as Terminal Aerodrome Forecast (TAF), Mission Execution Forecast (MEF) and weather review metrics. Typically these metrics will be forwarded up to the MAJCOM so your functional leadership can keep track of how their weather units are doing with respect to technical competence.

213. Evaluation concepts

AFW has the customer-oriented goal of providing accurate information on the past, present, and future states of the air and space environment. Success depends on both the war fighter and weather supporter. They both must do the following three things:

- Understand the effects of the atmosphere and space environment on systems, strategy, tactics, and operations.
- Identify criteria that are operationally significant to systems, strategy, tactics, and operations.
- Measure how well weather support processes and products support systems, strategy, tactics, and operations.

Technical performance

Technical performance relates to the observing and forecasting skills necessary for effective weather support. AFWA analyzes the technical performance of the weather support force.

You must evaluate technical skills using manual or automated methods. A locally developed method may consist of physically comparing a stack of completed forecasts with a stack of observations for verification. There are three categories of verification:

Category	Description
Operational verification (OPVER)	Tracks the forecast impact on mission execution. This is done at the WF level.
Terminal aerodrome forecast verification (TAFVER)	Tracks forecast accuracy. This is accomplished at the Operational Weather Squadron (OWS) level.
Warning/advisory verification (WARNVER)	Tracks resource protection effectiveness. Forecast warnings/watches/advisories are accomplished at the OWS level. Observed warnings/advisories are accomplished at the WF Level.

Weather flight

At the WF level, OPVER of the MEF is the single most important effectiveness measurement. Weather flights assess OPVER using AFW and customer thresholds. You will have to maintain close coordination with your customers to develop and maintain OPVER criteria. In addition, you will have to debrief your customers and compare actual conditions to the forecast conditions.

The WF portion of TAFVER and WARNVER is in relaying the most up-to-date warning or advisory information to your Operational Weather Squadron. The personnel at the WF are the eyes at the local level and can help or hinder the OWS in their quest to keep your TAFS and Warning/advisories current. A WF may improve their technical performance by adjusting local procedures or requesting assistance from the OWS or MAJCOM functional personnel.

Readiness of WF personnel and equipment is reported up to MAJCOM functional leadership. It's based on the availability and operational status of their authorized and assigned resources. The Status of Resources and Training System (SORTS) and/or the Air Expeditionary Force (AEF) unit type code (UTC) Reporting Tool (ART) is used to convey readiness information.

Operational Weather Squadron

For WARNVER, the OWS will use all available sources and even subjective analysis if appropriate. Sometimes warnings or advisories can be justified by weather events happening close to but not within the 5 mile TAF radius. OWS leadership ensures that all verification sources are credible. Using a flexible verification range acknowledges the limitations of weather forecasting accuracy.

TAFVER is conducted by breaking a forecast product down by elements (i.e., visibility, sky condition, temperature), followed by grading accuracy of each element. The primary product TAFVER is performed with is the TAF, but not limited to the TAF. Any technical grading of a forecast product is considered TAFVER. Other forecast products could include DD Form 175-1, Flight Weather Briefing, 5-day forecasts, or even hazard charts.

Operational effectiveness

Operational effectiveness is the ultimate goal of AFW support. To evaluate operational effectiveness, weather providers with MAJCOM coordination and users of weather information must decide what is operationally significant. Four examples are low-level or precision bombing, drop zone forecast, air-refueling, and insurgence and concealment. The customer and the weather supporter must work together to define specific thresholds that impact operations. The customer's role is one of assistance. Some examples are clouds, visibility, wind, and energetic proton levels. The customer and weather supporter must also develop effective metrics and feedback mechanisms. Three examples are: surveys, staff briefings, and debriefs. The evaluation should capture what's important to or has the

most impact on operations. Think about all phases of an operation, for example, planning, launch, route, execution, return, and recovery. Units should develop and implement plans for continuous improvement.

Validation of effectiveness

AFI 15–114, *Functional Resource and Weather Technical Performance Evaluation,* recommends all AFW units use the following items to evaluate effectiveness:

- Total number of scheduled missions.
- Total number of missions cancelled due to correct forecasts.
- Total number of missions cancelled despite correct forecasts.
- Total number of missions re-targeted, rearmed, or rescheduled due to correct forecasts.
- Total number of missions re-targeted, rearmed, or rescheduled despite correct forecasts.
- Total number of missions non-effective or partially effective due to actual weather conditions.
- Total number of missions non-effective or partially effective due to incorrect forecasts.
- Missions that were non-effective or partially effective due to actual weather conditions or incorrect forecasts.
- MEF reviews, studies and seminars used to improve operational effectiveness and forecast skills.

The skills of AFW personnel and how well those skills meet operational requirements during peace and war are extremely important to the Air Force. Technical performance and operational effectiveness are tracked and briefed throughout the chain of command. The AFW Technical Health Program identifies our weaknesses and leads us toward continuous improvement efforts

214. Weather Standardization and Evaluation Program for Weather Operations

The Standardization and Evaluation Program for Weather Operations (SEPWO) evaluates the ability of USAF weather units to meet weather standards, weather forecasting, and observing requirements of their customers. All USAF, Air Force Reserve, and Air National Guard (ANG) units are subject to this program.

SEPWO objectives

SEPWO objectives are as follows:

- Evaluate the ability of Air Force weather organizations to comply with Air Force standards and perform assigned missions.
- Provide an objective assessment of mission readiness and effectiveness for AF/A3O-W, owning MAJCOM and Field Operating Agency (FOA) senior leaders.
- Assess the technical capabilities of Air Force weather forces.
- Identify negative trends and oversee corrective actions.
- Identify positive trends and successful practices for benchmark and crossfeed.
- Provide a means of self-evaluation and process improvement to help focus resources where most needed.
- Identify shortfalls in compliance with Air Force instructions or previously implemented corrective actions.
- Provide, in conjunction with other evaluations, information to identify, prioritize, and develop solutions to functional shortfalls.

Checklists

SEPWO compliance performance checklists are available from AFWA. Their Standardization and Evaluation branch will have them on their website. These checklists are used to evaluate your unit.

SEPWO evaluation

The SEPWO is compliance oriented. The SEPWO is conducted using Air Force checklists developed by AFWA. SEPWO ensures that weather units adhere to technical standards. Detailed evaluation checklists are used that include items in each major area. The evaluation checklists are comprehensive and make reference to a wide range of directives.

Scheduling evaluations

SEPWOs are conducted every 24-36 months for active duty, reserve and contracted units. The Air National Guard uses a 48-60 month schedule. AFW encourages the MAJCOMs to include the SEPWO with Unit Compliance Inspections (UCI) and other inspections.

SEPWO team

SEPWO team membership normally consists of four personnel plus a MAJCOM representative. Team members are responsible for the briefings, checklists, and reports. They also develop and administer proficiency tests, give check rides and run checklists during visits. The team chief briefs the CM/unit leader daily on evaluation progress. The team chief is also the one that debriefs the group commander and CM on the final results of the visit and leaves a final copy of the SEPWO report.

Unit ratings

The SEPWO team calculates ratings for both operational and proficiency areas. The ratings are as follows:

- Outstanding.
- Excellent.
- Satisfactory.
- Unsatisfactory.

SEPWO report

The SEPWO report provides all management levels with a detailed account of how each weather unit conforms to Air Force standards and how personnel perform their duties. The results of all evaluations are promptly sent to the group commander and the CM/unit leader. The report must be completed prior to departure from the hub, base, or post weather stations being evaluated. Hard copies of the report are distributed to all MAJCOMs within 15 days following completion of the visit.

SEPWO report format

The SEPWO report is broken down into six sections. We will discuss each section briefly in the following table.

Section	Description
I	*Purpose and scope*—provides all management levels with a detailed account of how each weather unit conforms to Air Force standards and how personnel perform their duties. *AFW setting*—briefly describes the mission supported. *Executive Summary*—gives the host operational commander a short preview of the SEPWO team's assessment of the weather unit's capability to support the customer's mission.
II	Weather Interest Items/Special Interest Items.
III	*Observations*—briefly describes the observation. Observations are procedures, programs, or methods which affect flight safety, impact operations, or have the potential to affect the mission and/or flight safety. Observations are nonchecklist

Section	Description
	items and may be positive or negative. *Discussion*—describes the observation, why it is an observation, background information, and any past history of the same or similar observation the unit may have previously experienced. *Recommendations*—suggested course(s) of action.
IV	*Compliance and Performance Review*—list what areas were evaluated and how many areas had discrepancies. *Superior areas*—A description of areas or programs that deserve recognition and crossfeed to other weather units. *Exceptional Performers*—lists individuals who exceed standards though management of programs or exceptional skill and leadership. *Overall Scores*—Scores for compliance, performance and overall. *Overall Rating*—Evaluation rating. *Proficiency*—provides the written proficiency test results using Q ratings. *Check rides*—provides results of check rides administered using Q ratings and categories tested. *Exceptional Performers*—lists exceptional performers and a brief description of their action. *Overall Rating*—unit's overall rating based on the Q ratings.
V	MAJCOM unique information.
VI	General information.

Preparing for a standard and evaluation visit can cause a lot of tension in a weather station. This can be avoided by ensuring that your people are prepared throughout the year, and not just to get ready for the "IG." As a manager, it is your responsibility to ensure that your people are meeting Air Force standards and that your customer requirements are being met as well. Remember, that your goal for a standard and evaluation visit should be nothing less than "Outstanding!"

Resolving discrepancies

Your MAJCOM functional leadership and AFWA/A3 have approval authority for resolution plans and closure requests for SEPWO discrepancies and negative observations. Each unit will follow the MAJCOM or AFWA resolution procedures. MAJCOM procedures will differ between commands.

Within 60 days of evaluation, a plan must be submitted to MAJCOM functional leadership to resolve discrepancies. You will receive a reply within 30 days. In order to gain approval you will need to be very detailed in how you have corrected or plan to correct a problem and make sure it will not happen again.

One exception to this is units that receive an unsatisfactory rating. Units with this rating will be re-evaluated within 180 days.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

213. Evaluation concepts

1. What's the single most effective measurement tool for the weather flight?

2. What can sometimes be used to justify warnings or advisories?

3. What are three examples of effective metrics and feedback mechanisms?

4. Identify 5 items used to evaluate effectiveness.

214. Air Force Weather Standardization and Evaluation Program

1. What does the SEPWO evaluate?

2. What are four objectives of SEPWO?

3. How often are field units evaluated?

4. What are the possible unit ratings?

2–3. Self-assessment Programs

We just finished talking about how a weather unit tracks their technical health in order to better serve the customer. We looked at evaluating if your unit is technically proficient and compliant in accordance with United States Air Force (USAF) weather standards. This section outlines programs guidance, procedures, and standards with which weather units need to comply. This ensures that you are prepared for that next standards and evaluation visit (IG inspection). Everything and everybody in the unit will be evaluated; so be ready!

215. Air Force weather training

Air Force weather training program is in AFI 15-127, *Air Force Weather Qualification Training*. It outlines the different responsibilities and levels of training. As a leader, you will need to stay current on your training as well as ensure that all your personnel are current on their training.

Responsibilities

The Air Force weather training program is used by weather units to initially certify and annually recertify unit personnel for duty in the WF/OWS. The overall responsibility for administering the AFW training program falls on the unit commander or chief.

Initial interview

AFI 36–2201, *Certification and Management of Launch Weather Crew Force*, tells supervisors to determine three things during this interview. First, figure out what the person's current qualifications are. Check their electronic AF Form 623, Individual Training Record Folder. Evaluate their current task knowledge and skill. Decertify as necessary. After all, it may have been years since a given task was actually performed. Document the interview on the AF Form 623a, On-The-Job Training-Continuation Sheet, in the member's training records. Once that's done, you can determine formal and on-the-job training (OJT) requirements. Determine the OJT requirements by comparing current qualifications to position requirements. Close the interview by briefing the person on their training responsibilities. If required, also brief them on career development course (CDC) completion

responsibilities. If the interview is done effectively, the result is a streamlined and personalized worker's job qualification training. Make sure you document the interview on the 623a. At this point, the supervisor would begin the second step; planning and scheduling training.

Planning

When planning training, consider operational requirements, the availability of resources, and the best opportunities. Operational requirements refer to what needs to be accomplished; not by when it needs to be accomplished. All too often, people are rushed through training to meet a perceived sense of urgency caused by personnel changes. It's best to plan for no overlap between incoming and outgoing personnel. This prepares the unit for a worst-case scenario. Secondly, be creative and use a team approach. Getting SSgt Jones trained after her arrival is a problem for the whole unit to solve. Less leave, longer hours, and an increased tempo may be the nature of the beast. Poor planning is poor management. By planning well, you can streamline training based off each individual. This can really minimize the impact of personnel changes.

Conducting training

You can't stop with planning. The actual training has to get done. Strive for realism. You want your people trained with as much realism as possible. If training is on a live product or if service isn't possible, try to come up with something that's close. Many things in the weather station can mimic real life. For example, PMSV contacts are easily simulated through person-to-person dialogue. Another example is using archived weather surveillance radar set (WSR-88d) data to recreate a thunderstorm scenario. Be comprehensive. The bottom line is, ensure your people can perform all the required tasks to all the required outcomes.

The Career Field Education and Training Plan

The Career Field Education and Training Plan (CFETP) shows every training or line item that an individual must or should be trained on based on position. It also has the career path with a written description of what is expected at the different skill levels throughout your weather career. Core tasks are highlighted throughout the document as are line items that everyone must be certified on.

Basic qualification

Basic qualification (BQ) training is designed to move a person to the BQ status. BQ does not include deployment training. Instead, it focuses on home-station and airfield training requirements. An individual will receive a duty position qualification by completing individual qualification training (IQT).

Combat mission ready

Combat mission ready (CMR) status is awarded after a supervisor certifies that an individual has met all CMR training requirements and is qualified to perform the unit's deployment taskings. To keep this status an individual must stay proficient by continuing to train also called continuation training.

Keep your people up to speed on the latest field equipment and ensure they are familiar with the regional weather patterns and climatology. Have them review the weather products and OWS web-pages they will use when deployed.

Continuation training

There are three steps that are necessary to conduct effective training. Continuation training (CT) is a quarterly requirement. It encompasses both knowledge and task items and should focus on the seasonal challenges of weather forecasting. In order for personnel to maintain qualification on mission essential training, they must receive recurring training on perishable skills. As a manger, you will want to use all the AFWA and OWS resources you can. You can find most of these on the AFW website known as the Air Force Weather Knowledge Center (AFWKC). In addition, have your people participate in exercises that will test and hone their skills.

Imagine an Air Force that fills positions, but does little or no training enabling people to perform their duties. For example, Iraq possessed some of the world's best aircraft, but their pilots lacked the necessary skills to be effective in the air during Desert Storm. Effectiveness in the air involves much more than training pilots. We all support military operations. Our people need training that enables them to be effective.

216. Occupational Safety and Health Program

AFI 91–202, *USAF Mishap Prevention Program*, outlines the training requirement for newly assigned personnel. The Air Force mandates this training to meet its goal of zero occupational injuries and illnesses. As much as possible, integrate this training into job qualification training. For instance, observers may be required to wear hearing protection while at the observation point. Incorporate this safety requirement into observer training. Before this point, though, some form of initial safety briefing is needed. Work center supervisors must provide safety guidance and standards.

All Air Force personnel are required to follow safety standards and guidance while carrying out their duties. By following guidance, they can perform their duties and minimize the risk. The risk can only be minimized. Accidents still happen, regardless of preparation. Sometimes, the safety hazard is inherent to the work. In other words, it's always there. When this occurs, personnel must be aware of the hazard. Here's an example. Can the hazard of catastrophic explosion be eliminated from our space shuttle program, or do astronauts work with the hazard? Brief all new arrivals on the safety and health risks within the workplace. This could be anything from tripping or noise hazards, to electric shock or fire hazards. Always explain what they are, where they are, and when they most likely occur. Does that sound important? It is, and you need to document the training.

Use the AF Form 55, Employee Safety and Health Record, to document all safety awareness briefings and training. Documentation is required for anyone new to the work center, or when equipment, procedures and/or processes have changed. You, as a supervisor, are required to brief all occupational hazards in detail. That means when someone is new or you have a new way of doing business, brief the potential safety and health risks and document the briefings. People are the Air Force's most valuable asset. Nothing gets done without them. You, as a manager, must provide for and ensure their safety.

217. Suggested briefings

AFMAN 15–125, *Weather Support*, provides us with the "what," but not the "how" and "why." There's plenty to gain by covering all the suggested areas. Just going somewhere, however, is meaningless. What happens once you're there is crucial—plan visits that include briefings by the experts on hand. If you visit a flying unit, get a pilot to pass on his/her first-hand experience. Let's look at the orientation items from AFMAN 15–125.

Orienting new weather personnel

A well thought out orientation program is vital to newly assigned personnel. A good program ensures personnel understand their duties. Briefings should clearly show how duties fit into the unit and the impact they have on the base/post mission. New personnel should develop an "I can do that, and I can see just why I'm doing it" attitude.

Do not conduct a complete orientation immediately upon arrival. New arrivals often get "fire hosed" with information, and the overload diminishes the program's impact. Integrate briefings into job qualification training. For example, you could visit the supervisor of flying while training local operational forecast tasks. It is strongly recommended that station leadership conduct as much of the program as possible. That means you should walk folks around and provide input during briefings. This provides some measure of consistency and completeness. Managers should utilize this opportunity to assess strengths and weaknesses of weather support. Ask questions while visiting various agencies. A first-hand story from supported customers gives new personnel a direct look at weather impact and gives you, the manager, direct feedback on your support. An effective orientation

allows newly assigned personnel to adapt in less time. If done right, you will sell the unit, its mission, and the job.

Unit mission and the person's role

Every office in the Air Force has some form of orientation and familiarization for newly assigned personnel. The time and effort spent developing and conducting a program will benefit the organization and, ultimately, our customers. It is on your shoulders to conduct an effective briefing on the unit's mission and the person's role. Be honest with them. Discuss things like operational tempo. How many briefings do you do on a daily basis? Most of all, sell the unit, its mission, and the job! Do it sincerely and enthusiastically. Strive for a commitment for unit success. Hopefully, this will result in a "buy-in" from your new personnel.

Unit policies

The three suggested policies that you should consider briefing are:

- Equal Opportunity and Treatment Program.
- Substance Abuse.
- Leave.

Other suggested briefings

Remember how you felt upon arrival to a new station? You're the "newbie." Make your new personnel feel comfortable by introducing them to not only to staff, but all fellow workers. Listed below are some other suggested briefings.

Meteorological equipment

Have the maintenance people conduct briefings at the airfield's sensor locations and back at the station's displays. They should explain how the sensors work and discuss system limitations. If applicable, talk about recurring maintenance problems and schedules. While you are at the sensors, take the time to point out the effects often caused by topography and sensor location. Are sensors blocked from certain directions? Does jet blast and prop wash interfere with readings? AFW personnel need to know where the sensors are located and how they work.

ATC facilities

There are numerous reasons to visit these areas. Have ATC personnel talk about the airfield layout. Go over runway and sensor change procedures. Be sure to ask why they occur and talk about the dissemination system. How does information get from the tower or RAPCON to the weather station? This leads right into the Cooperative Weather Watch (CCW) program. Having ATC personnel explain their role as *supplemental weather observers* is a great idea. You, the manager, can gauge the scope and understanding of your CCW. Finally, cover operational emergencies and mishaps. All AFW personnel should know the impact they have during these critical periods.

Supervisor of flying

During training, around fighter aircraft, and at Army locations, this function is the focal point for daily flight operations. Good rapport and interaction with the weather station is vital. Have the supervisor of flying discuss the impact that observations, forecast, warnings, and advisories have on flying operations. How do unforecasted conditions impact operations, and what actions does the supervisor of flying take to respond? For example, what seems like a simple wind shift often becomes a complex orchestration of aircraft. The supervisor of flying should also discuss the passing of weather information; for example PIREPS. They should also mention criteria for alternate and divert airfields.

Flying squadrons/war fighter facilities

This is where you make the money. Have the war fighter walk your troop through the mission planning and preparation process. Discover the typical routine. Do your station personnel know where weather fits in? Wrap things up by discussing impacts of observations, warnings, and advisories.

Command post

Have personnel brief the function and responsibilities that command post has in the wing. Concentrate on warnings and advisories. Cover the dissemination system and what actions the various warning or advisory criteria cause.

Aircraft maintenance

Aircraft maintenance varies widely and depends on location and mission. There is one place, however, common to all AFW units that directly support a flying mission. Wherever there's aircraft, there's aircraft maintenance. Get your personnel briefed at Maintenance Operations Center (MOC). This is important, because the MOC can explain flight line safety concerns. This office is a key part of flight operations. Discuss what impact observations, warnings, and advisories have on flight-line personnel. Have them also talk about their dissemination procedures. Don't leave anything out.

A well thought out orientation program is vital to unit success. Two things will happen; personnel see how they fit in to the overall operations and learn how they impact resources and the flying mission. Take care of your people and they'll take care of the mission!

218. Support Assistance Requests

Occasionally you may find yourself needing assistance to help support your mission. Fortunately there is a process to help weather units and other agencies get the vital weather information they need that may not always be readily available. Whether you need climatology for a future deployment or a KQ identifier for an upcoming exercise, you should be familiar with the Support Assistance Request (SAR) process.

A SAR is a formal request for specialized weather support that requires assistance from an outside agency. Air Force weather units and other customers will use the SAR process when requesting specialized terrestrial, space, or climatological services from weather strategic centers including the Air Force Weather Agency (AFWA) and specialized theater-level support from servicing Operational Weather Squadrons (OWS) for their respective area of responsibility (AOR).

Submitting a SAR

Because many different units process SARs, it would be difficult to list the instructions for them all. Typically instructions for the requests are listed on the providing agency's homepage.

Before submitting a SAR, you must determine the classification of the request. Units will submit requests for unclassified support directly to the appropriate strategic center or OWS using the SAR function on the Joint Air Force and Army Weather Information Network (JAAWIN) website, or directly from the OWS web page. For classified support, units will submit requests using the SAR function on the JAAWIN-S or the classified OWS or 14th Weather Squadron's home page. In addition, units may also submit requests for classified support via secure telephone, fax, or e-mail. If there is a problem in providing the support, the strategic center or OWS will contact the requestor, clarify the requirement, and discuss alternatives, if required.

SARs can be submitted three different ways—recurring, infrequent, or one-time requests support. If the SAR is for support that must be delivered under strict time constraints, units will submit the SAR far enough in advance to allow the strategic center or OWS to work the request effectively. For recurring support, units may develop a "pre-positioned" SAR with the appropriate strategic center or OWS that may be activated short-notice by telephone, fax, or e-mail.

Types of SARs

Air Force Weather provides numerous products and support to its customers. The scope of this support is extensive as SARs are seen in many different formats.

The 14th Weather Squadron provides climatological data tailored to specific locations and mission factors. You can request data for your location whether it's peacetime support, exercise support,

simulation, or contingency support. You can obtain SAR information at the 14th Weather Squadron's web page.

The 2nd Weather Squadron's WXZ office provides space weather data. You can request routine space products, such as scintillation data. Additionally, mission specific space weather briefings can be requested through this office. SARs for space weather support can be submitted through the JAAWIN web page.

2 SOS/SYSD at AFWA provides temporary KQ identifiers. These identifiers are distributed as needed for deployed locations, contingency operations, and exercises. Requests are made through the e-mail address listed on AFWA's SAR web page.

OWSs can provide a reach back capability to weather flights requesting specialized weather data otherwise not available to them on a routine basis. Because OWSs are geographically aligned, it's important to ensure you submit the SAR to the appropriate agency. To determine the servicing OWS in an AOR, refer to the JAAWIN web site.

Weather units need to ensure USAF customers, other US military services, and other DOD or government agencies are knowledgeable of the SAR process. Units will direct agencies needing specialized support to the appropriate strategic center OWS and guide them through the SAR process to make their request.

As with any weather support product, weather units will encourage agencies submitting a SAR to provide feedback on the quality, effectiveness, and value of support directly to the appropriate strategic center or OWS.

219. Determining special and local criteria

Aviation safety is one of the most critical aspects of day-to-day airfield operations. Accurately reporting weather conditions helps us operate in a safe environment, ensures mission success, and enables our ability to fly, fight, and win. Because weather plays an important role in these operations, it's essential that the limiting factors affecting mission success are identified.

The established thresholds for special and local criteria are determined with the intent to ensure airfield conditions are accurately depicted in a timely manner. This allows pilots and the aviation community to make decisions concerning the airfield's availability and assess risk for flying operations.

Aviation Selected Special Weather Report (SPECI)

A special observation, or SPECI, is an unscheduled report taken when the weather has changed in specific ways. SPECI observations contain all data elements found in a Meteorological Aerodrome Report (METAR) observation with the exception of station pressure and additive remarks. The SPECI may elaborate on reasons for the special in the body of the report. SPECI observations will be made as soon as possible after the relevant criteria are observed.

AFMAN 15–111, *Surface Weather Observations*, lists the thresholds for SPECI criteria to include but not limited to ceiling, visibility, and runway visual range. Factors which impact flight operations such as a thunderstorm's arrival on station, the beginning or ending of precipitation, and wind shifts also require a SPECI to be taken. These weather occurrences, including many other weather parameters, are listed in AFMAN 15–111. In addition to AFMAN 15–111, specific criteria pertaining to each airfield must be considered. SPECI criteria can also be established locally. Weather flights will take a SPECI for any criteria significant to local installation operation. These criteria will be coordinated with base agencies and specified in the installation's weather support document.

Flight Information Publications

Flight Information Publications (FLIP) charts are sensitive flight critical mapping and charting type items produced by the National Geospatial-Intelligence Agency (NGA), foreign governments and commercial vendors that are distributed by the Defense Distribution Mapping Activity (DDMA) and

various civilian contractors. They are available for most parts of the world, including Africa, Asia, and Antarctica. Each set of maps provide information needed for flying in foreign airspace.

FLIPs list airfield take off and landing, and circling minima. These minima change from one airfield to another. The most widely used is the low altitude FLIP. For our purpose, ceiling and visibility information that is important to the pilots is what we will use for determining SPECI criteria. The minimum thresholds listed in the FLIP constitute SPECI criteria for the airfield in addition to the thresholds listed in AFMAN 15–111. Weather flights will have procedures to review each new edition of DOD FLIPs, including the RADAR Instrument Approach Minimums, local Notices to Airman (NOTAM), and applicable directives for changes in the airfield minima as soon as possible after publication. FLIPs are frequently updated so it's very important to ensure you immediately review them upon receipt. If flight minima changes you will need to ensure your SPECI criteria is changed and all cross referenced documents are updated.

In addition to AFMAN 15–111 and the FLIPs, you should be familiar with other Air Force, Army, Headquarters (HQ) or MAJCOM instructions and publications in regards to helicopter operations and bases with assigned Air Defense Aircraft such as the North American Aerospace Defense Command (NORAD) aircraft. These sources may also require location specific thresholds for SPECI criteria.

Aviation Selected Local Weather Report (LOCAL)

A LOCAL observation is an unscheduled observation. Whereas some of the criteria are listed in AFMAN 15–111, most criteria will be established at the base level for support of local customers. Examples of LOCAL criteria include crosswind thresholds for certain aircraft, runway condition changes, and altimeter changes. The time of observation is the time of occurrence. The observation is transmitted only locally; never long line. Local customers will identify their mission limiting factors and will need to be notified upon occurrence. In these cases, local criteria will be established through local coordination and documented in your weather support document.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

215. Air Force weather training

1. Where can you check for people's current qualifications?

2. Which qualification focuses on home-station and airfield training requirements?

3. What training certifies an individual to perform deployment taskings?

4. How often is continuation training required?

216. Occupational Safety and Health Program

1. What's the goal of this program?

2. What AF Form is used to document safety awareness training?

217. Suggested briefings

1. What are three suggested Air Forces policies that should be briefed to personnel?

2. What are some other briefings new personnel should get at a new station?

218. Support Assistance Request

1. What is a Support Assistance Request?

2. What three ways are SARs submitted?

219. Determining special and local criteria

1. When will SPECI observations be made?

2. For what area is FLIP charts available?

2–4. Certifying Non-weather Personnel

Surface observations provided by AFW personnel are invaluable. Every agency on the base/post is affected in some way by current weather conditions. Surface weather observing impacts everything from flight operations to personnel at the pool. This is a huge responsibility that cannot be accomplished effectively by one person working alone. Some form of cooperative weather watch is needed. To provide an effective Meteorological Watch **(**METWATCH), training must be accomplished.

220. Tower visibility observations

AFI 13–203, *Air Traffic Control (ATC),* directs all ATC personnel to be site certified at each new location. This site certification involves two aspects of weather. First, air traffic controllers are required to receive local weather phenomena training. This can be accomplished using text, video, seminars, and other training media. Second, controllers must be certified to determine prevailing visibility from the tower (officially known as Tower Visibility). Initial Tower Visibility Observation Certification training must be accomplished by a certified weather observer. Initial training occurs at each new location to which a controller is assigned. Recurring certification is done by the ATC Chief of Standards and Evaluations. This person is someone that works in the tower. All training must be documented on an AF Form 3622, ATC/Weather Certification and Rating Record.

AFMAN 15–111 states that weather technicians will task certify ATC personnel. Certification authority may be delegated to the training or program manager. This AFMAN also outlines Tower Visibility observing responsibilities. First, ATC must develop and maintain a Visibility Checkpoint Chart. AFW provides necessary assistance in developing the chart and selecting reference points.

Second, ATC must report visibility meeting LOCAL criteria to the base weather station. When controllers believe locally established visibility criteria have been met, AFMAN 15–111 requires them to notify weather personnel. Lastly, ATC reports visibility when it differs from the weather station observation, and either report is less than 4 miles/6000 meters.

In practice, good rapport and communication between ATC and the weather unit is required to operate efficiently. This is two-way communication, update them with changes when necessary and they will be more likely to keep you informed.

221. Cooperative weather watch

This lesson focuses on the purpose, procedures and contributors, and automated observations of cooperative weather watch.

Purpose of Cooperative Weather Watch

A Cooperative Weather Watch is used to offset limitations of the Basic Weather Watch. A Cooperative Weather Watch uses a team concept to increase the METWATCH capability of the weather observer. This program increases the weather station's sensing capability through the cooperation of base agencies. At many sites, the point of observation has viewing restrictions across portions of the horizon. Weather-related damage can occur on these parts of the base that are not visible from the observation point. A well-coordinated Cooperative Weather Watch adds immensely to the weather station's effectiveness. It is important to enlist the aid of the right agencies. Ensure that non-weather agencies such as ATC, Security Forces, Range Control, and so forth know how to report important weather conditions, changes, and reportable values. An effective training program is important in assuring the effectiveness of the Cooperative Weather Watch.

Cooperative Weather Watch procedures and contributors

As you can see, the METWATCH is a critical process in any weather unit's daily operations. To increase the effectiveness and geographic scope of the METWATCH units implement a Cooperative Weather Watch. Weather units will have locally developed procedures for their Cooperative Weather Watch program. The required support and details of the Cooperative Weather Watch should be annotated in the Weather Support Document. Let's take a look at the supporting agencies who are typically contributors in the Cooperative Weather Watch.

The primary concern is the occurrence of previously unreported conditions that affect safety of flight, the efficiency of flight and resources. ATC personnel are required to receive local weather phenomena training. Tower personnel should tour the observation site to get first-hand knowledge of observing limitations and clearly define tower's role in overcoming these limitations:

- **Security forces—**They may see unreported conditions and damage incidental to weather conditions.
- **Flightline personnel—**They may also see unreported conditions that might affect flight line operations.
- **Field personnel—**They may see unreported conditions. This might be the only reliable source for off-station conditions.
- **Pilots—**They provide PIREPs which might include unreported or unknown condition and weather affecting flight operations.

Automated observations

While the automated observing system watches the sky constantly, it has limitations. The only things it can report are those within the sensors range (i.e., clouds must be directly overhead to be seen by the system). The main factor limiting automated observation capability is sensor range. To give a scenario, you are the only technician on shift. You are prepping the next forecast, while keeping an eye on the automated system. You wouldn't see an inbound stratus or fog deck until it was over the airfield. But with a CWW, ATC personnel, from their vantage point in the tower, would call you

when they noted the limiting condition was inbound. This allows you stay on top of conditions while multitasking, and ensure flight safety.

222. Forward Area Limited Observing Program

The Forward Area Limited Observing Program (FALOP) is an ARMY G2 or S2 program used to enhance weather information collection. With this program, forward-deployed Army personnel take weather observations. The observation consists of a 13-element code that is relayed back to a command center. Weather is a key component to operational planning.

Uses

Army uses FALOPS for the following reasons: 1) intelligence preparation of the battlefield (IPB), 2) know your enemy, 3) know the terrain, and 4) exploit the weather. FALOPS not only completes the weather picture of the battlefield for the weather flight, but it may be their only source of forward information. FALOPS are often the key to providing tailored products.

Though it is not written, providing weather training to non-weather personnel is a crucial ingredient of effective weather support. Even if weather troops are at the right place at the right time, observing everything is nearly impossible. Training key agencies to observe key elements force multiplies the basic weather watch and enables the weather flight to make accurate, timely, and tailored services.

Ongoing management

FALOPS and all of the other programs listed in this unit are fluid. As a manager you will have to stay up to date on all of the programs your unit is tasked with or associated with. Governing publications and instructions must be followed to the letter. If your unit has unique reasons that you cannot be compliant on a particular program, then you must talk to your MAJCOM functional leadership and address it before it becomes a write-up in a unit inspection.

Keeping all your unit programs horizontally consistent is vital to ensuring compliance. One change in an AFI or AFMAN will drive changes to processes and SOPS that govern them. Communicating with all of your customers and agencies that your unit supports is key to providing the best weather product possible; tailored to mission needs and relevant to the customer at all times. Always be on the look-out for ways to improve your weather products and services.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

220. Tower visibility observations

1. Who does recurring certification of ATC personnel?

2. When does ATC report visibility?

221. Cooperative weather watch

1. How does a CWW support the METWATCH?

2. Who should you enlist for a CWW?

222. Forward Area Limited Observing Program

1. What is the FALOP?

2. What is vital to ensuring compliance?

Answers to Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

209

1. An OI provides guidance on specific topics that apply to a whole unit.
2. An SOP provides step-by-step task guidance that applies to a specific functional area within the unit.

210.

1. The lowest possible level.
2. Task difficulty and worker experience determines the format.
3. They will gain a thorough working knowledge of the procedure.

211

1. The document is reviewed annually for changes.
2. The wing plans office.

212

1. External customers are customers that are not part of your organization. Internal customers, in a broad sense, are part of your organization.
2. Commander conducts several meetings and interviews with their supported agencies.
3. WSD checklist.

213

1. At the WF level OPVER of the MEF is the single most important effectiveness measurement.
2. Weather events happening close to but not within the 5 mile TAF radius.
3. Surveys, staff briefings, and debriefs.
4. Any 5 of the listed: Total number of scheduled missions, Total number of missions cancelled due to correct forecasts, Total number of missions cancelled despite correct forecasts, Total number of missions re-targeted, rearmed, or rescheduled due to correct forecasts, Total number of missions re-targeted, rearmed, or rescheduled despite correct forecasts, Total number of missions non-effective or partially effective due to actual weather conditions, Total number of missions non-effective or partially effective due to incorrect forecasts, Missions that were non-effective or partially effective due to actual weather conditions or incorrect forecasts, MEF reviews, studies and seminars used to improve operational effectiveness forecast skills.

214

1. Evaluates the ability of AFW units to meet weather standards, weather forecasting, and observing requirements of their customers.
2. Any 4 of: Evaluate the ability of Air Force weather organizations to comply with Air Force standards and perform assigned missions. Provide an objective assessment of mission readiness and effectiveness for AF/A3O-W, owning MAJCOM and FOA senior leaders. Assess the technical capabilities of Air Force weather forces. Identify negative trends and oversee corrective actions. Identify positive trends and successful practices for benchmark and crossfeed. Provide a means of self-evaluation and process improvement to help focus resources where most needed. Identify shortfalls in compliance with Air Force instructions or previously implemented corrective actions. Provide, in conjunction with other evaluations, information to identify, prioritize, and develop solutions to functional shortfalls.

3. 36 months for active duty, reserve and contracted units, Air National Guard uses a 48-60 month schedule.
4. Outstanding, Excellent, Satisfactory and Unsatisfactory.

215

1. Check their electronic 623. Evaluate their current task knowledge and skill.
2. BQ Training.
3. CMR.
4. Quarterly.

216

1. Zero occupational injuries and illnesses.
2. AF Form 55, Employee Safety and Health Record.

217

1. Equal Opportunity and Treatment Program, Substance Abuse, and Leave.
2. Meteorological equipment, ATC facilities, Supervisor of flying, Flying squadrons/war fighter facilities, Command post and Aircraft maintenance.

218

1. A formal request for specialized weather support that requires assistance from an outside agency.
2. Recurring, infrequent, or one-time requests support.

219

1. Special (SPECI) observations will be made as soon as possible after the relevant criteria are observed.
2. They are available for most parts of the world, including Africa, Asia, and Antarctica.

220

1. ATC Chief of Standards and Evaluations.
2. ATC reports visibility when it differs from the weather station observation, and either report is less than 4 miles/6000 meters.

221

1. A Cooperative Weather Watch uses a team concept to increase the METWATCH capability of the weather observer.
2. ATC and range control, security forces, flight line personnel, field personnel and pilots.

222

1. ARMY G2 or S2 program to enhance weather information collection.
2. Keeping all your unit programs horizontally consistent is vital to ensuring compliance.

Unit Review Exercises

Note to Student: Consider all choices carefully, select the *best* answer to each question, and *circle* the corresponding letter. When you have completed all unit review exercises, transfer your answers to the Field-Scoring Answer Sheet.

Do not return your answer sheet to the Air Force Career Development Academy (AFCDA).

37. (209) Operating instructions (OI) *differ* from standard operating procedures (SOP) in that they
    a. do not have to be approved at wing level.
    b. provide guidance on specific topics that apply to a whole unit.
    c. are provided by the manufacturer of the appropriate piece of equipment.
    d. cover tasks or operations performed by a duty specific area within the unit.

38. (209) Standard operating procedures (SOP) make sure
    a. standardized procedures are used by the majority of the unit.
    b. procedures are in place for most personnel while performing tasks.
    c. procedures are used by personnel while performing combat operations.
    d. standardized procedures are used by all personnel while performing specific duties.

39. (210) What subjects should be covered in operating instructions (OI) and standard operating procedures (SOP)?
    a. Only topics required by Air Force instructions.
    b. Only topics required by self inspection checklists
    c. Topics based on the major command's (MAJCOM) discretion.
    d. Topics based on unit or work center discretion.

40. (210) How should tasks be grouped when writing operating instructions (OI) and standard operating procedures (SOP)?
    a. Alphabetically, or in numerical order based upon Air Force instructions.
    b. By duty section or chronologically based upon shift checklists.
    c. Alphabetically or numerically, unless different Air Force specialty codes (AFSC) are involved.
    d. By duty section or functional area, such as forecasting, observing, or radar operator.

41. (210) What is the *first* step when writing operating instructions (OI) or standard operating procedures (SOP)?
    a. Review current publications and applicable guidance.
    b. Consult the unit commander to determine what your suspense is.
    c. Check the duty section for old OIs and SOPs covering other items.
    d. Notify the Air Force technical library maintainer that you're writing a publication.

42. (210) What determines the level of detail you include in your operating instruction (OI) or standard operating procedure (SOP)?
    a. The level of difficulty and complexity of the task or duty.
    b. The number of personnel who will be performing the task or duty.
    c. The importance of the task or duty and how long it takes to accomplish.
    d. The danger involved with the task and what type of safety gear is needed.

43. (210) How often *must* operating instructions (OI) and standard operating procedures (SOP) be reviewed for accuracy and currency?
    a. Quarterly.
    b. Annually.
    c. Bi-monthly.
    d. Semi-annually.

44. (211) Why is the coordination of a weather support plan (WSP) easier than that of a weather support instruction (WSI)?
    a. Administrative approval is less complex.
    b. Civilian agency approval is less complex.
    c. Operations level approval is less complex.
    d. Administrative approval is more complex.

45. (211) A weather support instruction (WSI) is generally easier to write than a weather support plan (WSP) because it
    a. is a much shorter document.
    b. is in bullet format and requires no narration.
    c. uses plain language with very little complex terminology.
    d. is created from a single, major command (MAJCOM) derived template.

46. (212) What *must* be accomplished during the weather support plan (WSP) development opening phase?
    a. Your customers must be identified.
    b. A WSP chief must be appointed.
    c. The operations group commander must approve the process.
    d. The senior observer or administrative personnel must approve the process.

47. (212) Who *must* provide and arrange weather support, to include weather support instructions (WSI) and weather support plans (WSP)?
    a. Civilian forecaster.
    b. Flight commander or chief and unit leadership.
    c. Senior observer or administrative personnel if available.
    d. Operations group commander, if at an operational installation.

48. (212) Civil engineering units are examples of what types of customers?
    a. Civilian.
    b. Internal.
    c. External.
    d. Wing level.

49. (212) What *must* be accomplished during the determination of the scope of services?
    a. Identify the weather support chief in each supported unit.
    b. Refer any questions to the responsible weather squadron.
    c. Coordinate contracted weather support for any secondary customers.
    d. Coordinate procedures with customers and identify facility and equipment needs.

50. (213) Which agency analyzes the technical performance of the weather support force?
    a. Air Force Global Weather Central (AFGWC).
    b. Headquarters Air Force Weather Agency (AFWA).
    c. Headquarters Air Force Combat Climatology Center (AFCCC).
    d. Fleet Numerical Meteorology and Oceanography Center (FNMOC) and Air Force Weather Agency (AFWA).

51. (213) A locally developed method for determining technical health consist of
    a. comparing unit forecasting ability to local civilian counterparts.
    b. comparing actual forecasts to model forecast output using spreadsheets.
    c. physically comparing observations to forecasts to make sure everything matches.
    d. physically comparing a completed forecast with observations for verification.

52. (213) To which unit does the Weather Flight (WF) relay up-to-date weather warning data?
    a. 14th Weather Squadron.
    b. Air Force Weather Agency/A3 (AFWA/A3).
    c. Its parent Operational Weather Squadron (OWS).
    d. Its parent major command (MAJCOM), forward operating agency (FOA).

53. (213) How *must* weather providers and users begin to evaluate operational effectiveness?
    a. Deciding what is operationally significant.
    b. Comparing forecast models with output from forecasters.
    c. Counting the number of weather delays occurring annually.
    d. Watching local weather conditions and looking at forecasts.

54. (214) The standardization and evaluation program for weather operations (SEPWO) is designed to evaluate the ability of USAF weather units to
    a. provide an accurate forecast.
    b. get products to their customers quickly.
    c. meet uniform standards and comply with Air Force Instructions.
    d. meet weather standards and the requirements of their customers.

55. (214) Which is *not* an objective of the standardization and evaluation program for weather operations (SEPWO)?
    a. Identify negative trends and oversee corrective actions.
    b. Assess the technical capabilities of Air Force weather forces.
    c. Provide a means of self-evaluation improvement to help focus resources.
    d. Decertify any personnel who are incapable of accomplishing the mission.

56. (214) Active duty standardization and evaluation program for weather operations (SEPWO) inspections are conducted
    a. annually.
    b. every 24–36 months.
    c. every 30–48 months.
    d. 48 months from date of last inspection.

57. (215) What is the program used by weather units to initially certify and annually recertify unit personnel for duty in the weather flight (WF) or operational weather squadron (OWS)?
    a. Air Force Weather Training Program (AFWTP).
    b. Career Field Education and Training Plan (CFETP).
    c. Air Force Weather/Specialty Training Standard (AFW/STS).
    d. Standard Operating Procedure Specialty Training Standard (SOPSTS).

58. (215) Who has *overall responsibility* for administering the Air Force Weather Training Program (AFWTP)?
    a. Senior observer.
    b. Most experienced forecaster.
    c. Top technical performer.
    d. Unit commander or chief.

59. (215) What form is used to document initial interviews and where is it kept?
    a. AF Form 55, Employee Safety and Health Record; in the member's training records.
    b. AF Form 623a, On-the-job Training Record Continuation Sheet; in the member's training records.
    c. AF Form 55, Employee Safety and Health Record; in the member's Personal Information File.
    d. AF Form 623a, On-the-job Training Record Continuation Sheet; in the member's Personal Information File.

60. (215) To prepare the unit for a worst-case scenario and make sure you have continuity of training, you should
    a. assume overlap between incoming and outgoing personnel.
    b. plan for overlap between incoming and outgoing personnel.
    c. plan for no overlap between incoming and outgoing personnel .
    d. plan for a month overlap between incoming and outgoing personnel.

61. (215) The Air Force Weather (AFW) basic qualification (BQ) focuses on
    a. airfield and deployment training requirements.
    b. home-station and airfield training requirements.
    c. home-station and deployment training requirements.
    d. home-station, airfield, and deployment training requirements.

62. (216) What type of training does the Air Force mandate to meet its goal of zero occupational injuries and illnesses?
    a. Occupational Safety Readiness Inspection.
    b. Occupational Safety and Health Program.
    c. Operational Safety and Health Program.
    d. Operational Readiness Inspection.

63. (216) Workplace accidents will *still* happen regardless of
    a. preparation.
    b. minimizing the risk.
    c. documented safety briefings.
    d. occupational safety inspections.

64. (216) What Air Force form is used to document all safety awareness briefings and training?
    a. 55.
    b. 98.
    c. 55.
    d. 98.

65. (217) Which topic should *not* be included in an initial orientation briefing?
    a. Equal Opportunity and Treatment Program.
    b. Investment strategies.
    c. Substance abuse.
    d. Leave.

66. (217) The Maintenance Operations Center (MOC) briefing provides what important information to Air Force Weather (AFW) units?
    a. Flight line safety.
    b. Aircraft safety.
    c. Weather-maintenance rapport.
    d. Cooperative weather watch.

67. (218) What is the Support Assistance Request (SAR) used for?
    a. Personnel support.
    b. Specialized weather support.
    c. Specialized intelligence information.
    d. Specialized weather and intelligence information.

68. (218) Which is *not* a type of Support Assistance Request (SAR)?
    a. Recurring.
    b. Infrequent.
    c. Sequential.
    d. One-time requests.

69. (218) Which agency provides space weather data?
    a. 14th Weather Squadron.
    b. 2nd Weather Squadron/WXZ.
    c. 45th Weather Squadron/DOR.
    d. 2 SOS/SYSD at Air Force Weather Agency (AFWA).

70. (218) Which agency provides KQ identifiers?
    a. 14th Weather Squadron.
    b. 2nd Weather Squadron/WXZ.
    c. 45th Weather Squadron/DOR.
    d. 2 SOS/SYSD at Air Force Weather Agency (AFWA).

71. (219) Which publication lists takeoff, landing, and circling minima?
    a. Air Force Weather Agency (AFWA) Tech Note 98–002, *Meteorological Techniques*.
    b. Flight Information Publication (FLIP).
    c. Air Force Manual (AFMAN) 15–127, *Air Force Weather Qualification and Training*.
    d. Air Force Manual (AFMAN) 15–129, *Air and Space Weather Operations*.

72. (219) Which publication lists the thresholds for special (SPECI) weather criteria?
    a. Air Force Weather Agency (AFWA) Tech Note 98–002, *Meteorological Techniques*.
    b. Air Force Manual (AFMAN) 15–111, *Surface Weather Observations*.
    c. AFMAN 15–127, *Air Force Weather Qualification and Training*.
    d. AFMAN 15–129, *Air and Space Weather Operations*

73. (220) Recurring certification for Air Traffic Control (ATC) is accomplished by
    a. weather technicians.
    b. squadron training office.
    c. ATC Chief of Standards and Evaluations.
    d. Federal Aviation Administration (FAA) regional evaluator.

74. (220) Who task certifies Air Traffic Control (ATC) personnel on weather phenomena?
    a. Tower management.
    b. Weather technicians.
    c. Federal Aviation Agency (FAA) observers and forecasters.
    d. ATC technical training instructors.

75. (221) What is used to offset limitations of the basic weather watch (BWW)?
    a. Limited duty forecasting.
    b. Cooperative Weather Watch (CWW).
    c. Automated observation systems.
    d. Task certification of other personnel.

76. (221) All these personnel can contribute to the Cooperative Weather Watch (CWW) *except*
    a. postal service employees.
    b. Air traffic control (ATC).
    c. flightline personnel.
    d. security forces.

77. (221) What is the *main factor* limiting automated observation capability?
    a. Vertical visibility.
    b. Laser limitations.
    c. Field of view.
    d. Sensor range.

78. (222) Which is *not* a use of the forward area limited observing program (FALOP)?
    a. Intelligence preparation of the battlefield (IPB).
    b. Topographical mapping.
    c. Exploit the weather.
    d. Know the terrain.

Glossary of Terms, Abbreviations, and Acronyms

Terms

Air Expeditionary Forces (AEF)—An organizational structure composed of force packages of capabilities that provides warfighting combatant commanders (CCDR) with rapid and responsive aerospace power. AEFs are tailored to meet specific needs across the spectrum of response options and will deploy as aerospace expeditionary wings, groups, or squadrons. An AEF, by itself, is not a deployable or employable entity.

Air Force weather (AFW)—All Air Force activities which function together in a system to produce worldwide weather services for the Air Force, Army, unified commands, national programs, and other military and government agencies. It includes base and post weather stations; staff functions; centralized weather, climatology production facilities; and communications systems serving AFW.

allocation—Distribution of limited resources.

basic qualification (BQ)—Status used to depict in garrison qualification certification.

Career Field Education and Training Plan (CFETP)—Outline of career progression with training and certification record for all training line items.

characterization—Three step process of collecting, analyzing, and predicting the future state of the atmosphere.

Chairman of the Joint Chiefs of Staff (CJCS)—The Chairman of the staff that includes a Vice Chairman, Chief of Staff of the Army, Chief of Naval Operations, Chief of Staff of the Air Force, and Commandant of the Marine Corps.

Commander Air Force Forces (COMAFFOR)—Commander for all Air Force assets in the joint command.

Commander Army Forces (COMARFOR)—Commander for all Army assets in the joint command.

Combatant Command—A unified or specified command with a broad continuing mission under a single commander who is designated by the Secretary of Defense.

combat mission ready (CMR)—Status awarded to show deployment skills qualification.

combined—Between two or more forces or agencies of two or more allies.

contingency—An emergency involving military forces caused by natural disasters, terrorists, subversives, or by required military operations. Due to the uncertainty of the situation, contingencies require plans, rapid response, and special procedures to ensure the safety and readiness of personnel, installations, and equipment.

cooperative weather watch—Program using base agencies, ATC, and other units or personnel available to contribute to the weather awareness of the unit..

course of action (COA)—A plan or scheme adopted to accomplish a mission.

division—A level of command in the US Army that includes multiple battalions or brigades. Divisions are the basic unit of tactical maneuvers and are self sustaining.

doctrine—Fundamental principles by which military forces or elements thereof guide their

actions in support of national objectives. It is authoritative but requires judgment in application.

exploitation—Two step process of tailoring weather to a mission and integrating with the planners to allow a unit to tailor their products.

Forward Area Observing Program (FALOP)—Army intelligence operated weather observing program.

field operating agency (FOA)—A subdivision of the Air Force, directly subordinate to a Headquarters US Air Force functional manager. The mission of an FOA does not fit into the mission of any of the major commands (MAJCOM). An FOA performs field activities beyond the scope of any of the major commands. AFWA is a FOA reporting to the chief of staff, USAF, through the HQ USAF Directorate of Weather.

Flight Information Publication (FLIP)—Publication containing information for all the airfields in the US.

high performance waveform (HPW)—Secure **t**actical satellite based data communications system.

Individual Mobilization Augmentee (IMA)—Air Force Reserve member assigned to an active duty unit. Usually used to conduct garrison operations when most of unit is deployed.

infrastructure—A term generally applicable to all fixed and permanent installations, fabrications, and facilities for the support and control of military forces.

intelligence—The act of, or resulting product obtained by collecting, processing, integrating, analyzing, evaluating, and interpreting information.

interoperability—The ability of systems, units, or forces to provide services to and accept services from other systems, units, or forces and to use the services so exchanged to enable them to operate effectively together.

iridium—Satellite telephone used as a backup tactical communication device.

joint—Indicates activities, operations, organizations, and so forth, in which elements of more than one service of the same nation participate.

Joint Chiefs of Staff (JCS)—The Chairman, Vice Chairman, Chief of Staff of the Army, Chief of Naval Operations, Chief of Staff of the Air Force, and Commandant of the Marine Corps.

joint doctrine—Fundamental principles that guide the employment of forces of two or more services in coordinated action toward a common objective.

joint environment—Consists of forces from each military service and in some cases other government agencies.

Joint Force—A general term applied to a force composed of significant elements, assigned or attached, of the Army, the Navy or the Marine Corps, and the Air Force; or two or more of these services operating under a single commander authorized to exercise operational control.

Joint Forces Air Component Commander (JFACC)—Commander for all air assets in the joint command.

Joint Forces Commander—A general term applied to a combatant commander, subunified commander, or joint task force commander authorized to exercise combatant command (command authority) or operational control over a joint force.

Joint Forces Land Component Commander (JFLCC)—Commander for all Land assets in the joint command.

Joint Meteorological and Oceanographic Coordination Cell (JMCC)—subordinate unit to the JMCO that provides support to the JFC on a daily basis.

Joint Meteorological and Oceanographic Coordination Organization (JMCO)—A flexible, transportable, jointly supported collective of meteorological and oceanographic personnel and equipment formed to provide the joint task force commander, and joint force METOC officer with full meteorological and oceanographic services.

Joint Meteorological and Oceanographic Forecast Officer (JMO)—Officer designated to provide direct meteorological and oceanographic support to the joint task force commander.

Joint Operational Area Forecast (JOAF)—Official weather forecast of the operational area.

Joint Operational Planning and Execution System (JOPES)—Primary system for military operational planning and execution, including requests for forces.

Joint Operational Planning Process (JOPP)—Planning model to establish procedures for analyzing and developing a mission as well as comparing different courses of action to determine success.

joint team—Combinations of personnel from different services brought together as a team to accomplish a specific mission set.

Meteorological and Oceanographic (METOC)—Term used to convey all meteorological, oceanographic, and space environmental factors as provided by the services, support agencies and other sources

Meteorological Watch (METWATCH)—The concept of watching for changes in weather conditions.

military capability—The ability to achieve a specified wartime objective (win a war or battle, destroy a target set). It includes four major components: force structure, modernization, readiness, and sustainability.

METOC Forecast Center (MFC)—Navy or Air Force unit that specializes in characterization of the environment in their respective region.

METOC operations support community (MOSC)—A list of all units available to the SMO to utilize.

National Imagery and Mapping Agency (NIMA)—The DOD's source for maps, topography, and geography materials; headquartered at Bethesda, Maryland.

oceanography—The study of the sea, embracing and integrating all knowledge pertaining to the sea and its physical boundaries, the chemistry and physics of sea water, and marine biology.

operating instructions—Unit commanders guidance on policies from above the unit level.

principle—A comprehensive and fundamental law, doctrine, or assumption. (A doctrine is a generalization based on sufficient evidence to suggest that a given pattern of behavior will probably lead to the desired result. Doctrine is what is officially believed and taught to be the best way to conduct military affairs).

psychological operations—Planned operations to convey information and indicators that will influence an enemy's emotions, motives, objective reasoning, and ultimately their behavior.

reachback—The ability to use support elements outside if the operational theater.

readiness—The ability of forces, units, weapon systems, or equipment to deliver the outputs for which they were designed (includes the ability to deploy and employ without unacceptable delays).

reconnaissance—A mission to obtain, by visual observation or other methods, any information about enemy activities and resources. Missions are also conducted to obtain meteorological, hydrographic, or geographic characteristics of a particular area.

Senior Meteorological and Oceanographic Officer—Meteorological and oceanographic officer responsible for assisting the CINC and staff in developing and executing operational meteorological and oceanographic service concepts. Also called SMO.

Standardization and Evaluation Program for Weather Operations (SEPWO) Air Force Weather inspection program.

significant meteorological warning (SIGMET)—Warning or advisory of adverse weather conditions in an area or along a flight route.

Special Operations Forces (SOF)—Term used to describe any or all special operations forces.

space weather—A term used to describe the environment and other natural phenomena occurring above 50 kilometers altitude.

standard operating procedure (SOP)—Step by step guidance on how to do a process.

Staff Weather Officer (SWO)—A weather officer, qualified in forecasting, that commands a weather team. An SWO can be a lieutenant or a colonel depending on the Army unit supported. Some SWOs serve without a weather team as members of a meteorological and satellite sensing information (METOC) support level.

sustainment—The art and science of developing and using political, economical, psychological, and military forces as necessary during peace and war, to afford the maximum support to policies, to increase the probabilities and favorable consequences of victory and to lessen the chances of defeat.

tailored mission products—Mission specific products developed after obtaining mission details and battlefield factors.

targeting—The process of selecting targets.

tasking—Assigning responsibility and accountability for a military action to an allied force.

theater—An area outside of the United States that is the responsibility of a combatant commander.

Unified Command—A command with a broad continuing mission under a single

commander and composed of significant assigned components of two or more military departments. It is established by the President, through the Secretary of Defense with the advice and assistance of the Chairman of the Joint Chiefs of Staff-also called unified combatant command.

USSOCOM: A unique combination of a unified combatant command and unified support command with oversight of AFSOC, MARSOC, NAVSPECWARCOM and USASOC.

Abbreviations and Acronyms

AEF	Air Expeditionary Force(s)
AFCWC	Air Force Combat Weather Center
AFI	Air Force Instruction
AFIT	Air Force Institute of Technology
AFMAN	Air Force Manual
AFRC	Air Force Reserve Command
AFW	Air Force Weather
AFWA	Air Force Weather Agency
AFWKC	Air Force Weather Knowledge Center
AFWTL	Air Force Weather Technical Library
ANG	Air National Guard
AOC	Air Operations Center
AOR	area of responsibility
ART	Air expeditionary force unit type code Reporting Tool
ARTYMET	Artillery Meteorology
ATC	Air Traffic Control
ATO	Air Tasking Order(s)
AWC	Aviation Weather Center
C2	command and control
CBRN	chemical, biological, radiological, nuclear
CFETP	Career Field Education and Training Plan
CJCS	Chairman of the Joint Chiefs of Staff
CMR	Combat Mission Ready
COA	course of action
COMMAFFOR	Commander Air Force Forces
COMMARFOR	Commander Army Forces
CONUS	continental United States

CPC	Climate Prediction Center
CSSE	Combat Service Support Element
CT	continuation training
CWW	Cooperative Weather Watch
DDMA	Defense Distribution Mapping Agency
DOD	Department of Defense
DPG	Defense Planning Guidance
EMC	Environmental Modeling Center
FAA	Federal Aviation Administration
FALOP	Forward Area Limited Observation Program
FLIP	Flight Information Publications
FNMOC	Fleet Numerical Meteorology and Oceanography Center
FOA	Field Operating Agency
GCE	Ground Combat Element
GOS	Global Observing System
GTS	Global Telecommunication System
HF	high frequency
HIC	Hydrological Information Center
HPC	Hydrometeorological Prediction Center
HPW	high performance waveform
IG	Inspector General
IMA	Individual Mobilization Augmentee
IPB	Intelligence preparation of battlefield
IQT	Individual qualification training
ISR	intelligence, surveillance, and reconnaissance
J3	Joint Operations
J35	Joint Operations Plans
JAAWIN	Joint Air Force Army Weather Information Network
JFACC	Joint Forces Air Component Commander
JFC	Joint Force Commander
JFLCC	Joint Forces Land Component Commander
JIPB	Joint Intelligence Preparation of the Battlefield
JITT	just-in-time training
JMCC	Joint METOC Coordination Cell

JMCO	Joint METOC Coordination Organization
JMO	Joint METOC Officer
JOAF	Joint Operations Area Forecast
JOPES	Joint Operations Planning and Execution System
JOPP	Joint Operational Planning Process
JP	Joint Publication
JTF	Joint Task Force
JTWC	Joint Typhoon and Warning Center
LOCAL	Aviation Selected Local Weather Report
MAGTF	Marine Air-Ground Task Force
MAJCOM	major command
McIDAS	Man computer Interactive Data Access System
MEF	Mission Execution Forecast
METAR	Meteorological Aerodrome Report
METOC	Meteorological and Oceanographic
METWATCH	Meteorological Watch
MNFC	Multinational Force Commander
MOA	Memorandum of Agreement
MOSC	METOC Operations Support Community
NATO	North Atlantic Treaty Organization
N-AWIPS	National Advance Weather Interactive Processing System
NCDC	National Climatic Data Center
NCEP	National Center for Environmental Prediction
NESDIS	National Environmental Satellite, Data, and Information Service
NGA	National Geospatial-intelligence Agency
NHC	National Hurricane Center
NIMA	National Imagery and Mapping Agency
NMOC	Naval Meteorology and Oceanography Command
NOAA	National Oceanographic and Atmospheric Administration
NOO	Naval Oceanography Office
NORAD	North American Aerospace Defense Command
NOTAMS	Notices to Airman
NWS	National Weather Service
NWSTC	National Weather Service Training Center

OAR	Office of Oceanographic and Atmospheric Research
OI	Operating Instruction
OJT	on–the-job training
OPC	Ocean Prediction Center
OPORD	Operations Order
OPVER	operational verification
OWS	Operational Weather Squadron
PIREPS	Pilot Reports
PMSV	Pilot to Metro Service
RAPCON	Radar Approach Control
ROC	Radar Operations Center
SAR	Support Assistance Request
SEPWO	Standardization and Evaluation Program for Weather Operations
SIGMET	Significant Meteorological Warnings
SMO	Senior METOC Officer
SOF	Special Operations Forces
SOP	Standard Operating Procedure
SORTS	Status of Resource and Training System
SOWT	Special Operations Weather Team
SPC	Storm Prediction Center
SPECI	special observation
ST	special tactics
SWO	Staff Weather Officer
SWPC	Space Weather Prediction Center
TAFB	Tropical Analysis and Forecast Branch
TAFVER	Terminal Aerodrome Forecast Verification
TPC	Tropical Prediction Center
TSB	Technical Support Branch
UCI	Unit Compliance Inspection
UN	United Nations
USCENTCOM	United States Central Command
USEUCOM	United States European Command
USPACOM	United States Pacific Command
USSOCOM	United States Special Operations Command

USSOUTHCOM	United States Southern Command
USTRANSCOM	United States Transportation Command
UTC	unit type code
WARNVER	warning/advisory verification
WF	Weather Flight
WMO	World Meteorological Organization
WRS	Weather Reconnaissance Squadron
WSD	Weather Support Document
WSFO	Weather Service Forecast Office
WSI	Weather Support Instruction
WSP	Weather Support Plan(s)

Student Notes

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