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OF THE AIR FORCE**

AIR FORCE HANDBOOK 15-158

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Weather

ARMY WEATHER OPERATIONS



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This publication supports Air Force Policy Directive (AFPD) 15-1, *Weather Operations*; and Army Regulation (AR) 115-10/Air Force Instruction (AFI) 15-157 Interservice Publication (IP), *Weather Support and Services for the U.S. Army*. This handbook applies to the Regular Air Force, Air Force Reserve, and Air National Guard. It serves as a fundamental reference document for all staff weather officers assigned to support the Army and describes how to provide accurate, timely, relevant and consistent air and space environmental information. Refer recommended changes and questions about this publication to the Office of Primary Responsibility (OPR) using AF Form 847, *Recommendation for Change of Publication*; route AF Forms 847 from the field through the appropriate chain of command. Ensure all records created as a result of processes prescribed in this publication are maintained in accordance with AFI 33-322, *Records Management & Information Governance Program*, and are disposed of in accordance with the Air Force Records Disposition Schedule, which is located in the Air Force Records Information Management System. This publication may not be supplemented or further implemented/extended. The use of the name or mark of any specific manufacturer, commercial product, commodity, or service in this publication does not imply endorsement by the Air Force.

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Chapter 1

OVERVIEW

1.1. Introduction. This handbook describes how Air Force (AF) weather personnel enable commanders' situational understanding and decision making when the Army plans, prepares, executes and assesses operations. The term "weather", as utilized in this document, refers to terrestrial, aviation, space, and the electromagnetic environment. While intensive, this handbook is meant to be used to build foundational knowledge, and provide the resources and references required to gain a deeper understanding of Army operations. Staff Weather Officers (SWOs) should make every effort to educate themselves on the processes and procedures presented in this handbook by reading the joint, Air Force, and Army publications referenced. As a point of reference for this document, the G-Staff (division and above) designators are utilized throughout this document and can be considered interchangeable with the S-Staff (brigade and below) designator unless stated otherwise. Additional information on the different staffs can be found in Field Manual (FM) 6-0, *Commander and Staff Organization and Operations*.

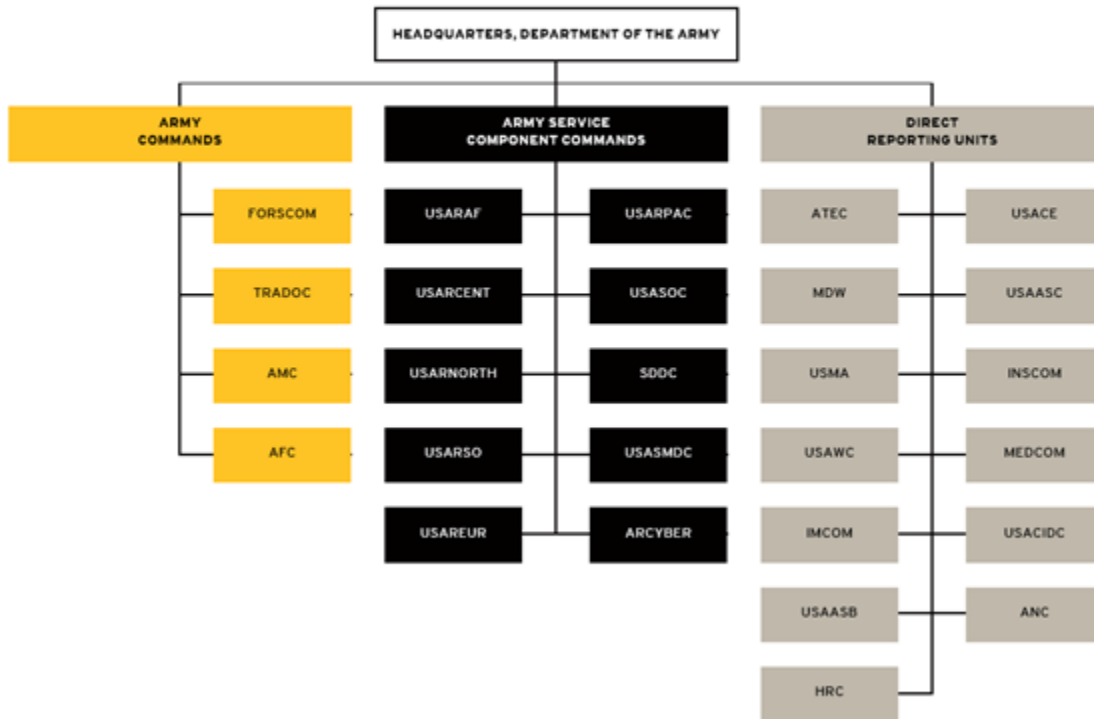
1.1.1. The U.S. Army fights centered on its six warfighting functions (command and control [C2], movement and maneuver, intelligence, fires, sustainment, and protection), which are the physical means commanders use to execute operations and conceptualize capabilities. Adverse weather effects degrade a commander's ability to synchronize and mass the effects of combat power at the decisive place and time to successfully compete, penetrate, disintegrate, and exploit U.S. adversaries.

1.1.2. In 2019, the Army began testing the concept of operations (CONOPS) for Multi-Domain Operations (MDO) as part of its current Unified Land Operations (ULO) operational concept. MDO places further emphasis on the joint force fight across all domains and requires AF weather personnel to integrate accurate, timely, and relevant weather effects information into intelligence and operations processes to enable Army commanders to achieve an asymmetric advantage by exploiting effects advantageous to the Army and simultaneously disadvantageous to the adversary.

1.2. Army Commands (ACOMs). The Army is broken out into three main organizational units: ACOMs, Army Service Component Commands (ASCCs), and Direct Reporting Units. **Figure 1.1** Provides a visual representation of this structure. Additional, up-to-date, information on the Army command structure can be found here: <https://www.army.mil/info/organization/> with authoritative mission descriptions located in AR 10-87, *Army Commands, Army Service Component Commands, Direct Reporting Units*. The following subsections in 1.2. are taken directly from the army.mil website as of October 2020.

Figure 1.1. Army Command Structure.

ARMY COMMAND STRUCTURE



1.2.1. U.S. Army Forces Command (FORSCOM) is located at Fort Bragg, North Carolina and is assigned a team of permanent SWOs. FORSCOM trains, mobilizes, deploys, sustains, transforms, and reconstitutes assigned conventional forces, providing relevant and ready land power to combatant commanders (CCDRS).

1.2.2. U.S. Army Training and Doctrine Command (TRADOC) is located at Fort Eustis, Virginia and is assigned a permanent SWO. TRADOC recruits, trains, and educates the Army's Soldiers; develops leaders; supports training in units; develops doctrine; establishes standards; and builds the future Army.

1.2.3. U.S. Army Materiel Command (AMC) is located at Redstone Arsenal, Alabama and is assigned a permanent SWO. AMC provides superior technology, acquisition support and logistics to ensure dominant land force capability for Soldiers, the United States, and our Allies.

1.2.4. U.S. Army Futures Command (AFC) is located in Austin, Texas and is assigned a permanent SWO. AFC will modernize the Army for the future, integrate the future operational environment, develop and deliver future force requirements, design future force organizations, and deliver materiel capabilities.

1.2.5. ASCCs. There are ten ASCCs that roughly correspond to the AF's geographic and functional commands. These commands are: U.S. Army Africa (USARAF), U.S. Army Central (USARCENT), U.S. Army North (USARNORTH), U.S. Army South (USARSOUTH), U.S. Army Pacific (USARPAC), U.S. Army Europe (USAREUR), U.S. Army Special Operations Command (USASOC), Military Surface Deployment and Distribution Command (SDDC), U.S. Army Space and Missile Defense Command/Army Forces Strategic Command (USASMDC/ARSTRAT), and U.S. Army Cyber Command (USARCYBER). Currently, SWOs are only assigned to support the geographical ASCCs.

1.2.6. Additionally, the following organizations have dedicated SWOs assigned: U.S. Army Intelligence Center of Excellence under TRADOC, which manages the Army Weather Support Course, the Combined Arms Center (CAC) under TRADOC, U.S. Army Installation Management Command (IMCOM) under AMC, and the Headquarters (HQ) U.S. Army Corps of Engineers (USACE).

1.3. Army Staffs. The commander's rank determines whether the staff is a G-Staff (commander is a general officer) or S-Staff. The coordinating staff consists of a G-1, G-2, G-3, G-4, G-5, G-6, G-8, G-9, Chief of Fires, Chief of Protection, and Chief of Sustainment. The last three positions are authorized only at the division and corps levels and coordinate their warfighting functions through their functional cells within the main command post. The Chief of Staff or the executive officer is responsible for directing the efforts of the entire staff for the commander. More information on staff roles and responsibilities can be found in FM 6-0, *Commander and Staff Organization and Operations*.

1.3.1. Assistant Chief of Staff, G-1 (S-1), Personnel. Handles all matters concerning human resources support (military and civilian) and also serves as the senior adjutant general officer in the command. Responsibilities include manning, personnel services, personnel support, and headquarters management. This staff also prepares portions of Annex F (Sustainment) to the operation order (OPORD) or operation plan (OPLAN). Additionally, this office works with the SWO to process all Army medals and decorations awarded to Airmen. The award of an Army medal or decoration can be initiated by either the SWO or the supported unit. Furthermore, Soldiers are eligible to receive an Air Force medal or recognition if they meet the criteria in accordance with AF Manual (AFMAN) 36-2806, *Awards and Memorialization Program*.

1.3.2. Assistant Chief of Staff, G-2 (S-2), Intelligence. Responsible for the intelligence warfighting function as well as gathering and analyzing information on the enemy, terrain, weather, and civil considerations. This staff prepares Annex B (Intelligence) and assists the G-3 in preparation of Annex L (Information Collection) in all OPORDs and OPLANs. The G-2 works with the G-3 to help the commander coordinate, integrate, and supervise the execution of information collection plans and operations. The SWO works closely with this staff to help in all functions and reports through the G-2.

1.3.3. Assistant Chief of Staff, G-3 (S-3), Operations. Responsible for the movement and maneuver warfighting function and all matters concerning training, operations and plans, and force development and modernization. Additionally, this staff is responsible for synchronizing the operation (through time, space, and purpose) as a whole for the commander including authenticating all plans and orders for the commander. The SWO works closely with this staff to support current and future operations and planning.

1.3.4. Assistant Chief of Staff, G-4 (S-4), Logistics. Responsible for sustainment plans and operations, supply, maintenance, transportation, services, and operational contract support. This staff prepares Annex F (Sustainment), Annex P (Host-Nation Support), and Annex W (Operational Contract Support) to the OPORD and OPLAN. The SWO works closely with this staff for load planning (equipment and personnel), transportation, facilities, modified table of organization and equipment (MTOE) issue, and maintenance, among other logistics.

1.3.5. Assistant Chief of Staff G-5, Plans. Responsible for all mid- to long-range planning at the division echelon and higher. Works with the G-3 to prepare Annex A (Task Organization), Annex C (Operations), and Annex M (Assessment) of the OPORDs and OPLANs. The G-5 is also responsible for developing coordinating directive products such as memorandums of agreement. The SWO works closely with the G-5 to provide climatology and predictive services to plans.

1.3.6. Assistant Chief of Staff, G-6 (S-6), Signal. Responsible for all network operations, information services, and spectrum management. This office prepares Annex H (Signal) and participates in preparation of Appendix 12 (Cyberspace Electromagnetic Activities) and Annex C (Operations) of all OPORDs and OPLANs. The SWO needs to coordinate closely with this staff to ensure network connectivity of all systems (e.g., laptops, phones, required network access, radios, Iridium[®] high frequency (HF), ultra-high frequency (UHF), imaging, airfield sensors, etc.), bandwidth, workstation set-up, and allocation of bands for transmission and receipt of data. This office also requires all Army (not AF) Authority to Connect/Operate (ATC/ATO) documentation for weather programs and equipment (e.g., Target Acquisition Weather Software, Mark IVB, Automated Surface Observing System, Joint Environmental Toolkit, etc.). This documentation can be provided by the respective Major Command (MAJCOM), if not on hand locally. Furthermore; in accordance with DoDI 8500.01, *Cybersecurity*; the G-6 should recognize and accept AF programs and equipment ATCs/ATOs for use on Army networks and operations.

1.3.7. Assistant Chief of Staff, G-8, Financial Management. Responsible for all financial management and located at division and higher echelons. This staff prepares part of Annex F (Sustainment) of all OPORDs and OPLANs. The SWO works closely with the G-8 to review and establish a unit budget, establish and manage an annual financial plan, submit for unfunded or unplanned for requests, and coordinate any other financial actions. Typically, Army funding for the SWO is usually added to the G-2 budget, but may vary depending on the unit.

1.3.8. Assistant Chief of Staff, G-9 (S-9), Civil Affairs Operations. Responsible for all matters concerning civil affairs.

1.3.9. Chief of Fires or Fires Support Officer. Responsible for the fires warfighting function at the division echelon and above through the Theater Army. At the brigade level and below, they serve as a special staff officer for fires and are responsible for coordinating with the air and missile defense officer and the air liaison officer (ALO). This staff is responsible for preparing Annex D (Fires) of the OPORDs or OPLANs. The SWO integrates with this staff and the ALO in order to provide predictive weather effects and recommendations for the scheme of fires, target selection and attack guidance (usually conducted during the targeting working group).

1.3.10. Chief of Protection. Responsible for the protection warfighting function at the division echelon and above through the theater army. Coordinates for chemical, biological, radiological, nuclear, and explosive (CBRNE), defense, and personnel recovery among others. The SWO integrates with this staff to provide downwind messaging and predictive weather effects in support of defensive and offensive operations.

1.3.11. Special Staff. In addition to the coordinating staffs, there are several special staff positions of which the SWO is one. These positions have varying degrees of interaction with the SWO. In particular, the SWO should make every effort to establish a good working relationship with the following special staff positions (at minimum): air and missile defense, ALO, aviation officer, CBRN officer, electronic warfare officer, engineer officer, force management officer foreign disclosure officer (FDO), human terrain teams, information operations office, PR officer, space operations officer, and the transportation officer.

1.3.12. Space Support Element (SSE). Space support is called out separately here due to the increasing priority put on gaining space situational awareness (SSA) and understanding the space environment. SSA may also be referred to as space domain awareness. Army space operations are governed by FM 3-14, *Army Space Operations*, and are rapidly evolving with the introduction of the new Multi-Domain Task Force and Intelligence, Information, Cyber, Electronic Warfare and Space units. In general, Army space operations are built on the foundation of SSA which SWOs directly contribute to through providing an understanding of the space environment (current and predicted) by leveraging the 2d Weather Squadron's Space Weather Operations Center's (Space WOC) products. SWOs integrate space weather intelligence into intelligence preparation of the battlefield (IPB) and the military decision making process (MDMP) by working closely with the SSE and space operations officers assigned at the division and higher echelons. The SSE is assigned to the G-3 (resides within the movement and maneuver cell of current operations [CUOPS] at the division) and serves as the commander's primary advisor on space operations and is responsible for developing the Annex N (Space Operations) of base orders. The senior space operations officer may also be designated as the Chief of Special Technical Operations. The corps SSE is the principal integrator for space capabilities in support of ULO.

Chapter 2

BASIC OPERATIONAL CONCEPTS AND ORGANIZATION OF AIR FORCE WEATHER SUPPORT TO THE ARMY

2.1. Combat Weather Squadron. The combat weather squadron (CWS) is the primary headquarters echelon to provide direct and general weather operations in support of Army forces. The CWS is normally aligned under an air support operations group, which may be assigned to an air ground operations wing under a numbered Air Force. In garrison, the CWS is located on installations with an ASCC or corps echelon headquarters. Furthermore, the CWS provides command and control of subordinate detachments (dets) and operating locations that are co-located with other directly supported Army force echelons. These dets and OLs are normally geographically separated from the CWS.

2.1.1. CWS personnel are trained in basic Soldier skills to deploy and operate with Army force echelons across the range of military operations. These Airmen are trained and equipped to operate for extended periods in austere conditions without traditional airbase logistical support. The AF senior weather officer at each Army echelon is traditionally referred to as the SWO. However, the term SWO, is also used by the Army to identify any member of the staff weather office, regardless of rank. In accordance with AR 115-10/AFI 15-157 (IP), the SWO is designated a special staff officer and coordinates activities under the staff supervision of the Assistant Chief of Staff, G-2, or the coordinating staff officer. For additional information on the responsibilities of a staff see, chapter 2 of FM 6-0.

2.1.2. SWOs integrate meteorological and space weather support into the Army's mission from the ASCC-level down to the brigade combat team (BCT) and aviation units down to the battalion-level within conventional Regular Army, Army National Guard (ARNG), and Army Reserve. Manpower to provide this support is currently earned based off the AF War Mobilization Plan, Volume 1, *Weather Supplement (WMP-1)*.

2.1.3. The primary mission of a SWO is to integrate environmental intelligence into the decision cycle to mitigate the effects of weather on friendly operations while exploiting the enemy's vulnerabilities. In addition, SWOs establish and maintain weather-reporting networks within their respective operational areas for use during operational planning and execution. These observation networks combined with joint and coalition networks make up the theater meteorological and oceanographic (METOC) collection plan. SWOs apply this information to update predictive weather effects assessments in support of commanders' situational understanding and decision-making. Predictive weather effects assessments can be presented in various formats, one such being a mission execution forecast (MEF).

2.1.4. Regular AF weather personnel receive Army-specific mission readiness/combat mission readiness (MR/CMR) training upon their initial assignment, and recurring training for the duration of their time at an Army weather support unit in accordance with AFI 15-127, *Weather Training*. Air National Guard (ANG) and Air Force Reserve personnel receive this training upon initial assignment to an Army support unit type code (UTC). SWOs should study and be able to apply Army doctrine to all contingencies and operations. This enables more effective integration of weather effects information and knowledge into all facets of the Army's intelligence and operations processes. Listed below are the minimum core Army documents that should be studied:

2.1.4.1. AR 5-25, *Army Weather Functional Activities*, October 2016

2.1.4.2. AR 115-10/AFI 15-157 (IP), *Weather Support and Services for the U.S. Army*, December 2018

2.1.4.3. Army Techniques Publication (ATP) 2-01.3, *Intelligence Preparation of the Battlefield*, March 2019

2.1.4.4. Army Doctrine Publication (ADP) 2-0, *Intelligence*, September 2018

2.1.4.5. ADP 3-0, *Operations*, October 2017

2.1.4.6. ADP 5-0, *The Operations Process*, May 2012

2.1.4.7. FM 2-0, *Intelligence*, July 2018

2.1.4.8. FM 3-0, *Operations*, October 2017

2.1.4.9. FM 3-14, *Army Space Operations*, October 2019

2.1.4.10. FM 6-0, *Commander and Staff Organization and Operations*, May 2014

2.1.4.11. TRADOC Pamphlet (TP) 525-3-1, *The U.S. Army in Multi-Domain Operations 2028*, December 2018

2.1.5. The following websites are useful in accessing reference material, forms and publications:

2.1.5.1. Army Publishing Directorate: <https://armypubs.army.mil/default.aspx>

2.1.5.2. Air Force E-Publishing: <https://www.e-publishing.af.mil/>

2.1.5.3. Chairman Joint Chiefs of Staff (CJCS) Directives Library: <https://www.jcs.mil/Library.aspx>

2.1.5.4. Joint Doctrine Publications: <https://www.jcs.mil/Doctrine/Joint-Doctrine-Pubs/>

2.1.5.5. TRADOC Publications: <https://adminpubs.tradoc.army.mil/index.html>

2.1.6. Some SWOs receive special training and equipment to support Army echelons tasked to conduct forcible entry operations (e.g., airborne and air assault) as part of their immediate response force (this may also be referred to as the global response force in some publications as the nomenclature changed mid-2019) or regionally aligned force missions. Some special training opportunities are available to SWOs to include, but are not limited to, Pathfinder, Air Assault, Airborne, pre-Ranger, Desert Warrior, and other local training opportunities.

2.1.7. SWOs may find similarities to AF flying squadron support duties when directly supporting Army aviation units. Aviation mission integration support takes place in garrison and in deployed environments and consists of: Pilot-to-Metro Service (PMSV), flight weather briefings, and planning support. However, it is important to note that there is a significant difference in integrating weather support into Army and AF aviation operations. For example, the Army requires a focus on weather effects much closer to the surface than the AF. Additionally, the Army executes a unique employment of Unmanned Aerial Systems (UAS) in remote locations with personnel much less experienced with weather effects than AF personnel.

2.2. Air National Guard Weather Flight. The ANG Weather Program is organized into weather flights (WFs) with no higher (weather) echelons within each state/territory. Additionally, the WFs may not be co-located in the same state/territory as their habitually aligned ARNG unit(s). At the discretion of their state/territory, the WFs are assigned under various ANG organizations and managed day-to-day by one, funded, fulltime, enlisted member. WFs may habitually align to the ARNG units including divisions, BCTs, security force assistance brigades (SFABs), military intelligence brigades (MIBs), combat aviation brigades (CABs), and aviation battalions. The chain of command depends on the status of its members. When mobilized under Title 10 U.S. Code, the chain of command is federal, with the President as Commander in Chief; and when mobilized under Title 32 U.S. Code or State Active Duty, the chain of command is within the state, with the governor as Commander in Chief. **NOTE:**ANG WFs may also habitually align to MDS Strike Fighter Squadrons creating prioritization and training challenges.

2.2.1. Command and control of ANG units can complicate their participation in active duty exercises and deployments. ANG personnel are allocated 15 funded Title 32 annual training days per year. Additional staff coordination and approval are required for training events longer than 15 days. Exercises longer than 15 days may require an allocation of Title 10 Military Personnel Appropriation (MPA) resources (days and dollars). These Title 10 resources are obtained through a gaining MAJCOM and should be identified and requested as part of their annual processes. Therefore, when coordinating for ANG weather personnel participation, maximum lead-time is essential.

2.2.2. When tasked to mobilize, ARNG units first go through mobilization and complete operational readiness training and are typically activated long before their habitually aligned ANG WFs. Aviation units and divisions are trained at various locations while BCTs are trained at one of six Continental United States (CONUS) installations depending on their geographic location. As with active duty deployments, ANG SWOs are responsible to provide or arrange for weather support throughout the mobilization, deployment, and demobilization process when appropriate Title 10 resources (MPA days and dollars) are provided and manning is available. The gaining-MAJCOM programs for the necessary T10 resources so the ANG SWOs can provide this vital support. Early coordination through the National Guard Bureau (NGB) weather division is essential to allow adequate time to ensure additional manpower not associated with the actual deployment is postured ISO the ARNG Pre-Deployment training.

2.2.3. It could take up to one year to properly plan and coordinate weather support for any ARNG deployment to any of the Army Combat Training Centers and/or Warfighters. The FORSCOM SWO and the CAC SWO provide a list of scheduled ARNG rotations to the NGB weather staff for sourcing. The NGB weather staff then sources and coordinates between the ANG WF, NGB, and Air Combat Command (ACC) to ensure support can be provided when funding and manpower is available. The state governor consents to a voluntary mobilization of an ANG member under Title 10 U.S. Code 12301(d). No such consent is required under a full mobilization under 10 USC 12301(a); partial mobilization under 10 USC 12302; or pre-planned missions under 10 USC 12304(b). This further emphasizes the need for long lead-time requests.

2.2.4. Coordinating ANG weather support to overseas contingencies requires at least one year to properly plan, source, and coordinate to meet involuntary mobilization timelines in accordance with AFI 10-401, *Air Force Operations Planning and Execution*; AFI 10-402, *Mobilization Planning*; and the Agile ARC Mobilization Process. An ARNG activation does not trigger an ANG weather activation. ACC, as the gaining MAJCOM, provides notification through the NGB weather staff in order to source ANG weather personnel through a formalized and time-sensitive process to mobilize to active duty under Title 10, U.S. Code. ACC then coordinates mobilization, man-days, funding, transportation, etc. between the NGB weather staff, NGB/A3X, and the ANG WF(s) providing personnel.

2.2.5. To the maximum extent possible, ANG weather personnel are utilized to support ARNG operations, exercises, deployments, and other activities. Early and often communication with ACC is required in order to ensure this happens. Of note, the ANG is not usually notified in time of overseas CONUS exercises. Thus, the Regular AF should submit requirements in the Program Objective Memorandum (POM) for Title 10 resources to fund ANG support and notify the ANG as soon as possible when planning begins.

2.3. Air Force Reserve Weather Personnel. The AF Reserve does not have weather units assigned to provide direct weather support to Army Reserve forces. AF Reserve Individual Mobilization Augmentee weather personnel support Regular AF Army weather support units to backfill specific positions when their active duty counterparts are deployed or otherwise not available to execute their duties. The 3 CWS and 18 CWS are resourced to the two Army Reserve CABs for pre-deployment training exercises, training center rotations, and for deployed support. Although no Reserve weather forces are dedicated specifically to Army support, Reservists of any status may volunteer to support active component units via MPA funds. This is strictly voluntary participation for Reservists and does not impact, or reset, their mobilization-to-dwell ratio. Under this status, the active component unit gains operational control (OPCON) and tactical control (TACON) of the reservist, while the AF Reserve retains administrative control (ADCON). Units should contact their MAJCOM to secure funding and then work with HQ AF Reserve Command Weather to request personnel.

2.4. Presentation of Weather Forces and Command Relationships. Although embedded within Army force echelons, weather capabilities supporting conventional Army operations deploy as part of an air expeditionary task force (AETF).

2.4.1. The Commander, Air Force Forces (COMAFFOR) exercises OPCON, ADCON, and TACON of all assigned and attached weather personnel deployed to a theater unless otherwise directed by the appropriate authority consistent with joint publications. TACON of AF personnel and equipment may be delegated to the supported Army commander when appropriate. Definitions can be found in the Terms section of [Attachment 1](#) in this publication and in the Office of the Chairman of the Joint Chiefs of Staff, “DoD Dictionary of Military and Associated Terms”. Upon assignment to a unit, SWOs should engage with their leadership to learn the proper command authorities and relationships of their unit.

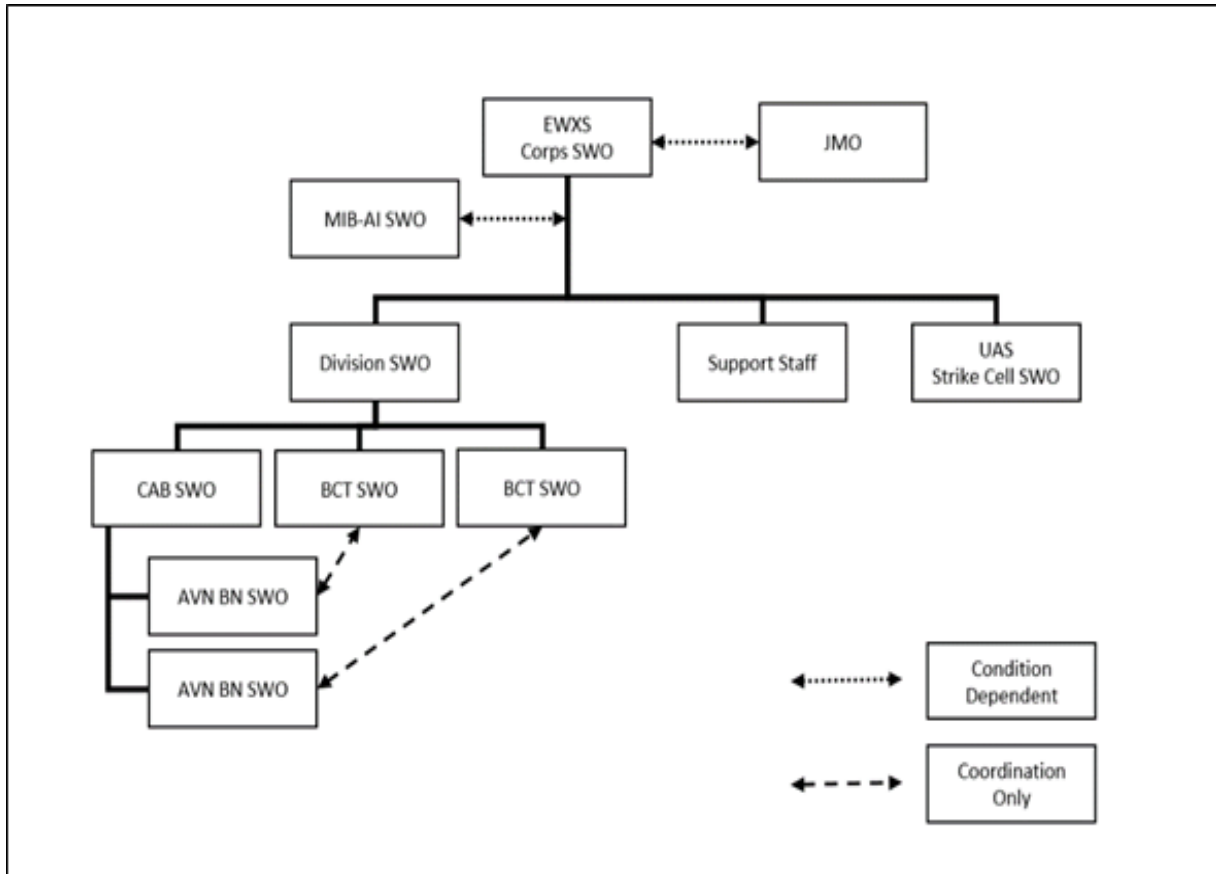
2.4.2. The senior AF weather representative to the COMAFFOR is designated lead of the COMAFFOR weather team. The COMAFFOR weather team monitors and coordinates AF weather operations in theater, including those supporting conventional ground-based forces, and advises the COMAFFOR A-staff on all matters related to employing AF weather personnel and equipment. The Army Forces (ARFOR) SWO should work with the ARFOR staff (G-3/5) to submit Army capability requests to the Joint Force Commander (JFC). The ARFOR SWO should maintain communications with the Air Force Forces (AFFOR) weather team when these requests emerge as the AFFOR needs to maintain oversight of all AF weather capabilities within the Area of Responsibility (AOR).

2.4.3. Once a Joint Task Force (JTF) is designated for an operation, the JFC organizes the staff and identifies requirements. One of those requirements is a joint METOC officer (JMO) who is responsible for management of METOC support within subordinate joint force units and for coordinating external support with other services/service components. Enclosure B to Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3810.01F and Joint Publication (JP 3-59, *Meteorological and Oceanographic Operations* outline the duties and responsibilities of personnel in joint headquarters positions. Initially, ASCC, corps, and division SWOs should expect to potentially fill this position if the headquarters they support becomes the core of the JTF. JMOs in this position should ensure the weather officer position is identified in the JTF headquarters’ joint manning document to ensure a rotational replacement is requested. Additionally, these echelon SWOs should also be prepared to be the joint forces land component commander (JFLCC) SWO or dual hatted as both the JMO and JFLCC SWO. The JFLCC SWO serves as a component under the JTF (if not dual-hatted) and would work through the JMO for joint METOC requirements. Ideally, SWO designations mirror the components command relationship with the JFC. However, dual hatting should be avoided whenever possible, as each of these roles are full-time positions if executed properly.

2.4.4. Weather personnel deployed to support conventional Army operations are organized into dets or OLs attached to an expeditionary air support operations group (EASOG) or an expeditionary weather squadron (EWXS) if there is sufficient number of forces to warrant an independent squadron. These expeditionary weather elements are mostly comprised of CMR SWOs sourced from CWSs located on Army installations throughout the world. The EASOG and EWXS are subordinate to AETF. Per AR 115-10/AFI 15-157, weather forces deploy with their habitually aligned Army units to the maximum extent possible, with exception of airfield services, which may be sourced from non-Army support weather units. When the operation planning process begins, SWOs should capture details pertinent to weather operations and communicate with their AF higher headquarters (HHQ) and/or MAJCOM-level weather staff via appropriately classified means to help organize and plan support for a potential execution order (EXORD) if required.

2.4.5. The EWXS commander organizes the squadron into forward-deployed dets and/or OLs in support of Army echelons. When establishing a EWXS, support personnel should be included in the organization. Support personnel include logistics, administrative, maintenance, and first sergeant Air Force Specialty Codes in addition to a director of operations and superintendent depicted as the Support Staff block in [Figure 2.1](#)

Figure 2.1. Notional EWXS Organizational Chart.



Chapter 3

ARMY AND AIR FORCE RESOURCES FOR AIR FORCE WEATHER UNITS AND WEATHER SUPPORT REQUIREMENTS

3.1. Army Weather Support Resources

3.1.1. Upon initiation of planning for joint operations, the CCDR usually designates a lead METOC production unit, which provides METOC support to the JTF. Though guided by doctrine, the process by which a unit is designated may differ between combatant commands as each CCDR may execute operations pre-, within, and post- conflict differently. The lead METOC production unit is normally designated from existing service METOC production units/centers and is a reach back organization that does not deploy to the joint operations area. Because the lead METOC production unit may not have all the forecast capabilities required to support the JTF, there may be cases where an additional supporting production unit is also designated. The lead METOC production unit coordinates support requirements with the JMO and produces a joint operations area forecast and other METOC products as required by the supported joint force and staffs.

3.1.2. The command relationship between the JTF and the lead METOC production unit is typically direct support. When an operational weather squadron (OWS) is designated as a lead METOC production unit, it should be identified in Annex H of a joint OPLAN, and/or in Tab B of Annex B (Intelligence) for Army OPLANS and OPORDS per FM 6-0. Additional information can be found in JP 3-59 and enclosure B to CJCSI 3810.01F.

3.1.3. Leveraging weather information from an OWS or any other weather squadron (WS) within 1st and 2nd Weather Groups via reach back is understood and discussed in AFI 15-128, *Air Force Weather Force Structure*.

3.1.4. A listing of Air Force Weather organizations and their contact information can be found in the Air Force Weather Directory or the almanac version of Thor's Notice To Airmen, both accessible from the following link: <https://org2.eis.af.mil/sites/12594/A3W/Pages/Home.aspx>.

3.2. Army Organizational Equipment for Air Force Weather Units

3.2.1. Army Equipping Concept. The Army reviews and updates equipment and personnel requirements at each echelon (and to some extent by functional capability) on a regular basis. The consolidated requirements document that ensures equal distribution across the echelon is known as the basis of issue plan. It is used by the Headquarters Department of the Army (HQDA) to standardize a unit's table of organization and equipment (TOE). Per AR 71-32, *Force Development and Documentation Consolidated Policies*, the TOE is a document that prescribes the capabilities, organizational structure, and minimum mission essential wartime requirements (both personnel and equipment) necessary for a military unit to accomplish its doctrinal mission. A MTOE is the authorization document that lists those items identified as

wartime requirements for a particular unit/mission. This document is broken into paragraphs, one for each subordinate unit. In accordance with AR 115-10/AFI 15-157 (IP), the Army programs for and provides a number of capabilities (including equipment) and services to Army weather support operations. Unit and personal equipment are normally identified in the “Staff Weather Office” or “USAF Weather Team” paragraph of a unit’s MTOE.

3.2.2. Staff Weather Office MTOE. Each unit is authorized MTOE items based on the Army echelon(s) supported. Units may hand receipt items to keep at the unit location on a long-term basis or check out items from the Army as needed. Leaders need to weigh advantages (availability) and disadvantages (storage, maintenance, accountability), as well as Army unit desires, to decide the best course of action. Information on a unit’s MTOE may be found on the Army’s Force Management System Website (FMSWeb) which can be accessed at the following link: <https://fmsweb.fms.army.mil/unprotected/splash/welcome.aspx>. Contact your squadron headquarters, TRADOC, or FORSCOM SWO if assistance using FMSWeb is required.

3.2.2.1. Army Equipment Requirement Changes. SWO MTOEs are standardized by individual unit mission and type. The MTOE is based on the TOE, which is standardized by echelon. When the MTOE list of equipment needs to be changed, SWOs should work with their aligned unit to get it updated. Additionally, CWS commanders identify requested changes (addition and removal) in writing to the MAJCOM for staffing to the TRADOC SWO for situational awareness as this may drive changes to the TOE. MAJCOMS, ASCC SWOs, and commanders are encouraged to contact HQDA G-2 SWO and the TRADOC SWO for assistance with any issues.

3.2.3. Army Equipment Management. Army provided unit and/or personal equipment requirements are issued by the Army unit G-4 or post issuing facility (often called the Central Issue Facility). AF commanders identify the equipment requirement in writing (memorandum for record) which is then approved by the G-4 or issuing facility. AF weather personnel should sign a hand-receipt for all issued equipment. This equipment should be tracked and maintained in proper working order so it can be returned when the requirement no longer exists. Army G-4 and AF equipment managers should require periodic checks on hand receipted items. Items that are unaccounted for, lost, or damaged generally result in an Army investigation initiated through the G-4. Findings are referred to the AF weather unit chain of command. As a function of ADCON, AF commanders have the authority to decide remedies (if any) according to the Uniform Code of Military Justice and applicable administrative authorities. Additionally, many Army units require a police report, in lieu of a commander’s memorandum, for any gear that is lost in the field (i.e. field loss) in order to mitigate or relieve the financial burden of replacement on the Airman.

3.2.4. Army Intelligence Program of Record (POR). The current Army intelligence POR is the Distributed Common Ground Station-Army (DCGS-A). Identified on the MTOE as AN/TYQ-93(V), this system is designed to enable SWOs and Army personnel to access and upload weather information onto an Army tactical intelligence network. SWOs should receive training on this system and its capabilities. For classification reasons, DCGS-A is normally located on the intelligence network and not the operations network in Tactical Operations Center (TOC) network design. The location of the DCGS-A machine may require SWOs to perform additional pre-setup actions with respect to security/access with the G-2 before deploying to the field.

3.3. Air Force Organizational Equipment for Army Weather Support Units

3.3.1. Air Force Weather Equipping Concept. Each weather unit supporting the Army manages an AF equipment account for AF-owned equipment. Generally, these items are listed on the unit's equipment custodian account & custodian inventory report and managed in the Defense property Accountability System by the nearest AF base's Logistics Readiness Squadron. Required hands-on maintenance for this equipment is generally performed by the nearest AF base's Radar, Airfield and Weather Systems section or by the using unit. Units responsible for AF-owned equipment receive funds from Headquarters Air Force to maintain the equipment.

3.3.2. Equipment Status. The MAJCOM weather functional staff maintains status of all AF equipment. Changes to unit equipment status to fully mission capable (FMC), partially mission capable, or non-mission capable should be reported to the appropriate MAJCOM point of contact as soon as possible following local procedures.

3.3.3. Equipment Deployment. Deployable weather equipment (generally a TMQ-53, tactical meteorological observation system [TMOS]) is assigned and deployed with team UTCs designated by HQ USAF/A3W. It is the assigned unit's responsibility to conduct a thorough operations check and ensure the equipment is FMC before shipment in support of the assigned team UTC. The ability to deploy non UTC-aligned TMOS equipment on a rare case-by-case remains. If this occurs, the parent MAJCOM should contact the owning unit and provide guidance on shipment. It is the unit's responsibility to conduct a thorough operations check and ensure the equipment is FMC before shipment. Once shipped, the losing unit should contact their MAJCOM for instructions on placing the equipment in deployed status, or removing from all equipment lists and showing the requirement for replacement.

3.3.4. Equipment Redeployment. Depending on location and operational status, the original piece of deployed equipment may or may not return to home station. Weather units should only be concerned that a FMC piece of equipment is made available to fill the previously vacated requirement and that the unit equipment account is updated. Typically, though, deployable weather equipment redeploys with its aligned UTC. In the even that this does not happen, the unit should contact their MAJCOM to request replacement equipment.

3.4. Army Weather Support Requirements. The term "weather requirement" can have multiple meanings to the AF weather community. This is why it is important to understand what kind of weather requirement a unit has before staffing it to HHQ. Support that requires additional equipment, manpower or funding may be more difficult to acquire than those that require weather data, products, or services within current capabilities.

3.4.1. Army Weather Support Data, Products and Services Requirements. Requirements for weather support data, products, and services should be viewed as requests. If the request is outside of the aligned SWOs capabilities, it should be submitted in accordance with AFMAN 15-129, *Air and Space Weather Operations* via the Support Assistance Request (SAR). Requirements involving a change in a software or hardware baseline of an existing system (e.g., materiel changes, program/equipment capability) should be submitted in accordance with MAJCOM guidelines and policy. These requests should be submitted by the SWO if possible to minimize confusion between Army and AF terminology.

3.4.2. Army Funding and Supply Requirements. CWSs, dets, and OLs receive funding and supplies from the Army unit they support. Weather commanders should foster a productive working relationship with Army unit Headquarters, Headquarters Company or Headquarters, Headquarters Battalion to receive essential funds and supplies. Additional Army responsibilities are outlined in AR 115-10/AFI 15-157 (IP) and AR 5-25.

3.4.3. Army Weather Sensor Requirement. When an Army garrison identifies a weather sensing requirement, the AF weather unit should work with that Army staff to state the requirement in a memorandum to be coordinated up the Army chain of command to HQDA G-3/5/7 staff and DCS, G-2 staff. This should then be coordinated with HQ AF weather staff (A3W) for adjudication. This process is found in the AR 115-10/AFI 15-157 (IP).

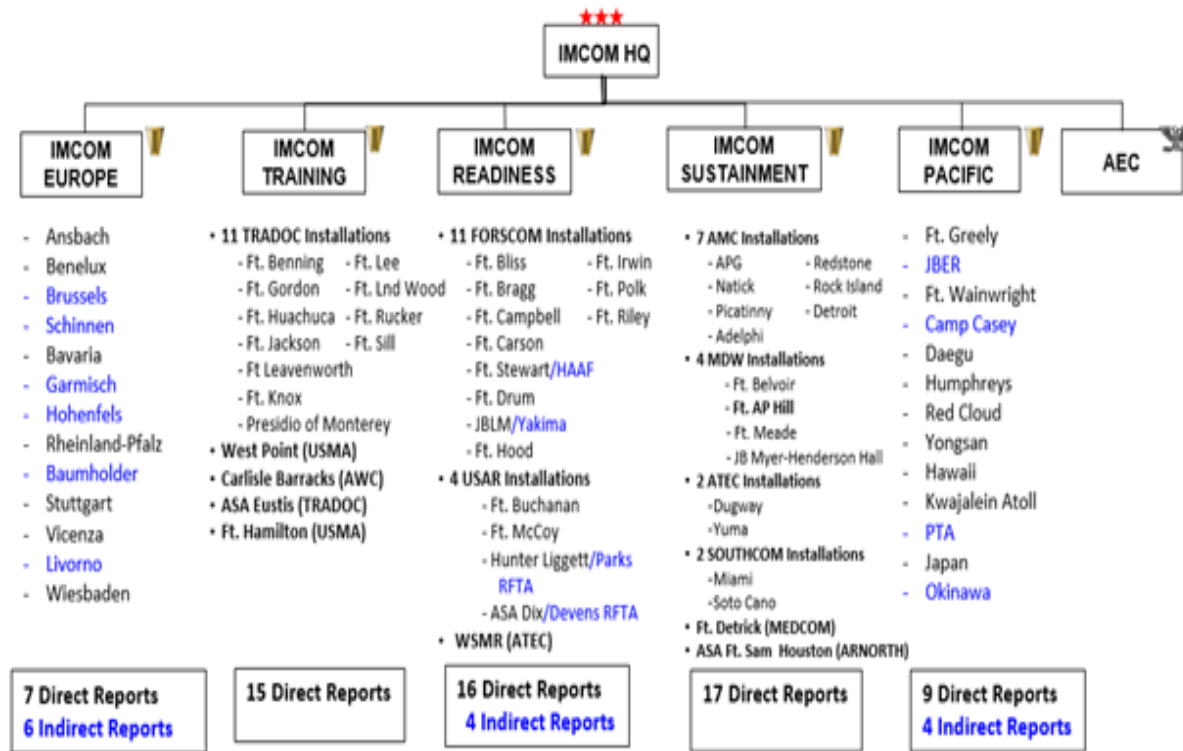
3.4.4. Air Force Weather Personnel Requirement. The weather unit should submit a request through their AF chain-of-command for additional SWOs due to new support requirements for Army unit types covered in the WMP-1. If the parent squadron cannot furnish support, the requirement should be sent to the MAJCOM weather functional manager for assessment. If the Army requests SWO support to an Army unit type not covered in the WMP-1, the Army should send a formal request up the Army chain of command to HQDA so that the Army can formally request a new AF weather team capability.

3.4.5. General Weather Support Requirement. Some Army units are not authorized AF weather personnel and therefore receive general support from the next highest echelon with weather personnel. When Army units submit a weather support requirement, SWOs should ensure they state the requirement(s) and do not identify the solution. This means Army leaders should say, “I need weather support to do requirements X and Y”, and the weather unit leadership can decide how to best support these requirements. Repeated or enduring weather support requirements should be tracked and analyzed by MAJCOM functional managers for direct support consideration. For assistance with submitting an Army requirement for weather support contact the DA G-2 SWO. For installation support without co-located SWOs, please see section 3.5 below.

3.5. HQ Army IMCOM and Facility Management

3.5.1. HQ IMCOM is a 3-star command located at Fort Sam Houston in San Antonio, Texas, and is aligned as a Major Supporting Command under AMC. IMCOM manages 75 garrisons, 29 airfields and 5 heliports worldwide (**Figure 3.1**). Through these echelons, IMCOM’s link is to the garrison commander and the garrison staff. AR 115-10/AFI 15-157(IP) and AR 5-25 outline both Army and AF responsibilities, highlighting each Service’s roles in fostering and leveraging this critical support relationship.

Figure 3.1. IMCOM Installation and Directorate Alignment.



3.5.2. HQ IMCOM SWO Responsibilities. The HQ IMCOM SWO maintains oversight on weather facility status, to include all military construction and sustainment, restoration and modernization activities as well as facility quality, functionality and capacity ratings regarding the workspace SWOs occupy. The HQ IMCOM SWO also:

3.5.2.1. Coordinates Army stationing actions (Air Force weather personnel relocation and facility requirements) with HQDA, HQ IMCOM, IMCOM Directorates and garrison Department of Public Works (DPW).

3.5.2.2. Assists HQDA G2 Weather Chief with policy development, review and updates, as well as coordinates with Air Staff counterparts regarding weather support to the Army.

3.5.2.3. Assists in coordination to ensure Army locations without a co-located weather unit receive necessary Watch, Warning and Advisory support from their official Air Force Weather organizations.

3.5.2.4. Provides preparatory and recovery weather forecast situational awareness to HQ IMCOM leadership regarding significant weather events (e.g., tropical cyclones), impacting IMCOM locations worldwide.

3.5.3. Army Real Property Category Codes (CATCODES). The Army real property CATCODES 14115 and 14117 were established to ensure AF Weather facilities meet Army standards as well as standard facility design considerations to fulfill unique SWO capacity and mission functionality requirements. The CATCODES are listed throughout numerous Army facility tracking systems (e.g., Army Stationing and Installation Plan, Real Property Planning & Analysis System, etc.). The installation DPW real property staff assists in ensuring accurate weather facility CATCODE identification in these databases.

3.5.4. Facility Repair Process. Per AR 115-10/AFI 15-157(IP) and AR 5-25, the Army is responsible to provide Air Force Weather personnel with facilities that meet established Army standards for quality, mission functionality and capacity. The Army funds for facility repairs whenever issues arise; facility managers and the installation DPW staff work in concert to ensure deficiencies are addressed and resolved as soon as possible. Beyond routine repairs, more significant issues and critical deficiencies (e.g., life, health, safety, space, etc.), are addressed through the quarterly Airfield Operations Board process or by working directly with garrison DPW representatives. Additionally, the installation DPW conducts annual Real Property Planning Board meetings; Air Force weather unit leadership and facility managers should make it a point to attend these meetings. **NOTE:**CWSs, dets, and OL leadership should make every attempt to integrate into DPW Planning Charrettes (PC) and Project Definition Reviews (PDR) for all operational and aviation-related construction projects. These projects include, but are not limited to, Air Traffic Control Towers (with or without auxiliary buildings), runways, major apron replacements, and hangers. Weather sensing requirements (e.g., fixed base observing system [FBOS], etc.) should be identified early in the construction project planning (e.g., during the PC) in order to be incorporated into new construction or correctly relocated if needed. The DPW Real Property Planning Board meeting is the first entry point into becoming involved in the PC and PDR. If a new sensing requirement exists, AR 115-10/AFI 15-157 (IP) provides guidance on acquisition.

Chapter 4

ARMY WEATHER SUPPORT COMMUNICATIONS

4.1. Army Communications Equipment. AR 115-10/AFI 15-157 (IP) states the Army manages and operates Campus Area Networks for Army and AF personnel on Army posts, camps, and stations and provides required information technology services at both common-user (baseline) and mission-unique (above-baseline) basis. As this implies communications in both a garrison and tactical setting, SWOs should be familiar with the tactics, techniques, and procedures (TTPs) to connect their MTOE communications equipment with AF weather support resources located off-post or outside of the area of operations (AO) and on troubleshooting procedures for service interruptions.

4.1.1. Army Communications Architecture. At the brigade echelon and above, the G-6 communications POR for inter- and intra-theater communications is warfighter information network-tactical (WIN-T). Headquarters elements connect to WIN-T systems to coordinate operations between headquarters elements. Mission requirements help dictate the kind of server enclave to be used. non-classified internet protocol router network (NIPRNET), secure internet protocol router network (SIPRNET), and combined enterprise regional information exchange system (country or region specific) are the most familiar enclaves.

4.1.2. G-2 Communications Equipment. The current Army intelligence communications POR is known as Trojan SPIRIT LITE (Special Purpose Intelligence Remote Integrated Terminal Lightweight, Intelligence Telecommunications Equipment). Like G-2 operations in garrison, much of intelligence operations occurs in a secure facility. SWOs should ensure their weather support resource website access accounts are active prior to deployment (all AF weather resources now require a Common Access Card and/or SIPR token for login). The SWO should coordinate port access prior to deployment with G-6 personnel.

4.1.3. C2 Communications Equipment. The current G-3 C2 POR is the Command Post of the Future (CPOF). CPOF training and system access is useful for integration into Army operations. If the Army unit leadership provides a CPOF to the SWO, they should coordinate port access prior to deployment with G-3 personnel.

4.2. Army Network Connectivity Training. AR 115-10/AFI 15-157 (IP) identifies the Army's responsibility to furnish the communications architecture to move data within Army networks from the theater downlink site, to the theater uplink site, and to and/or from the Joint forces theater entry point. When participating in any Army unit training event, SWOs should train on communications equipment connectivity, using standard operating procedures (SOPs)/TTPs and coordinating with their G-6, G-3, and/or G-2 personnel to minimize errors when tasked for real-world deployment.

4.3. Army Network System Training and Use. Depending on the training plan or OPORD, the SWO uses a combination of Army POR systems and NIPRNET/SIPRNET laptop computers. Weather personnel should be prepared to operate on all systems and maintain training proficiency required to conduct weather operations and Army staff integration. Additionally, SWOs should fully understand their network system and equipment capabilities as CD/DVD-ROM drives are not always available; a fully developed primary, alternate, contingency, and emergency (PACE) communications plan is strongly encouraged. An example PACE plan is found in [attachment 5](#).

4.3.1. DCGS-A Training and Use. The Army G-2 is responsible for ensuring up-to-date DCGS-A hardware and/or software training is provided to their aligned SWOs. AF weather personnel should be proactive in requesting access to the DCGS-A hardware and training.

4.3.2. CPOF Training and Use. When operating on a CPOF network, the SWO should coordinate with the G-3 for network access and training. SWOs should be proficient in CPOF functionality to support staff integration.

4.4. Army Network and Communications Considerations. Weather personnel supporting real-world tactical operations training or contingencies with communications systems should coordinate with Army G-6, G-3, and G-2 personnel early and often to properly integrate weather support. Army tactical communications systems can be easily overwhelmed by a large stream of weather data and information and directly affect mission success depending on the echelon. Consider the following communications-related questions and comments when planning weather support operations:

4.4.1. What is the primary Army communications system the SWO can use for reach back weather support?

4.4.2. Is the SWO identified in the communications network architecture?

4.4.3. Are Army POR systems identified and ready for SWO use?

4.4.4. Are SWO computer systems configured and approved for network access by G-6 or G-2 personnel?

4.4.5. Is a static IP address required?

4.4.6. What is the PACE plan for communications?

4.4.7. Has the theater area of interest (AOI), product list, and file size limits been identified for operations?

4.4.8. Has a SAR been submitted to the theater OWS for additional support?

4.4.9. Has a request for forces (RFF)/formalized support request been routed to the appropriate MAJCOM?

4.4.10. Who are the weather points of contact in the theater and above your supported echelon?

4.4.11. Coordinate weather communications frequency requirements across the full spectrum (HF, UHF, voice/data satellite communications) during staging along with communications security and planning to include non-secure and secure voice/data lines. This coordination can be done through the Army unit's frequency manager who usually resides in the G-6.

4.4.12. How can weather sensor data be transmitted (e.g., Iridium[®], network, HF, etc.)?

4.4.13. Establish KQ identifiers for each SWO and/or tactical weather sensor prior to deployment if possible. Once in theater, new KQ requirements should be staffed through the JMO in accordance with JP 3-59.

4.4.14. Adding any system or sensor to an Army network requires: Army Certificate of Net worthiness or Risk Management Framework as it is now known as, as the AF certificate does not suffice; Firewall Exemption Letter; frequency deconfliction/approval (if required); power consumption approval (may be required for small outposts); and bandwidth usage approval (may be required for some outposts).

Chapter 5

AIR FORCE WEATHER SUPPORT IN ARMY READINESS AND TRAINING

5.1. Army Sustained Readiness Management. FORSCOM manages Army Sustained Readiness Management to synchronize resources to meet their objectives and to forecast unit and strategic readiness against operational demand for risk management and mitigation. The sustained readiness model utilized by FORSCOM has no fixed cycles for Regular Army forces, but has 5-year readiness cycles for Army National Guard and Reserve forces. In addition to staff integration, Army weather support leaders should review Army sustained readiness products regularly to ensure they have situational awareness and plan accordingly with aligned Army units.

5.2. Army Training Events. Army training events are broken down into live events (Soldiers using systems), virtual events (Soldiers using simulated systems), constructive events (simulations used to support live or virtual training events), or a combination of all three. The acronym LVC (live, virtual, and constructive) is often used when describing Army training. As part of sustaining long-term readiness and demonstrating a commander's leadership, mission command, and command and control capabilities, divisions and brigades regularly participate in numerous LVC training events.

5.2.1. Army Training Event Planning. Planning for LVC Army training events generally starts at least one year from execution. The CWS, det, or OL should treat these events as a deployment because their aligned Army unit does. As their standard procedure, FORSCOM (Army's force provider) publishes an order for the identified Army training audiences to begin planning for a training mission. A timeline is established, mission requirements are identified, a manning document is created, and many other actions are taken just as a unit would leading up to a deployment. Training audience SWOs should be prepared to support their Army unit in virtual training events just the same as a live training event or deployment. The requirements for providing weather support and weather effects on operations do not change.

5.2.1.1. Training Audience SWO Planning. Training audience SWO units are encouraged to identify recurring, career field and unit-specific Army weather support training requirements to accomplish and maximize the value of each training event. SWOs should make every attempt to include their own unique training objectives into larger Army training events in order to maximize training time. Other considerations should be communications path and data reception. Working with training event planners and understanding the network architecture should ensure a solid communications path with the adequate capabilities to support Army training. Training audience SWOs should articulate weather data and information requirements in the OWS SAR as early as possible to maximize mission success.

5.2.2. Weather observer, coach/trainer (OC/T). OC/T's are utilized to coach or mentor SWOs as well as Army leaders and their staffs on integration of weather effects intelligence into the staff battle rhythm and decision making processes. Weather leaders are encouraged to act as/provide OC/T's during Army training events. Ideally, OC/T's should be sourced from units outside of those participating in the audience as part of or supporting the main Army training audience. This enables experienced individuals with differing perspectives to provide a non-biased observation of the training audience.

5.2.3. Combat Training Centers (CTCs). FORSCOM manages two CONUS CTCs at the National Training Center at Fort Irwin, California, and the Joint Readiness Training Center at Fort Polk, Louisiana. A third CTC, the Joint Multinational Readiness Center (JMRC), is located at Hohenfels, Germany and is managed by USAREUR. All CTCs are designed to train a full BCT and its appropriate echelons above BCT support structures. Depending on mission training objectives, the CTCs focus on developing collective task proficiency at the BCT level and below as well as allowing commanders to identify training deficiencies, improve the force, and prepare for success. Because these events offer the closest simulation of a real-world Army deployment, training audience SWOs are encouraged to learn new or hone existing weather integration techniques as well as conduct tactical operations. These locations, with exception of JMRC, have dedicated manpower to perform the weather OC/T function. Additional information on the FORSCOM-led CONUS CTCs can be found in FORSCOM Regulations 350-50-1, *Training at the National Training Center* & 350-50-2, *Training at the Joint Readiness Training Center*.

5.2.3.1. Joint Modernization Command (JMC). The AFC's JMC (headquartered at Fort Bliss, Texas) manages the Army's Joint Warfighting Assessments (JWA). While the ground maneuver mission for JWAs is similar to the FORSCOM CTCs, it also enables the Army a venue to focus on future force development, test and evaluate systems and network integration, new CONOPS, and joint/multinational interoperability in a resource-constrained environment. These events are tasked to shape and validate training and training resources for capability solutions under evaluation and make recommendations to the Army on its findings when complete. Depending on training objectives, these training events can be executed on different installations around the world with a full range of LVC participants. The AFC SWO can coordinate weather requirements and support for these training events. CWSs, dets, or OLs supporting the training audience units should begin coordination to provide or arrange weather support as soon as they become aware of the tasking. Given that the Army tests new equipment during these events, SWOs should keep situational awareness for weather-related test requirements for Army systems.

5.2.4. Warfighter Exercise (WFX). TRADOC's CAC manages corps and division, scenario-driven, mission command training events through its Mission Command Training Program. The CAC SWO identifies specifications for a Weather Services-LVC weather scenario that meets the mission training objectives for the training audience's future real-world mission. The CAC SWO facilitates the weather unit with training event expectations, nuances, and simulations in the months leading up to the training event. During a WFX, the CAC SWO operates as the exercise control group (i.e., White Cell) SWO and manages weather scenario changes and weather effects to ensure Army training objectives are met. A WFX is a virtual and constructive training event with no weather forecasting requirements. Instead, SWOs

should focus on Army staff integration skills and utilize existing weather unit tactical SOPs/TTPs to support the mission. The White Cell SWO does not participate in this process. **NOTE:**When operating in a multinational work environment, SWOs should coordinate SOPs, TTPs, and products with unit FDO and MAJCOM/A5I prior to release/presentation to prevent an inadvertent release of sensitive or otherwise classified information. Ensure weather products (WPs) are marked with the proper “REL” dissemination control.

5.3. After Actions Reports (AAR). Regardless of the type of training event a SWO supports, weather-related AARs, positive/negative feedback, and lessons learned are essential for leader and staff development. SWOs are highly encouraged to always generate an AAR after each training event. SWOs should also review previous AARs to ensure mistakes are not repeated. SWOs should submit lessons learned in accordance with AFI 10-1302, *Air Force Lessons Learned Program*. Lessons learned can be retrieved from the Joint Lessons Learned Information System portal webpage at: <https://www.jllis.mil> and/ or may also be included in the Army Center for Lessons Learned at: <https://call2.army.mil>. Additionally, if an item requires Army resolution, the item should become part of the formal Army training event report. Without inclusion into the final Army report, the Army does not direct resources towards the item’s resolution. **NOTE:**AAR items that require changes across the force or to Army doctrine/policy can only be resolved at service HQ level. These items should be elevated through the Army AAR process and through the AF chain of command to reach the Chief of Army Weather Policy on the AF/A3WP staff.

5.4. Army Leader Training. AF weather personnel train Army leaders and their staffs on AF weather capabilities and how to best understand and utilize weather. At ASCC, corps and below, SWOs should educate Army leaders at their aligned echelon on their unit’s capabilities. The TRADOC SWO can provide assistance preparing materials for baseline familiarization to the Army. for Army leaders at their headquarters and explain their unit’s capabilities and limitations in support of operations. Consistent familiarization of SWO capabilities and limitations throughout an Army leader’s career help solidify our interservice relationship and enable a commander’s success.

Chapter 6

WEATHER SUPPORT TO ARMY ECHELONS DURING OPERATIONS

6.1. Army Service Component Command. Weather support to the ASCC focuses on long-term theater-level planning for a CCDR or a geographic combatant command (GCC) if also assigned as the theater Army. Army weather support personnel supporting an ASCC should typically focus on strategic planning support, not tactical, day-to-day operations. See FM 3-94, *Theater Army, Corps and Division Operations* for additional details on an ASCC.

6.1.1. The SWO participates in staffing, planning, and operations meetings as the weather subject matter expert to proactively integrate METOC information into the commanders' decision cycles. Processes which the SWO integrates weather effects information and knowledge include, but are not limited to, the operations process (plan, prepare, execute, and assess), risk management, MDMP, IPB, information collection, targeting, and protection.

6.1.2. Direct SWO integration into these processes allows commanders to anticipate, mitigate, and exploit weather effects; optimizing air, space, cyberspace, and ground operations in the AOR to the advantage of allied objectives and the detriment of the adversary. The following are some of the activities the ASCC SWO performs:

6.1.2.1. Support long-range, deliberate planning on an annual cycle with operational climatic information and knowledge.

6.1.2.2. Provide indications and warnings of changes in weather patterns that could affect ongoing theater operations, or trigger a contingency plan (such as disaster relief), or non-combatant evacuation operations.

6.1.2.3. Coordinate mission-tailored WPs and services for multinational operations and exercises through the G-2/G-3.

6.1.2.4. Integrate weather support requirements into deployment plans and enter requests for forces into the Adaptive Planning and Execution system through the G-3/5/7.

6.1.2.5. Coordinate mission-tailored weather effects information and knowledge products for subordinate functional brigades and commands that do not have their own direct support weather personnel (e.g., theater sustainment command) until support has been arranged.

6.1.2.6. Coordinate with the COMAFFOR SWO and affected MAJCOM functional staff for additional personnel requirements.

6.1.2.7. Arrange for higher echelon support to provide unsupported Army forces at lower echelons with weather products and services.

6.1.2.8. When direct support is required, track movement of weather units/personnel/equipment deployed into theater.

6.1.2.9. Ensure a process or means to establish and maintain communication with Army weather support personnel deployed in theater is planned for with known communication assumptions before deploying.

6.1.2.10. Identify, review, and brief critical weather thresholds across the warfighting function capabilities that affect ongoing/planned operations or assets.

6.1.2.11. Maintain focus on weather effects on critical theater supply routes and nodes (contact the G-4 representative to identify key logistical routes & embarkation/debarkation nodes).

6.1.2.12. Integrate current and forecast weather effects on the troop and logistical port of embarkation and debarkation, en route, intermediate staging bases, and at the forward AOR.

6.1.3. See **Table 6.1** for additional weather support actions that are common to all echelons.

Table 6.1. Multi-Echelon Weather Support Actions Executed by Weather Personnel.

ASCC * CCP only	Corps	DIV	AVN BDE/BN (including aerial-ISR)	BCT/SFA B TB(X)	Weather Support Action
X	X	X			Produce/disseminate weather effects analysis to the Air and Missile Defense element to support Theater Air and Missile Defense planning
X	X	X			Produce/disseminate Tab B (Weather) within Annex B (Intelligence) to Army OPLANs and contingency plans
X	X	X			Coordinate with joint, coalition, and host nation weather forecasting, monitoring, and sensing capabilities
X*	X	X			Work directly with the G-3 Aviation Element and the Airspace Control Element to support mission planning
X*	X	X			Provide long-term mission-tailored weather effects analysis to support Army Corps of Engineer and commander base camp site selection
X*	X	X			Enable weather effects analysis to the chemical, biological, radiological, and nuclear (CBRN) staff section to support prediction of weapons of mass destruction (WMD) effects propagation and be prepared to furnish chemical downwind message) to subordinate echelons when required
X*	X	X			Produce/disseminate/integrate weather effects planning support, in particular to weather-vulnerable, non-lethal means such as military information support operations.

ASCC * CCP only	Corps	DIV	AVN BDE/BN (including aerial-ISR)	BCT/SFA B TB(X)	Weather Support Action
	X	X			Ensure/monitor the quality and accessibility of weather data, information, and knowledge being pushed/pulled and available in Army command and control database. Information and knowledge includes AF-provided authoritative mission execution and other weather products, that include: model data, raw data, sensor data and imagery in addition to forecaster in the loop products
X	X	X	X	X	Tailor/disseminate/integrate a thorough weather effects analysis to support intelligence, surveillance, and reconnaissance (ISR) activities
X	X	X	X	X	Tailor/disseminate/integrate weather products for target development, in particular the Decide, Dwell, Detect, and Assess portions of the targeting cycle
X	X	X	X	X	Tailor/disseminate/integrate weather updates as part of the commander's/battle update brief (CUB/BUB) to include area forecast and mission status of SWO equipment and subordinate weather units
X	X	X	X	X	Answer Commander's Critical Information Requirements (CCIR) requests for weather effects information and knowledge across all warfighting function capabilities
X	X	X	X	X	Monitor weather effects on air, sea, and/or ground-based mission execution, and provide warning of impending negative effects as well as emerging opportunities
X	X	X	X	X	Tailor/disseminate/integrate space weather effects on Army operations.
X	X	X	X	X	Engage the commander's staff to obtain all relevant mission-limiting/critical weather threshold sensitivities across all warfighting function capabilities

ASCC * CCP only	Corps	DIV	AVN BDE/BN (including aerial-ISR)	BCT/SFA B TB(X)	Weather Support Action
X	X	X	X	X	Train Army commanders and headquarters staff on SWO capabilities and limitations
X*	X	X	X	X	Participate in the MDMP, including rehearsal of concept drills and other rehearsals
X*	X	X	X	X	Tailor/disseminate/integrate weather input to operation decision briefs (the "Go/No-Go brief")
X*	X	X	X	X	Coordinate weather products, information, and knowledge with higher, adjacent, and subordinate weather units
X*	X	X	X	X	Integrate weather observations, forecasts, watches, warnings, and advisories into force protection condition, resource protection, and security
X*	X	X	X	X	Collaborate with Army units and the JMO on the development of a weather sensor network for their operational area.
	X	X	X	X	Train Soldiers on taking/disseminating supplemental weather observations in forward areas as required or requested per the CCMD METOC GEN ADMIN instruction.
		X	X	X	Tailor/disseminate/integrate the MEF in parallel with the staff running estimate to support the commanders decision cycle.
		X	X	X	Conduct weather observations in accordance with theater collection plan
			X	X	Tailor weather products for subordinate units lacking organic weather support
			X	X	Tailor/disseminate/integrate weather information and knowledge to units to enable proper operation of systems such as CBRN sensors and detectors and to allow for correct interpretation of system responses and to enable system calibration

6.1.4. ASCC weather personnel may operate tactical meteorological equipment (TACMET) from the ASCC main command post (MAIN) and/or contingency command post (CCP) when deployed in accordance with requirements to support aviation operations or the METOC sensing strategy as identified in the OPLAN.

6.2. Corps. The corps headquarters is designed to be the Army's primary operational level headquarters. Depending on the mission, the corps can serve as an ARFOR, multinational or joint force land component command, JTF or combined JTF (CJTF) headquarters, or as an intermediate tactical headquarters. The corps headquarters consists of a corps MAIN command post, a tactical command post (TAC), early entry command post (EECP), and a mobile command group.

6.2.1. The corps MAIN can operate from a field location but the preferred location is a permanent structure near the division MAIN. The corps MAIN is responsible for the continuity of corps operations, future planning, and synchronization of operations. It focuses on planning 72 hours and beyond. The corps TAC, EECP, and mobile command group are all mobile, easily displaced with organic transportation. These formations are responsible for the current operations, as well as controlling and synchronizing operations when the corps MAIN is displacing or otherwise not mission capable. It focuses on CUOPS and also performs planning and synchronization out to 72 hours. The corps commander determines the sequence and timing of corps deployment or movement, initial location, and detailed task organization of command posts. See chapters four and five of FM 3-94 for additional details on a corps.

6.2.2. The corps SWO should coordinate with and support all warfighting functions and staff elements. The corps SWO assists the commander's management of operations within the corps AO and furnishes key insights on weather effects information and knowledge for current and planned operations within the headquarters and to lower echelon SWOs.

6.2.3. The Corps SWO may operate TACMET from the corps command post when deployed based on requirements to support aviation operations or the METOC sensing strategy. In addition, corps personnel may operate Army-assigned tactical radios (e.g., SINGARS) for PMSV if supporting aviation operations.

6.2.4. See **Table 6.1** for additional corps SWO weather support actions.

6.2.5. The corps SWO also may be assigned a theater weather radar. In garrison, these would normally be assigned to a CWS in order to provide the opportunity for SWOs to train on the equipment. During contingency operations, the radar is normally assigned to the EWXS, but may be located with and operated by subordinate, geographically separated unit personnel.

6.3. Division. The division is considered to be the Army's primary deployable headquarters at the tactical level. Depending on the mission, the division is designed to serve as a JTF headquarters in a small scale operation or a multinational division headquarters to a CJTF. Like a corps, the division consists of a MAIN, TAC, EECP, and mobile command group. The division MAIN (D-MAIN) is the division's principal command post. It provides the commander with a full suite of information systems to plan, prepare, execute and assess division operations. The D-MAIN is not capable of providing C2 while being displaced. It maintains continuity of

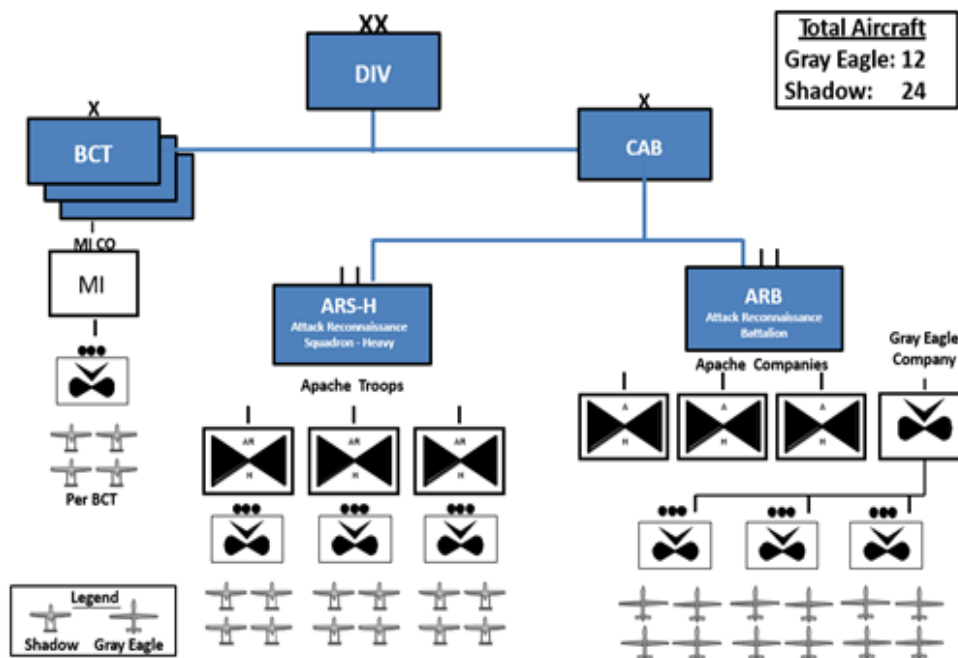
operations, future planning, and synchronization of the entire effort from an established location. The division TAC (D-TAC) is completely mobile and controls the division’s immediate fight as well as specific, limited-scope operations such as river crossings (usually referred to as “wet gap” operations) and passage of lines. The D-TAC conducts operational planning in the 24- to 72-hour range. See chapters six and seven of FM 3-94 for additional details on a division.

6.3.1. The division SWO should coordinate with and support all warfighting functions and staff elements. The SWO assists the commander’s management of operations within their AO and integrates weather effects into current and planned operations within the headquarters and to lower echelon SWOs.

6.3.2. Division SWOs may operate TACMET from the division command post when deployed based on requirements to support aviation operations or the METOC sensing strategy. In addition, division personnel may operate Army-assigned tactical radios (e.g., SINGARS) for PMSV if supporting aviation operations.

6.3.3. Army Employment of ISR in a Division. The division G-3 Air assembles all requests for aviation to include the Gray Eagle support. The G-3, in consultation with the G-2, assesses all requests against the commander’s priority of effort and issues operations orders to the CAB. The CAB maintains C2 of the Gray Eagle UAS and is responsible for executing assigned missions. The importance of having the tactical user G-3 and G-2 staff involved in the mission process is fundamental for the effective execution of UAS missions. Commanders and their staffs at each echelon develop planning, synchronization, and orders processes that take advantage of the UAS capabilities and reduce the likelihood of C2 confusion of the systems during operations. Echelons below division with Gray Eagles and Shadows are shown in **Figure 6.1**

Figure 6.1. UAS Organization in a Division.



6.4. Aviation Brigade. The CAB is a division asset, which is designed to be modular, tailorable, and typically task-organized as required for offensive, defensive, and stability operations in support of ground maneuver forces or for Defense Support of Civil Authorities. The CAB is designed to split into four aviation maneuver battalions or battalion/squadron task forces, and one aviation support battalion. CABs are manned to support the brigade and battalion levels with additional personnel to support Shadow and Gray Eagle UAS. Army National Guard and Army Reserve Theater Aviation Brigades and Expeditionary CABs do not have Shadows or Gray Eagles organic to their organizational structure. SWOs supporting the CAB and/or aviation battalion (AVN BN) level operate from the CAB and/or AVN BN TOC to support aviation operations and contribute to the METOC collection plan.

6.4.1. Aviation SWO support actions include but are not limited to:

6.4.1.1. Produce WPs for HHQ and tailor them using the mission execution forecast process (MEFP) to specific flight and route planning for aviation operations.

6.4.1.2. Provide MEFs and mission monitoring (flight follow) for execution of forward arming and refueling point (FARP), pick-up zone (PZ)/drop zone (DZ)/landing zone (LZ), medical evacuation (MEDEVAC), PR, and downed aircraft recovery operations.

6.4.1.3. Mission watch all missions during execution and provide weather updates as necessary.

6.4.1.4. Support airfield control operations, including coordination with the GCC weather support center supporting the theater for additional capability, if needed.

6.4.1.5. Conduct PMSV operations.

6.4.1.6. Support separated aviation battalion task force when formed.

6.4.1.7. Task organize to support short duration, critical events (e.g., FARP, forward command post, sensor relocation, etc.).

6.4.2. The CAB SWO is responsible for organizing and integrating the support at the CAB HQ as well as ensuring all requirements are met at each of the aviation battalions to include Gray Eagle and Shadow support requirements. Gray Eagles can be tasked to perform a wide variety of missions over a very expansive area for which the CAB SWO is generally the coordination focal point with both the division and BCT SWOs. The CAB Gray Eagle company may be released partially, or in total, from division control to conduct dedicated manned-unmanned teaming (MUM-T) or direct support to a BCT.

6.4.3. Army aviation attack and reconnaissance units conduct reconnaissance as a maneuver force with manned and unmanned systems typically maneuvering interdependently. MUM-T is the integrated maneuver of Army aviation rotary wing and UAS to conduct movement to contact, attack, reconnaissance, and security tasks. MUM-T significantly enhances the survivability, depth, breadth, and persistence of the reconnaissance effort and increases the lethality by locating and attacking enemy forces with autonomous or remote fires in depth. See FM 3-04, *Army Aviation* for additional details on a CAB.

6.5. Army UAS. Over the last 10 years, UAS have become integral to Army operations and can be found from platoon to corps level as depicted in **Figure 6.2**. The Army has over 7,500 UAS in various sizes and capabilities. Across the joint UAS community, the aviation category for unmanned aircraft is broken down into five capability groups (see **Table 6.2**). UAS capabilities and utilization are forecast to steadily increase for the near future.

Figure 6.2. U.S. Army Family of Unmanned Aerial Systems.



6.5.1. As outlined in AR 115-10/AFI 15-157 (IP), direct weather support is mostly limited to BCTs, aviation battalions and above. UAS elements assigned to units below BCT level or in brigades without direct weather support should coordinate weather support requests to the next highest echelon with a SWO. Army UAS weather support includes but is not limited to:

- 6.5.1.1. Receive WPs from HHQ and tailor them using the MEFP to specific flight and route planning for UAS operations.
- 6.5.1.2. Integrate weather effects into unit commanders and staff MDMP.
- 6.5.1.3. Mission watch all missions during execution and provide weather updates as necessary.
- 6.5.1.4. Support launch and recovery element (LRE) operations, including coordination with the lead forecast unit (LFU) or GCC weather support center supporting the theater for additional capability, if needed.

6.5.1.5. Conduct “over the shoulder” weather support/expertise to UAS operator(s) during mission execution.

6.5.1.6. Disseminate weather-related mission feedback to operations nodes, command posts as required.

6.5.1.7. Integrate weather support into processing, exploitation, and dissemination activities as required or requested.

6.5.1.8. Conduct weather data and information collection for accident investigations and provide the database to the investigation board.

6.5.1.9. Task organize to support short duration, critical events requiring UAS capabilities.

Table 6.2. UAS Capability Group Classification.(Source: Joint CONOPS for UAS).

UAS Category	Maximum Gross Takeoff Weight (lbs)	Normal Operating Altitude (ft)	Speed (KIAS)	Current / Future Representative UAS
Group 1	0-20	<1,200 AGL	100 kts	Wasp III, FCS Class I, TACMAV, RQ-14A/B, BUSTER, BATCAM, RQ-11B/C, FPASS, RQ-16A, Pointer, Aqua Terra, Puma
Group 2	21-55	<3,500 AGL	< 250	Vehicle Craft Unmanned Aircraft System, ScanEagle, Silver Fox, Aerosonde
Group 3	<1320	<18,000 MSL		RQ-7B, RQ-15, STUAS, XPV-1, XPV-2
Group 4	>1320	>18,000 MSL	Any Airspeed	MQ-5B, MQ-8B, MQ-1A/B/C, A-160
Group 5				MQ-9A, RQ-4, RQ-4N, Global Observer, N-UCAS

6.5.2. UAS Category Groups 1 and 2. The primary systems in the small UAS groups 1 and 2 are the RQ-11 Raven and Scan Eagle, respectively. Due to system limitations of UAS groups 1 and 2 as well as their sensitivities to environmental phenomena, AF policy identified in the Weather Supplement to the WMP-1 states UAS group 2 or smaller should only receive general support (area forecasts/products) instead of direct support (tailored forecasts/products for specific missions). While it is common practice for group 1 and 2 UAS operators to use local MEFs, forecasters are not required to provide direct support to these classes of assets. If weather support is required, UAS operators normally contact the first echelon with a SWO. Usually, for the infantry/armored/stryker company or platoon, general support resides with the BCT SWO.

6.5.3. UAS Group 3. The primary system in this tactical UAS group is the RQ-7B Shadow. Shadow Platoons are organic to all three BCT varieties, and CABs. Since a Fires Brigade and an expeditionary military intelligence brigade (eMIB) are functional brigades, their UAS are supported by their attached division HQ. CAB UAS operations are directly supported by the CAB SWO. Army UAS are typically employed in a decentralized manner and optimized for full integration into organic unit operations. Therefore, Army weather support units at each echelon operating Group 3 and 4 UAS should arrange and integrate direct weather support for their assets. Airframe capabilities and mission requirements may dictate additional weather support via reach back to a higher echelon SWO or the LFU.

6.5.4. UAS Group 4. The primary system in UAS Group 4 is the MQ-1C Gray Eagle. UAS in Group 4 are organized into company-sized formations with three flight platoons (3-4 UAS each) which can be individually tasked to deploy to support commander's requirements. These airframes require large-airfield support services and are managed by the CAB HQ. Depending on mission requirements, these UAS receive weather support from the CAB SWO.

6.5.4.1. Gray Eagle UAS companies are task-organized by ASCCs to division commanders and managed by the CAB to execute commander-directed reconnaissance, surveillance, and target acquisition (RSTA) missions. Deployed or in garrison, these UAS normally launch and recover from large airfields within the division support area for security, airfield, and C2 support requirements.

6.5.4.2. The Gray Eagle company (or tasked subordinate elements) maneuvers independently or with Apaches from the attack reconnaissance battalion or heavy attack reconnaissance squadron using MUM-T. The Gray Eagle company or subordinate elements conduct the following tasks:

6.5.4.2.1. Zone, route, and area reconnaissance

6.5.4.2.2. Attack

6.5.4.2.3. Battle damage assessment (BDA)

6.5.4.2.4. Mission C2

6.5.4.2.5. Surveillance (in support of division taskings)

6.5.5. UAS Group 5. The Army currently does not have any Group 5 UAS. Group 5 UAS are the largest aircraft, operate at medium to high altitudes, and typically have the greatest range, endurance, and airspeed.

6.5.6. Depending on the mission and task organization, SWOs at different echelons may provide a variety of support services and products including MEFs to the LRE. UAS SWOs should coordinate with the CAB, division, or corps SWOs who support the mission from their command post. Additional SWO support may be required within the LRE vehicle/facility for in-flight decision-making and weather expertise.

6.5.7. Forecasters should use every resource to maintain situational awareness. Often, while providing support to ISR, forecasters have access to the near-real-time full motion video available from the division's or BCT's organic ISR assets. This is a valuable source of weather data and should be exploited. If the mission allows, or if mission-limiting weather is expected, the supporting forecaster can request a weather sweep to update their situational awareness.

6.6. 116th MIB. The 116th MIB is comprised of all conventional Army manned and unmanned aerial ISR (A-ISR) assets not assigned to a BCT or CAB. The 116th MIB and its subordinate aerial exploitation military intelligence battalions (MI BN) are subordinate to Intelligence and Security Command and support ASCCs and GCCs.

6.6.1. Elements of the 116th MIB deploy as a force package to combatant command (CCMD) requirements. Up to five force packages can deploy simultaneously. Each force package has a command and control element (C2E) and can be comprised of aircraft from one or more of the CONUS- based MI BNs. LREs normally collocate with the C2E. In theaters with a robust, established military footprint, LREs may be located apart from the C2E. In this case, the lead SWO of the force package is responsible for arranging/integrating support for the entire package and coordinate with the 116th MIB SWO for assistance if the weather team or equipment configuration does not meet the force package requirements.

6.6.2. Each 116th MIB deployment package has SWOs assigned for deployment. The SWOs align with the C2E to maximize integration into MDMP while covering briefing and mission watch responsibilities. If LREs are not co-located with the MCE, the SWO lead organizes and arranges support. This could include arranging support from SWOs already at the asset location or providing remote support from the C2E location. In these cases, SWOs can be temporarily forward deployed for weather equipment set up, tear down, maintenance or for special missions, but should return to align with the C2E as soon as practical.

6.6.3. 116th MIB units who are tasked to deploy should formally identify and staff weather support requirements to HHQ prior to entering a new AO. Be advised that depending on mission sensitivities or classification, 116th MIB SWOs may operate in separate facilities or TOCs away from a primary operations center. This may incur additional weather support requirements or prioritization of direct weather support with the G-3.

6.6.4. The 116th MIB's systems are low density/high demand assets and are deployed globally across multiple CCMDs simultaneously, often covering AOs larger than that of a CAB (theater versus division area of operations). The 116th MIB meets GCC/ASCC support requirements by building capabilities-based A-ISR force packages and deploying them in accordance with the Army's Sustainable Readiness Model rotation policy. Each A-ISR force package is optimized to meet specific tactical, operational, and/or strategic requirements to achieve maximum possible effectiveness and efficiency of A-ISR support. The 116th MIB's design agility and flexibility also postures the 116th MIB for support of special operations forces.

6.6.5. 116th MIB units may operate from airfields with established weather support. 116th MIB SWOs should coordinate ahead of arrival for the utilization of available weather equipment when possible. In addition to considerations listed in [Table 6.1](#), some planning considerations include:

6.6.5.1. Will the package launch and recover from a single location or multiple locations? If multiple locations, how many?

6.6.5.2. Does/do deployment location(s) have an observation available? Manned or unmanned?

6.6.5.3. Is there a coalition and/or host nation observation and terminal aerodrome forecast available?

6.6.5.4. Ensure the AFFOR SWO is aware of any potential requirements as soon as possible.

6.7. Brigade Combat Team. The BCT includes capabilities across the command and control, movement and maneuver, intelligence, fires, sustainment, and protection warfighting functions. These capabilities are scalable to meet mission requirements. The three types of BCTs are Infantry Brigade Combat Team (IBCT) to include airborne, Stryker Brigade Combat Team (SBCT), and Armored Brigade Combat Team (ABCT). Weather personnel support all three types of BCT in addition to SFABs, which also receive direct support from SWOs, though the nature of that support may vary slightly. The planning window for a BCT is generally less than 72 hours. The BCT SWO furnishes mission services focused on BDE and battalion (BN) level mission execution decisions. See FM 3-96, *The Brigade Combat Team* for additional details.

6.7.1. Weather personnel supporting BCTs work directly with the AVN BN SWO and the UAS unit to provide MEFs for planning and integration of Army aviation assets into BCT operations (PZ/DZ/LZ selection, mission watch, etc.). BCTs operate Group 1, 2, and 3 UASs. BCTs receive close air support, lift, MEDEVAC and ISR support from AVN BNs for convoy operations and patrols. The BCT SWO works closely with the AVN BN SWO to determine availability of air assets during planned mission times.

6.7.2. BCT SWOs may operate from the TOC based on BCT commander requirements, to support aviation and ground operations, or to support the sensing strategy. BCT SWO support actions include but are not limited to:

6.7.2.1. Aid route and convoy planning support for movements such as logistics convoys.

6.7.2.2. Receive WPs from HHQ and tailor them using the MEFP for BCT organic air assets, air delivery, aerial reconnaissance, airborne and UAS operations (all aviation operations, as applicable) and aerostats.

6.7.3. Army Employment of ISR in a BCT. A BCT employs the Shadow as a ground maneuver commander's primary day/night, RSTA system. It provides the commander with enhanced enemy situational awareness and near-real-time intelligence of ongoing operations. The Shadow conducts the following tasks for the BCT:

6.7.3.1. Surveillance

6.7.3.2. Zone, route, and area reconnaissance

6.7.3.3. Battle damage assessment (BDA)

6.7.3.4. C2 support

6.7.4. The Shadow platoon may not always be collocated or in the vicinity of the BCT TOC. Forecasters should ensure that there is a plan for communications to engage with the mission commander (MC) whether by phone, internet chat, or other means of pre-established communications. The MC is the responsible individual who coordinates and receives weather information, to include the flight weather briefing, and relays all information to the aircraft commander. Additionally, the MC is the individual notified of impending unforecasted weather conditions where the UAS may need to be recalled for safety of flight.

6.7.5. See **Table 6.1** for additional BCT SWO support actions.

6.7.6. Airborne/Air Assault Weather Support. Weather personnel attached to airborne or light infantry units are usually limited and should typically carry all equipment in a rucksack or parachute drop bag. This significantly limits weather personnel's ability to sustain operations for extended periods, and resupply from higher echelon is imperative.

6.7.6.1. Batteries, food, water, and ammo are all heavy, yet mandatory to ensure effective weather operations. Timely and accurate ammunition, casualty, and equipment reports to higher echelons are imperative for resupply.

6.7.6.2. Light infantry or airborne SWOs should ensure all element members have redundant communication and mobile observing equipment during cross load to maintain capability if the members become separated during forcible entry (infiltration). This should be coordinated with the unit's S-6 in compliance with the PACE plan.

6.7.6.3. Upon landing at the objective, personnel should first assemble to their pre-rehearsed locations, and then once security is achieved, begin tactical weather operations until follow-on forces arrive.

6.8. Transportation Brigade Expeditionary (TB[X]). 7th TB(X) and 3rd TB(X) are the only brigades with the capability to conduct deployable port opening and provide Army joint logistics over-the-shore (JLOTS) operations in support of MDO. Additionally, these headquarters are charged with oversight and management of Army watercraft and water terminal capabilities. TB(X) units earn direct weather support for the JLOTS mission. These brigades (BDEs) should not be confused with Sustainment Brigades who do not traditionally receive direct weather support.

6.8.1. Weather personnel supporting the JLOTS mission work directly with HHQ SWOs and GCC weather support centers for weather products for port operations planning and logistics movement, mission oversight, etc.

6.8.2. TB(X) SWO operates from a location based on TB(X) commander requirements to support JLOTS operations and joint reception, staging, onward-movement, & integration, or to support the METOC collection plan. TB(X) SWO support actions include but are not limited to:

6.8.2.1. Support Army JLOTS and platform operations planning.

6.8.2.2. Receive weather products from HHQ and tailor them using the MEFP for TB(X) organic assets, ship movements, container load/offload, convoy, and rail operations.

6.8.2.3. In addition to weather, SWOs supporting TB(X) are required to access DoD-approved data sources and provide sea state, sea temperature and tidal information.

6.8.3. See [Table 6.1](#) for additional TB(X) SWO support actions.

6.9. Functional Brigades. Due to manpower authorizations, the following functional brigades receive weather support on a less frequent basis (general support). The SWO at the next higher echelon should furnish non-specific planning weather products on a routine basis and specific products or services upon request. These types of products generally include (but are not limited to) 5-day planning forecasts, routine route/area forecasts for commonly used areas, observations if already being taken, and other similar products.

6.9.1. Supported brigades include:

- 6.9.1.1. Civil Affairs
- 6.9.1.2. eMIB and Theater-MIB
- 6.9.1.3. Field Artillery
- 6.9.1.4. Maneuver Enhancement
- 6.9.1.5. Medical
- 6.9.1.6. Military Police
- 6.9.1.7. Signal
- 6.9.1.8. Sustainment

6.9.2. Depending on force structure, corps and division SWOs should make existing products available to those units without weather personnel. If SWOs are unable to brief remotely, they should furnish amplifying information to the S-2 who should present the weather briefing as part of the operational environment. Pertinent information to include would be to describe why a certain operation/location is marginally or significantly affected by weather.

6.9.3. During combat operations, the EWXS commander may task-organize an over watch team drawing personnel from existing weather dets and OLs for the purpose of supporting a specific mission or operation of limited duration. In the event a mission becomes an enduring support requirement the EWXS commander, with assistance of the JMO, may need to request additional personnel (e.g., RFF) or reach back support from the LFU.

Chapter 7

SUPPLEMENTAL WEATHER OBSERVATION PROGRAM (SWOP)

7.1. Overview. AR 115-10/AFI 15-157 (IP states that the Air Force trains Army personnel to take and disseminate supplemental weather observations in support of Army operations. This training is provided to, but is not limited to, specified air traffic controllers, military intelligence, aviation support, and Special Forces personnel.” The Forward Area Limited Observation Program, which used to meet this training requirement, is no longer widely used across the service though some theaters still employ it. Check with your theater Senior METOC Officer (SMO) to determine if there are local employment procedures of SWOP. During operations in Iraq and Afghanistan, weather Airmen created a process to relay weather information and knowledge from non-weather personnel known as the SWOP. There is no AFI or joint publication governing the structure or implementation of an SWOP; however, the JP 3-59 states that JFC “tasking supported joint forces to record and report firsthand observations of mission-area weather conditions and actively provide feedback to METOC personnel on forecast products” can mitigate inherent limitations of modeling and the perishable nature of METOC data. The following sections provides an example of how to set-up and execute a SWOP.

7.1.1. Supplemental Weather Observations. Weather and environmental information and knowledge from isolated locations that has been observed and communicated to weather personnel using plain language and simple weather code.

7.1.2. Developing a Supplemental Observation Network. SWOs develop observation networks to expand weather data coverage within their AO. Though land-owning BCTs provide the vast majority of supplemental weather observations, there are opportunities to conduct observations through other sections within the division’s CAB and assigned functional brigades. All weather units should establish leadership support and be able to organize, train, equip, advise, and assist supplemental observers to build meteorological capacity/infrastructure.

7.1.3. Establishing Leadership Support. A supplemental observer network is only as strong as the support it receives from leadership. Experience demonstrates that commander support is the greatest indicator of success in implementing and sustaining a supplemental observer network. An important step in gaining the commander’s support is identifying how a supplemental observer network enhances operations and how its absence can hinder operations. In the past, without the buy-in and authorization of the commander, supplemental weather observation training programs have developed through “hand-shake” deals and eventually deteriorated over time.

7.1.4. OPORDs and fragmentary orders (FRAGOs). The OPORD is the commander's operational order to subordinate units. A FRAGO is an abbreviated order altering or supplementing the original OPORD. Though weather requirements, thresholds, and information are located within Tab B (Weather) of Annex B (Intelligence) of an Army operations plan or order, SWOs should work with G-3 to identify how to best include supplemental weather observations into the OPORD. In addition, the weather units should work within their chain of command to incorporate a SWOP into higher echelon OPORDs—do not delay pursuing inclusion into the local OPORD anticipating higher echelon SWOP guidance. Ideally, the corps publishes its OPORD providing the lower echelons with guidance on a theater SWOP. If the SWOP is not included in the OPORD, a FRAGO can be issued detailing it and other SWO-related matters.

7.1.5. Organize. Organizing a supplemental weather observation network requires identifying opportunities, determining best use of supplemental observer assets, scheduling, and management to address mission-impacting sensing gaps.

7.1.6. Identifying Opportunities. Given the stresses on time and resources within an AO, a weather det/OL should evaluate the best opportunities for returns on investment when it comes to using supplemental observers. First, the weather det commander or officer-in-charge assesses the AO to determine the locations of data voids, aviation stops, areas of interest and then links them to potential supplemental weather observation locations. Once identified, locations are prioritized with input from the supported unit (help in establishing leadership support) and next higher weather commander (identify priorities for other units operating within AO). Ideally, a SWOP should occur at all the locations identified, but that is not always possible. The most successful SWOPs recruit supplemental observers who are directly impacted by the weather variables they report on. For example, an Army scout may be very concerned about snow, freezing rain, and thunderstorms. Alternatively, an aviation company S3 may be more concerned with high winds and visual flight rules (VFR) conditions. As with all matters, expect priorities to change over time generating requirements for additional supplemental weather observation sites.

7.1.7. Full Observations vs. Specific Element Observations. What is reported by the supplemental observer may be limited by available equipment. If a location does not have a way to measure an element, it cannot be reported.

7.1.8. Mission Limiting Thresholds. SWOs should focus training on identifying basic mission-limiting weather (cloud free line of sight for ISR, freezing rain, thunderstorm, hail, etc.) and procedures for reporting it as soon as possible.

7.1.9. Scheduling. It is important to establish a realistic schedule of disseminating observations based on the location's mission sets/availability. Though hourly observations are preferred, it is not always practical or required. In the past, realistic observation schedules were tailored to meet the Army unit's battle rhythm. For example, if the Army unit has a security detail at the forward operating base, this may be a good opportunity for an observation.

7.1.10. Management. The most important aspect of supplemental observer management is remembering they do not belong to the weather chain of command. Supplemental observers have their own duty priority lists. Maintaining good weather Airman-supplemental observer relations can help alleviate issues when priorities don't match. If possible, a FRAGO from a HHQ echelon G-3 describing the mission impact should help give these efforts a higher priority.

7.1.11. Contact. As the supplemental observer network grows and weather information and knowledge is disseminated, other weather det/OLs may require additional or nonscheduled observations. All requests for supplemental weather observation information and knowledge should go through the weather det/OL managing that location's supplemental observer. This ensures the supplemental observer is not overtaxed and the coordinating weather det/OL maintains a dialog with that supplemental observer.

7.1.12. Supplemental Weather Observer Roster. Part of managing a supplemental observer network is maintaining a site roster. The roster contains the observation location information, trained personnel, contact information, observation schedule or duty schedule, and capabilities (e.g., visibility, wind speed, ceiling height, etc.).

7.1.13. Feedback. It is important to provide feedback to supplemental observers and unit leadership on use of information and knowledge, especially when that information and knowledge influences operations. This helps maintain support for the supplemental observer network.

7.1.14. Train. Supplemental observers furnish limited weather observations. For the most part, they usually do not have any formal weather education and only require a fundamental understanding of the weather elements. As such, the goal of supplemental observer training is to produce personnel who recognize changes in weather conditions that are pertinent to operations. Whether or not the supplemental observer provides single element or full observations, the training program should be given in its entirety. This alleviates the requirement to send out an instructor if the observation is expanded later.

7.1.15. Packing List. Whether conducted locally or at a remote location, there are certain items required to provide supplemental observer training. These items include but are not limited to:

7.1.15.1. SWOP training materials

7.1.15.2. Hand receipt paperwork

7.1.15.3. Handheld or tactical weather sensor(s)

7.1.15.4. Items required to make a tactical visibility binder (e.g. digital camera)

7.1.15.5. Weather Flipbook (see [Attachment 2](#))

7.1.16. Observation Point. Making sure the observation point is in close enough proximity to the supplemental observers is important so that taking observations doesn't become a large burden. During inclement weather or high operating tempo, it is unrealistic to expect them to perform additional observing duties.

7.1.17. Handheld Weather Sensors. All handheld weather sensor(s) should be hand receipted to the supplemental observer. If handheld weather sensors are limited, SWOP locations and mission need should be prioritized. SWO should bring additional handheld sensors for backup SWOP efforts. Generally, the Army unit providing the SWOP should fund the additional equipment; however, whether AF or Army purchased if the equipment is available it should be utilized (remember to get a hand receipt for all equipment not funded and owned by the unit using it). If no handheld sensor access is available, SWOs should identify potential weather resources available to the supplemental observer. For example, aerostat sites have commercial off-the-shelf ground sensors affixed to the site and additional sensors affixed to the platform. These sensors may not be networked with the data that is maintained on a laptop at the control facility. Non-standard (and non-networked) sensor sources of weather information can be very important to mission planning and execution.

7.1.18. Tactical Visibility Chart (TACVIS). The SWO should develop a visibility binder with the supplemental observer. Time needed to establish a quality tactical visibility chart is going to be at least an overnight process so that weather trainers can develop night and day visibility charts. If the digital camera has an adjustable aperture, weather personnel should take good nighttime pictures of surrounding well-lit markers, which are “usually” any radio/communications towers that have lights on them. Laser range finders and other such tools may also be utilized in order to determine range and height of markers. The local Army geospatial intelligence section (terrain team) within the G-2 can also print an image or map with range rings that can be used to create a TACVIS.

7.1.19. Weather Flipbook. To assist the supplemental observer in identifying observation elements, units may create a weather flipbook. If available, provide it in both hard copy and electronic formats during initial training. The weather flipbook should be designed to fit in the person’s pocket and contain visual aids for wind speed, visibility, obscuration, cloud cover, ceiling height, weather, and rain intensity. See [Attachment 2](#) for an example Weather Flipbook.

7.1.20. Advise and Assists. Supplemental observer training is short and limited in scope. The weather det/OL should expect supplemental observer knowledge retention to be low and require additional information and guidance until skills improve. For a successful supplemental observer network, the weather det/OL needs to be proactive in maintaining the skills of the supplemental observer and be readily available to answer questions concerning element reporting. Remember to give feedback on how their observations influenced operations. This aids in their understanding of how important their observations are and energize them to continue.

7.1.21. Quality Control. Like submitting a traditional observation, the supplemental observer needs to quality check their supplemental weather observation before and after dissemination.

7.2. Report Format. The supplemental observer program has a simple format requiring a minimum of four elements (location, time, one or more weather elements, and initials). Location can be in plain English for a site or in military grid reference system coordinates. Time is recorded in Coordinated Universal Time or Greenwich Mean Time. The supplemental observer is encouraged to use plain English to describe the phenomenon.

7.2.1. For some locations, a full report may be necessary to support operations. For others, such as tracking cloud heights, only a single element may be necessary. The goal is a format easily identified and communicated through available distribution sources (e.g., radio, MiRC®, Blue Force Tracker, and/or OWS applications). The format may be something like the examples in **Table 7.1**

Table 7.1. Supplemental observing weather report examples.

Required Elements:	LOCATION, TIME [CLOUD COVER/WIND SPEED AND DIRECTION/VISIBILITY /WEATHER/GROUND STATE/TEMPERATURE/PRESSURE/REMARKS] INITIALS – WEATHER AIRMAN INITIALS
Example 1:	<p>“Here at location Bravo, the clouds are 8 of 8 overcast and we can’t see the farm house at 400 feet on the hill. My initials are GH”</p> <p>Location Bravo, 04011222Z [OVC004////////CAN’T SEE FARM HOUSE ON HILL] GH - JCH</p>
Example 2:	<p>“Thunderstorms just kicked up to the west and then the wind picked up. Measured at 35kt. Dust is reducing visibility. Can’t see the second guard tower at two miles, but can see the chow hall at half mile. My initials are TT”</p> <p>Location Bravo, 04011532Z [CB west/35KT/<3200/DU////VIS GREATER THAN 1/2 LESS THAN 2] TT – JCH</p>
Example 3:	<p>“FARP TANGO JK13452545; time of observation 04011922Z; clear skies; wind 22knots from 120; estimate 5 miles visibility in dust; ground dry; 30 Celsius; 1019.2;JJ”</p> <p>FARP TANGO JK13452545, 04011922Z [CLR/12022KT/8000/DU/DRY/30C/1019.2/NO VIS BINDER] JJ – JCH</p>

7.3. Semi-Permanent and Micro Weather Sensors. In the event the need for weather data exceeds a supplemental observer’s availability, SWOs should coordinate the temporary installation of a tactical weather sensor (e.g., TMOS, micro weather sensor) until a more permanent solution can be established. As with the handheld weather sensors, basic operator training should be required and the equipment needs to be hand receipted to the supplemental observer.

Chapter 8

WEATHER INTEGRATION IN JOINT AND ARMY OPERATIONS PROCESSES

8.1. Joint Operations Overview. In conducting joint operations, commanders and staff apply operational art to operational design using the joint operation planning process. More information detailed information on joint operations can be found in JP 3-0, *Joint Operations* and JP 5-0, *Joint Planning*.

8.1.1. Planners apply operational design to provide the conceptual framework that underpins joint operation or campaign plans and their subsequent execution. The application of operational art and operational design further reduces uncertainty and adequately orders complex problems to allow for more detailed planning.

8.1.2. Planners further use the joint operations process to develop the CONOPS, force plans, deployment plans, and supporting plans that contain multiple courses of action (COA) in order to provide the flexibility to adapt to changing conditions and remain consistent with the JFC's intent.

8.1.3. The joint operation process includes a number of elements and four broad activities (situational awareness, planning, execution, assessment) as shown in **Figure 8.1** regardless of the mission (e.g., overseas deployment, CTC rotation, or an event on post) a process similar to that discussed above should be used. More detailed discussion on this process can be found in chapter II of JP 5-0.

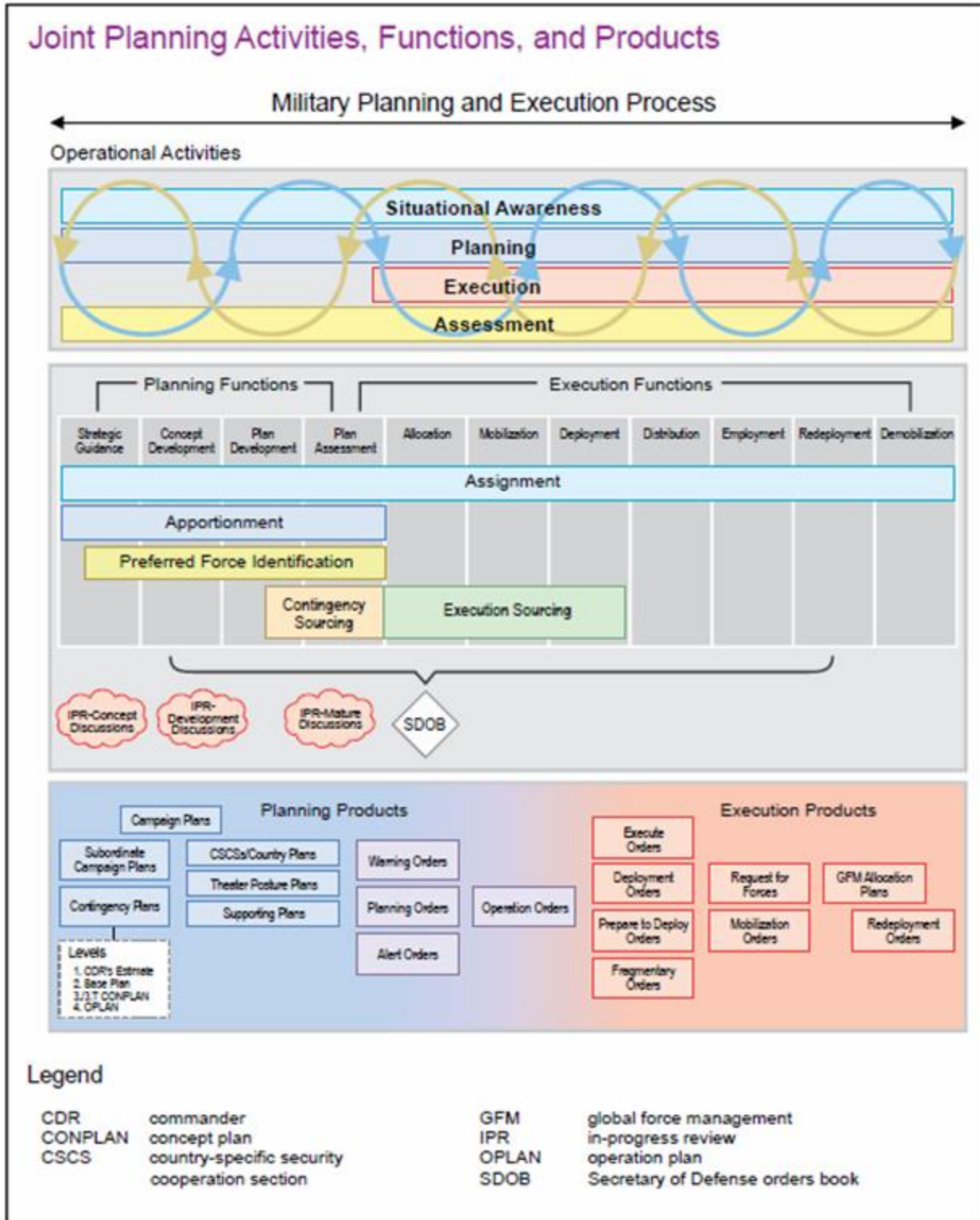
8.1.3.1. Situational awareness addresses procedures for describing the operating environment (OE), including threats to national security.

8.1.3.2. Planning translates strategic guidance and direction into campaign plans, level 1-4 plans, and OPORDs.

8.1.3.3. Execution begins when the President of the United States (POTUS) decides to use a military option to resolve a crisis. Only the POTUS or Secretary of Defense (SECDEF) can authorize the CJCS to issue an EXORD. Depending upon time constraints, an EXORD may be the only order a JFC receives. The EXORD defines the time to initiate operations and conveys guidance not provided earlier. Execution continues until the operation is terminated or the mission is accomplished.

8.1.3.4. Assessment is used to determine progress towards mission accomplishment. Assessment involves comparing the desired OE with the actual OE to determine the overall effectiveness of the campaign or operation (e.g., are the JFC's objectives being met?). Assessment is a continuous activity in both planning and execution and allows for the identification, adaptation and adjustment of operations in order to reach the desired end state.

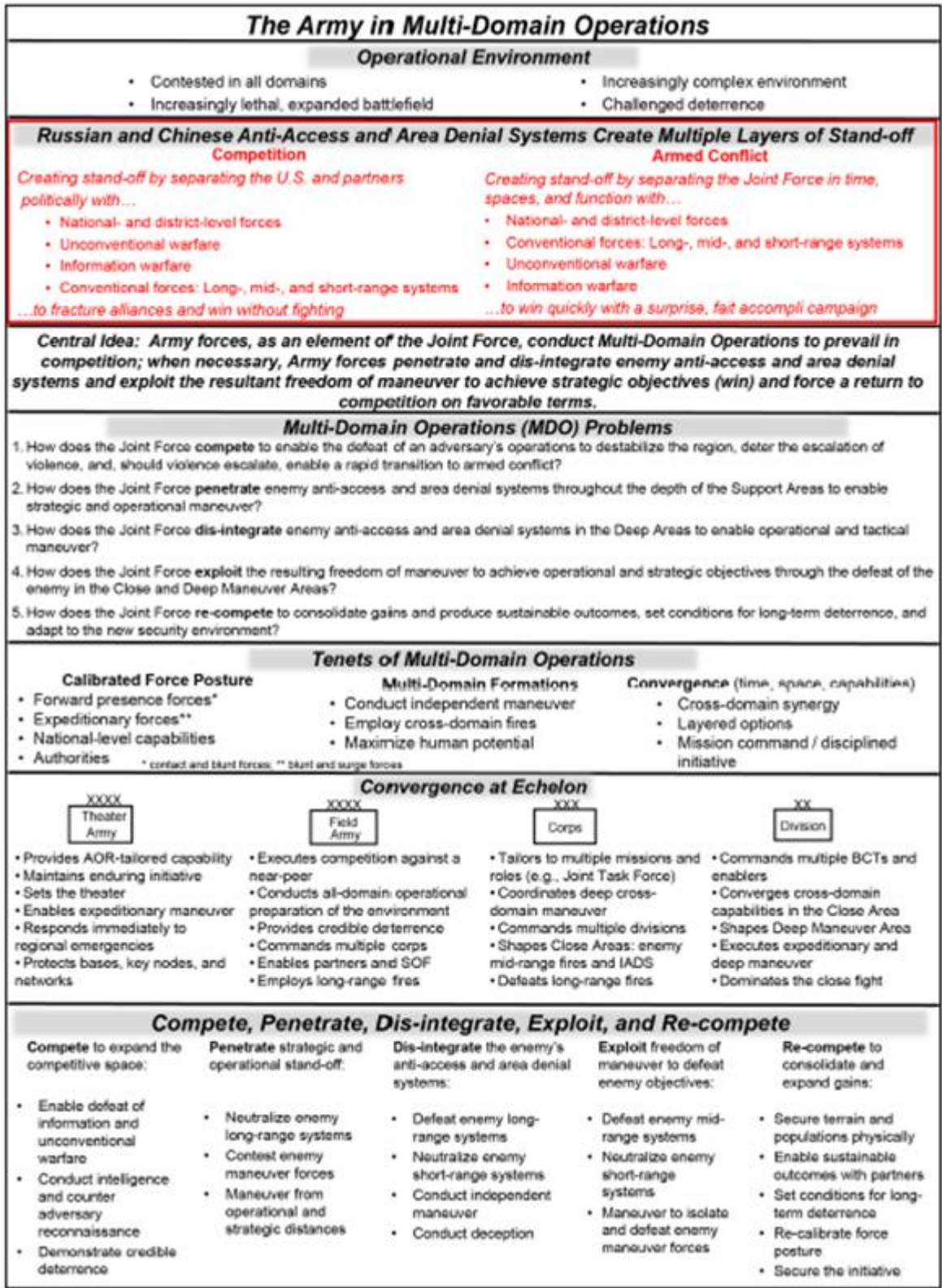
Figure 8.1. Joint Planning Activities, Functions and Products (JP 5-0).



8.1.4. A SWO's integration into the Army operations process does not just include integrating weather environmental intelligence and knowledge into development of plans and orders. SWOs should capture details pertinent to weather operations and communicate with their HHQ and/or MAJCOM-level weather staff via appropriately classified means. This helps them to organize and plan support for a potential EXORD if required.

8.2. Multi-Domain Operations. MDO is updating the Army's ULO model. Regulations, FMs and other references are in the process of updating at the time of this document's initial publication. MDO 2028 is a concept that seeks to solve the problem of "layered standoff" through "rapid and continuous integration of all domains of warfare". MDO addresses five operational problems in order to meet national strategic objectives with the joint force and partner nations: compete, penetrate, dis-integrate, exploit, and re-compete. The Army executes MDO with echeloned (e.g., corps, division, brigade, etc.) forces in all domains and the electromagnetic spectrum in order to create cross-domain synergy and overmatch against the adversary. See TP 525-3-1 for greater detail on Army MDO. See [Figure 8.2](#) for the MDO logic map as presented in TP 525-3-1.

Figure 8.2. MDO Logic Map.

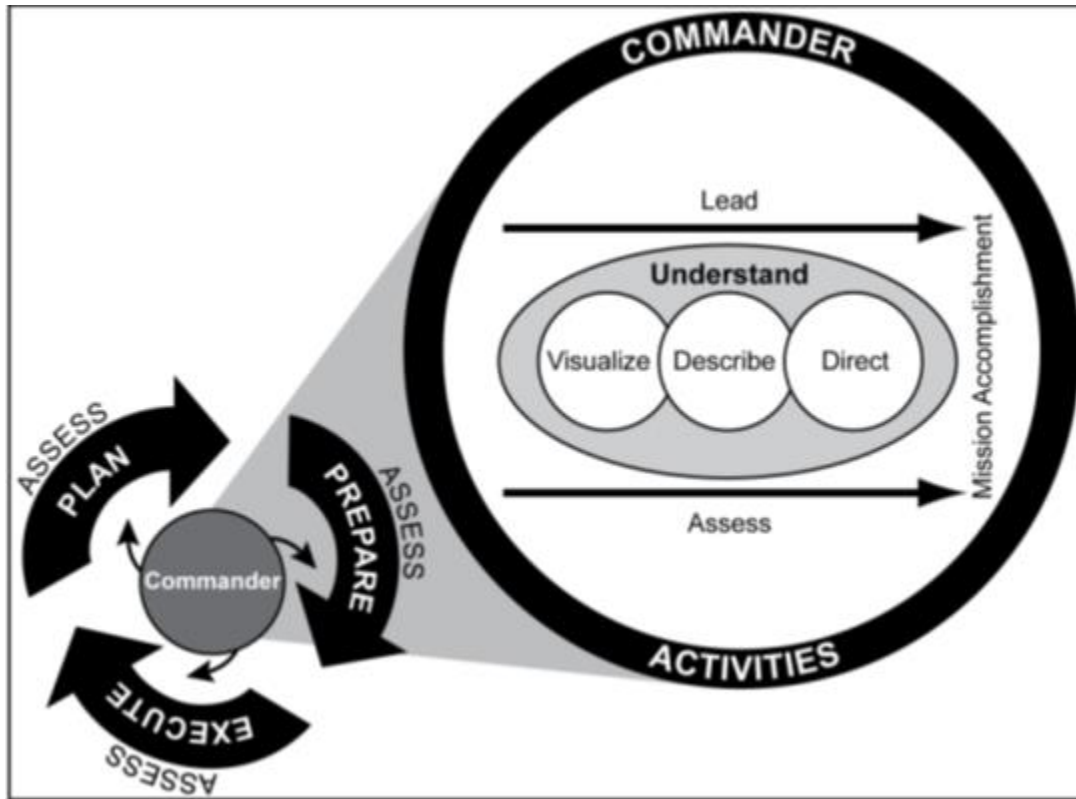


8.2.1. Army leaders plan, prepare, execute, and assess operations by analyzing their OE in terms of the operational variables and mission variables. An OE is a composite of the conditions, circumstances, and influences that affect the employment of capabilities and bear on the decisions of the commander. The operational variables consist of political, military, economic, social, information, infrastructure, physical environment, and time (PMESII-PT). The mission variables consist of mission, enemy, terrain and weather, troops and support available, time available, and civil considerations (METT-TC). The SWO's primary focus is on the physical environment, climate, and weather variables.

8.3. Operations Structure. The operations structure—the operations process, warfighting functions, and operational framework—is the Army's common construct for ULO. It allows Army leaders to rapidly and effectively organize efforts in a manner commonly understood across the Army. The operations process (**Figure 8.3**) provides a broadly defined approach to developing and executing operations. The warfighting functions serve as a common means of organization for critical functions. The operational framework furnishes Army leaders with basic conceptual options for arraying forces and visualizing and describing operations. SWOs should completely understand this framework and be able to apply weather subject matter expertise throughout the operations process.

8.3.1. Commanders use the operations process to drive the planning necessary to understand, visualize, and describe their unique OEs; make and articulate decisions; and direct, lead, and assess military operations. The operations process consists of the major C2 activities performed during operations: planning, preparing, executing, and continuously assessing the operation. SWOs are engaged with the commander and staff throughout the operations process by focusing on operational climatological and predictive weather effects assessments in the physical environment with a focus on adverse weather condition's influence on the employment of warfighting function capabilities in AOs, AOIs, and areas of influence. It is essential that SWOs engage with the staff to understand weather limiting thresholds for the capabilities of each warfighting function. Based on these thresholds, SWOs should integrate current and predictive weather effects assessments throughout the operations process.

Figure 8.3. Army Operations Process (Source: Figure 2, ADP 5-0).



8.3.2. Situational Understanding. Success in operations demands timely and effective decisions based on applying judgment to available information and knowledge. Situational understanding is the product of applying analysis and judgment to relevant information to determine the relationships among the operational and mission variables to facilitate decision making. Commanders and staffs seek to build and maintain situational understanding throughout the operations process to develop and improve their understanding of the OE and the problem. Using personal observations and inputs from others (e.g., running estimates from the staff), commanders improve their understanding of their OE throughout the operations process. Situational understanding enables commanders to establish the situation's context, develop effective plans, assess operations, and make quality decisions. Commanders and staffs use the operational and mission variables to help build their situational understanding. They analyze and describe an OE in terms of the eight interrelated PMESII-PT operational variables identified earlier. Physical environment includes the geography and manmade structures, as well as climate and weather in the AO. Upon receipt of a mission, commanders filter information categorized by the operational variables into relevant information with respect to the mission using the METT-TC mission variables. The SWO analyzes and describes how the weather affects the employment of the six warfighting function capabilities used to execute the mission. Using the operational variables as a source of relevant information for the mission variables allows commanders to refine their situational understanding of their OE and to visualize, describe, direct, lead and assess operations.

8.4. Army Warfighting Functions. Army commanders conceptualize capabilities in terms of combat power when executing operations. Combat power has eight elements: leadership, information, command and control, movement and maneuver, intelligence, fires, sustainment, and protection. The Army collectively describes the last six as Army warfighting functions. The SWO should learn how to support each warfighting function to ensure the commander and staff can make timely and effective decisions. JP 3-59 discusses how AF weather forces directly support the warfighting function.

8.4.1. C2. Weather products inform commanders' guidance and direction to Army forces, help enable commanders to synchronize and effectively control forces, and manage risk during operations while employing lethal and nonlethal capabilities in the operational area. These products also support an efficient decision-making process that enables commanders to make any decisions involving weather information at a pace more rapidly than the adversary's decision-making cycle. This decreases risk and allows commanders opportunities to gain the operational advantage (e.g., control the timing and tempo of operations). Additional details on weather support to decision making processes can be found in the next chapter. WPs also help enable commanders and subordinate commanders to allocate means and integrate and synchronize actions throughout the operational area, while synchronizing movement and maneuver with intelligence, fires, sustainment, and protection within the operational areas.

8.4.2. Movement and Maneuver. Weather personnel integrate weather and WPs for the center of gravity/decisive point and also to inform commanders of various ways and means to help maneuver forces to attain positional advantage. Commanders leverage weather information for both friendly and adversary movement and fires capabilities to exploit weather windows of opportunity and outmaneuver the adversary through the flexible application of friendly movement and fires. Weather information is also used to evaluate the movement and deployment of forces into an operational area and the maneuver of these forces to operational depth for offensive and defensive purposes. Weather personnel routinely collaborate with geospatial engineer teams at corps and above echelons to integrate weather conditions and effects on terrain and hydrological systems, which may affect friendly and adversary traffic ability and mobility challenges.

8.4.3. Intelligence. The purpose of intelligence is to support commanders and staffs in gaining situational understanding of enemy, terrain and weather, and civil considerations mission variables. Intelligence leaders furnish the commander with predictive assessments that consider all aspects of those mission variables and an estimate regarding the degree of confidence in each analytic assessment. Commanders require information about weather aspects of the OE before and during operations to effectively accomplish their missions. Intelligence and weather enable commanders to visualize the OE, organize their forces, and control operations to achieve their objectives by answering specific requirements focused in time and space. Current and predictive weather effects assessments facilitate the commander's visualization and support decision making.

8.4.4. Fires. Joint fires are those delivered during the employment of forces of two or more components in coordinated action to produce desired results in support of a common objective. SWOs integrate WPs to the joint fires officer in support of the unit's targeting process for all selected targets and the available weapons and other systems employed to create a specific lethal or nonlethal effect on these targets. WPs enhance fires support, which assists joint forces to move, maneuver, and control territory, populations, airspace, and key waters. To optimize the effectiveness and synchronization of joint fires, SWOs provide weather information for air, land, maritime, and special operations forces capabilities used to counter air and missile threats, interdict enemy capabilities, and conduct strategic attack. Weather personnel should be integrated into the targeting board to enhance the synchronization of targeting efforts with intelligence and operations.

8.4.5. Sustainment. Sustainment provides commanders with the means to enable freedom of action and endurance and ability to extend operational reach. Effective sustainment determines the depth to which the joint force can conduct decisive operations, allowing commanders to seize, retain, and exploit the initiative. Weather personnel integrate WPs into logistic plans based on weather-limiting thresholds for logistics capabilities. This information is important to the development of a feasible, supportable, and efficient concept of logistics support. Weather personnel also furnish geospatial engineering teams with current weather and predicted weather parameters in support of their mobility/trafficability assessments. These assessments are important to logistics planners and commanders, since the ability to synchronize the various classes of supply in time and space across the other joint functions is critical to mass combat power and create the desired effects to defeat the adversary. Often, sustainment activities can occur well outside the boundaries of the operational area, requiring weather personnel to be aware of and advise commanders on weather and weather effects which may limit operational reach and greatly diminish the commander's freedom of action.

8.4.6. Protection. Weather support activities for the Protection warfighting function are focused on preserving the Army force's fighting potential, so it can be applied at the decisive time and place and incorporate integrated and synchronized offensive and defensive measures that enable the joint force, while degrading capabilities for the adversary. Weather personnel integrate WPs and information to commanders to enhance maneuver support activities, to include but not limited to: WPs to inform tasks associated with planning and execution of air, space, and missile defense operations; weather support capabilities and information in support of cyberspace defense; weather and WPs for the protection of forces, bases, joint security areas, and lines of communication (e.g., advisories and warning of severe weather conditions); and, WPs to enable mitigation of the effects of CBRN threats and hazards through WMD consequence management. Weather personnel also integrate weather information to mitigate health threats that are a composite of enemy actions; occupational, environmental, geographical, and meteorological conditions; endemic diseases and employment of CBRN that can reduce effectiveness of military forces. Weather personnel, in coordination with the G-2, integrate weather effects regarding adversary's capabilities against personnel and resources into the MDMP to optimize maneuver support.

8.4.7. Engagement Concept. Although determined to not be a warfighting function in 2016, the engagement concept transcends all Army warfighting functions. TRADOC Pamphlet 525-2-1, *US Functional Concept for Intelligence*, addresses how ‘information collection and analysis can help improve understanding of the enemy, terrain, weather, and civil considerations.’ Weather and physical environment information and knowledge can serve as tools to build trust with indigenous combat forces, civilian leaders and the civilian population within an AO. An example of this is when weather and physical environment tools are used to develop a source for Human Intelligence (HUMINT) collection or support Civil Affairs efforts. When significant weather events are forecast to occur, SWOs should consider these events as opportunities to enable engagement activities. This should broaden interaction and strengthen trust. Examples of physical environment tools that support engagement are tide tables, lunar phases, and climatological data such as first/last frost day.

Chapter 9

WEATHER INTEGRATION IN ARMY OPERATIONS AND INTELLIGENCE PROCESSES

9.1. Running Estimates. Running estimates are principal knowledge management tools used by the commander and staff throughout the operations process. Effective plans and successful preparation, execution and assessment hinge on accurate running estimates, or the continuous assessment of the current situation. The running estimate helps the staff to track and record pertinent information as well as furnish recommendations (especially for anticipated decisions) to commanders. Running estimates represent the analysis and expert opinion of each staff section by functional area. The basic outline for the running estimate comprises situation and considerations, mission, COAs, analysis, comparison, and recommendations and conclusions. SWOs should work with Army staff sections to ensure each warfighting function has incorporated weather effects into their running estimates.

9.2. Types of Intelligence Products. The G-2 staff produces and maintains a broad variety of products tailored to its consumers. These products are developed and maintained in accordance with the commander's guidance. For all of these products, the primary focus of the G-2 staff's analysis is presenting predictive intelligence and weather to support operations. See TP 525-2-1 and ADP 2-0 for additional information on intelligence activities.

9.2.1. Intelligence summary (INTSUM). The current assessment of the threat situation and civil considerations. Information and intelligence used to develop the INTSUM is ultimately applied to develop and update the staff estimate. INTSUMs provide the context for commander's situational understanding. The INTSUM reflects the G-2's interpretation and conclusions regarding threats, terrain and weather, and civil considerations over a designated period of time. The INTSUM assists in assessing the current situation and updating other intelligence reports. It is disseminated to higher, lower, and adjacent units. The SWO should include current and predictive weather effects on the friendly warfighting function capabilities and threat/adversary capabilities based on weather limiting sensitivity thresholds for these capabilities.

9.2.2. Intelligence Estimates. These are the most detailed products developed for capturing the analysis and conclusions about threats and other relevant aspects of the OE. Intelligence estimates are developed for a specific situation or condition in order to determine the courses of action available for a threat. Furthermore, intelligence estimates are used to: determine the probable order of COA adoption, disseminate intelligence and weather information, and determine other relevant aspects of the OE.

9.2.3. Weather Products (weather estimates). The SWO is responsible for working with the G-2 staff and the commander to develop tailored weather products, which are often included in Tab B of the intelligence estimate. Similar to Intelligence Estimates, these short-range mission execution forecasts are continuously updated weather effects assessments of the warfighting function capabilities to inform whether planned operations are supportable based on current and forecast weather conditions. Failure to maintain accurate MEFs may lead to errors or omissions that result in flawed plans or bad decisions during execution. During planning, commanders use this information to select feasible, acceptable, and suitable COAs

for further analysis. The following is an example of the basic information in a MEF: operational climatology/predictive weather effects on friendly and threat operations/capabilities based on specific weather sensitivity thresholds in the OE (AOs, named areas of interest (NAIs), AOIs, etc.). Depending on the unit mission or situation, MEFs may go by other names such as Nowcast, Golden Hour forecast, or Fire Mission forecast. See [Attachment 3](#) for an example of a MEF. Under no circumstance should AF weather personnel delegate weather product generation responsibility to non-AF weather personnel. While occurrences may exist at echelons below brigade or locations where a SWO is not assigned, Army Soldiers at all ranks and echelons should be trained to submit requests to the next higher Army echelon SWO.

9.2.3.1. Meteorological mission watch. SWOs should conduct mission watch to monitor operations and environmental conditions based on critical thresholds. Refer to AFMAN 15-129 for details on the mission watch process.

9.2.3.2. SWOs should update command and control elements (e.g. Battle Captain, G-33, etc.), air and ground mission commanders, and staff when environmental conditions change or are forecast to occur that differ from MEFs or other weather products.

9.2.3.3. SWOs should consider utilizing all sources of weather information and knowledge within the theater for mission watch. This includes Air Force tactical weather sensors or observers as well as Army sensors and supplemental observers. See [chapter 7](#) for details on the SWOP.

9.2.3.3.1. Much like pilot reports from manned aircraft, the sensors onboard a UAS can be a valuable asset. Temperature and wind sensors can provide flight level information. Full motion video sensors can indicate the presence of weather elements that are undetectable to some sensors unless they are in or under the phenomena. These include but are not limited to the presence of ground fog and showers in the vicinity. AR 115-10/AFI 15-157 (IP) paragraph 2-2.b and AR 5-25 paragraph 4-4.c states the requirement for the Army to share information from Army-owned weather sensing equipment with the Air Force whenever possible.

9.2.3.3.2. Use the effects matrices listed in the Annex H, JMO Letter of Instruction (LOI) or the ARFOR SWO LOI for a common weather effects matrix reference.

9.3. Common Operational Picture (COP). The common operational picture is a display of relevant information within a commander's AOI tailored to the user's requirements and based on common data and information shared by more than one command. The COP facilitates C2 through collaborative interaction and real-time sharing of information between commanders and staffs. This convergence of intelligence and the other warfighting functions is critical to operations. The intelligence portions of the COP are those messages and overlays relating to threats, terrain and weather, and civil considerations in the common database. The G-2 ensures the common database reflects the most current information and intelligence available in order to maintain the integrity of the intelligence portion of the COP. The SWO inputs new or updated weather information in the COP to help the commander and staff visualize the OE. Whenever possible, SWOs should strive to integrate weather inputs into the running estimates of all warfighting functions to facilitate decision quality products on the COP. Additionally the COP can be utilized to track SWOs and sensors within the AOI, an important and useful tool at the ASCC, ARFOR and Corps SWO levels.

9.4. Collaboration and Dialogue. SWOs should be fully engaged in collaboration and dialogue with all staff elements. Through collaboration and dialogue, the Army commander creates a learning environment by allowing participants to think critically and creatively and share their ideas, opinions, and recommendations without fear of retribution. Participants should feel free to make viewpoints based on their expertise, experience, and insight; this includes sharing ideas that contradict the opinions held by those of higher rank. Collaboration occurs during planning and continues through execution regardless of the physical location of participants and results in an improved understanding of the situation, commander's intent, concept of operations, and tasks to subordinate units throughout the force.

9.5. Battle Rhythm. Within the operations process, commanders and staffs should integrate and synchronize numerous activities, meetings, and reports within their headquarters, with their HHQ, and with subordinate units. They do this by establishing the unit's battle rhythm. Battle rhythm is a deliberate daily cycle of command, staff, and unit activities intended to synchronize current and future operations. The unit's battle rhythm sequences the actions and events within a headquarters that are regulated by the flow and sharing of information that supports decision making. An effective battle rhythm facilitates interaction between the commander, staff, and subordinate units, and planning by the staff and decision making by the commander. SWOs should establish a battle rhythm that supports these activities in addition to accomplishing their weather specific tasks. Of note, Army staff battle rhythms are normally established during deployment certification events and/or their lead-up exercises and then carried into the deployment. Thus participating in the supported unit's exercises and CTC events are critical to learning and integrating into that Army staff's battle rhythm.

9.6. Staff Integration Processes. Throughout the operations process, commanders and staffs integrate the warfighting functions to synchronize the force in accordance with the commander's intent and concept of operations. Commanders and staffs use several integrating processes (targeting and risk management) and continuing activities (information collection and protection).

9.6.1. Targeting. Targeting is the process of selecting and prioritizing targets and matching the appropriate response to them, considering operational requirements and capabilities. The purpose of targeting is to integrate and synchronize fires into operations. Targeting begins in planning, and it is an iterative process that continues through preparation and execution. Targeting facilitates engagement of the right target, at the right time, with the most appropriate assets based on the commander's targeting guidance and objectives. The chief of fires (fire support officer [FSO]) leads the staff through the targeting process. Based on the commander's guidance and priorities, the staff determines which targets to engage and how, where, and when to engage them. The staff then assigns friendly capabilities best suited to produce the desired effect on each target, while ensuring compliance with the rules of engagement. The SWO should work with their Chief of Fires on when to provide a predictive weather effects assessment for all capabilities being considered to prosecute targets. **NOTE:** Weather personnel cannot be shy or hesitant during staff integration meetings or working groups. Rank of the briefer should not be a factor in the success or failure of a mission; however, this is not always the case and consideration should be given to send a SWO of appropriate rank to meetings. Coordination with the G-2 and FSO on weather effects on future operations facilitates the timing of a SWO's input.

9.6.2. Collections. G-2 staffs furnish intelligence support to targeting for both lethal and nonlethal actions. It includes intelligence support to the planning (target development) and execution of direct and indirect fires, cyber electromagnetic activities, and the information-related capabilities executing inform and influence activities, as well as assessing their effects. The G-2 staff also ensures the information collection plan supports the targeting plan. SWOs should provide predictive weather effect assessments for all ISR assets being considered in the information collection plan to optimize the intelligence staff's use of available assets (includes the platform and payload). Additionally, SWOs should maintain communications with the forecast team supporting those assets to ensure horizontal consistency of effects and impacts.

9.6.3. Risk Management. Risk management is the process of identifying, assessing, and controlling risks arising from operational factors and making decisions that balance risk cost with mission benefits during operations. The Chief of Protection (or G-3 in units without a protection cell), in coordination with the safety officer, integrates risk management into the MDMP. Protection is the preservation of the effectiveness and survivability of mission-related military and nonmilitary personnel, equipment, facilities, information, and infrastructure deployed or located within or outside the boundaries of a given operational area. Commanders and staffs synchronize, integrate, and organize capabilities and resources throughout the operations process in order to preserve combat power and mitigate the effects of threats and hazards.

9.6.3.1. Hazards are conditions or natural phenomena able to damage or destroy life, vital resources, and institutions, or prevent mission accomplishment. Understanding hazards and their effects on operations allows the commander to better understand the terrain, weather, space, and various other factors that best support the mission. This also helps the commander visualize potential impacts on operations. Successful interpretation of the environment aids in correctly applying threat COAs within a given geographical region. Hazards include disease, extreme weather phenomena, solar flares, and areas contaminated by toxic materials or radiation.

9.6.3.2. Throughout the operations process, commanders and staffs use risk management to identify and mitigate risks associated with weather hazards that have the potential to injure or kill friendly and civilian personnel, damage or destroy equipment, or otherwise impact mission effectiveness. The SWO should continually integrate predictive assessments of weather hazards (Severe Thunderstorms, Tornadoes, Hail, etc.) via the MEF or other locally approved weather products to inform commanders and staff of risk management. Like targeting, risk management begins in planning and continues through preparation and execution.

9.6.4. Continuing Activities. While units execute numerous tasks throughout the operations process, commanders and staffs plan for and coordinate the following continuing activities: information collection and Protection (see Risk Management). Information collection is an activity that synchronizes and integrates the planning and employment of sensors and assets as well as the processing, exploitation, and dissemination of systems in direct support of current and future operations. The G-2 and G-3 staffs collaborate to collect, process, and analyze information the commander requires concerning threats, terrain and weather, and civil considerations that affect operations. Information collection (to include reconnaissance and surveillance) is indispensable to building and improving the commander's understanding.

9.7. Commander's Critical Information Requirements. A CCIR is an information requirement identified by the commander as being critical to facilitating timely decision making to facilitate the successful execution of military operations. Commanders decide to designate an information requirement as a CCIR based on likely decisions and their visualization of the course of the operation. CCIRs fall into one of two categories: priority intelligence requirements (PIRs) and friendly force information requirements (FFIRs). A PIR is an intelligence requirement that the commander and staff need to understand the adversary or the OE. The intelligence officer manages PIRs for the commander through planning requirements and assessing collection. A FFIR is information the commander and staff need to understand the status of friendly force and supporting capabilities. FFIRs include information about the mission, troops and support available, weather and time available for friendly forces that the commander considers most important. In coordination with the staff, the operations officer manages FFIRs for the commander. SWOs should always follow current and future missions to facilitate PIR/FFIR recommendation. A simple shift in wind direction could be a PIR/FFIR during mission execution in a CBRN threat environment.

9.8. Planning. Operational planning continues during execution, with an initial emphasis on refining the existing plan and producing the OPORD. Later on in the process, the emphasis shifts to refining the force and utilizing employed assigned and allocated forces. As the operation progresses, planning generally occurs in three distinct but overlapping timeframes: future plans, future operations, and current operations.

9.8.1. Weather personnel process and disseminate meteorological outputs of collection, analysis, prediction, and tailoring in order to integrate them into Army planning methodologies for decision-making and intelligence. This should enable commanders and their staffs to maintain situational understanding of an operation's physical environment in order to anticipate the weather to both mitigate its effects on friendly operations and exploit asymmetric effects on enemy operations.

9.8.2. The SWO should be able to apply the steps of the MDMP, which is an iterative planning methodology. It integrates activities of the commander, staff, subordinate headquarters, and other partners. This integration enables them to:

9.8.2.1. Understand the situation and mission (e.g., what is the AOI climate and associated hazards)

9.8.2.2. Develop and compare courses of action (e.g., how does weather effect each COA and what are the resources needed for each?)

9.8.2.3. Decide on a course of action that best accomplishes the mission (e.g., from a weather paradigm what is the most advantageous COA?)

9.8.2.4. Produce an OPLAN or OPORD for execution (e.g., integrate into IPB and all annexes).

9.8.3. The MDMP helps leaders apply thoroughness, clarity, sound judgment, logic, and professional knowledge to understand situations, develop options to solve problems, and reach decisions. The MDMP results in an improved understanding of the situation and a plan or order that guides the force through preparation and execution. Commanders encourage active collaboration among all organizations affected by the pending operations to build a shared understanding of the situation, participate in course of action development and decision making, and resolve conflicts before publishing the plan or order.

9.8.4. During the MDMP, commanders focus their activities on understanding, visualizing, and describing the OE. The staff's effort during the MDMP focuses on helping the commander understand the situation, make decisions, and synchronize those decisions into a fully developed plan or order. During the MDMP, the SWO is responsible for providing tailored climatology/weather effects products, information and assessments of the warfighting function capabilities in the areas of operation, interest, and influence. The SWO adjusts these products and information based on the commander's requirements and the operation. Staff activities during planning initially focus on mission analysis. The products that the staff develops during mission analysis help commanders understand the situation and develop the commander's visualization. Commanders use the MDMP to visualize the OE and the threat, build plans and orders for extended operations, and develop orders for short-term operations within the framework of a long-range plan. The results of mission analysis (to include IPB and running estimates) inform commanders and facilitate course of action development during the MDMP. **NOTE:** Weather personnel should look for ways to add/overlay weather information and knowledge into existing planning tools. Having one decision-level product for commanders to use saves time and demonstrates a higher level of staff coordination and integration.

9.9. Intelligence Preparation of the Battlefield. IPB is one of the processes commanders use to aid in planning ([Figure 9.1](#)). The intelligence staff uses the products developed during IPB as a baseline to begin situation development. Situation development is a process for analyzing information and producing current intelligence concerning the portions of the mission variables of enemy, terrain, weather, and civil considerations within the AO before and during operations. The process helps the intelligence staff recognize and interpret indicators of threat/adversary intentions and objectives. Situation development confirms or denies threat/adversary COAs, provides threat/adversary locations, explains what the threat/adversary is doing in relation to the friendly force commander's intent, and provides an estimate of threat/adversary combat effectiveness. Through situation development, the intelligence officer and SWO assist the commander in gaining and maintaining situational understanding. Situation development helps commanders make decisions, including when to execute branches and sequels.

9.9.1. It is vital the SWO be fully integrated in IPB. IPB is the systematic process of analyzing the mission variables of enemy, terrain, weather, and civil considerations in an AOI to determine their effect on operations. IPB is most effective and best aids the commander's decision making when the intelligence staff integrates the expertise from across the staff and supporting elements, to include the SWO. The SWO integrates environmental effects information and products focused on the employment of capabilities of the six warfighting functions in the specific geographic area (AOs, NAIs, AOIs, etc.) which are used during the MDMP to aid in developing friendly COAs and decision points for the commander. The SWO focuses on how environmental effects can influence both friendly and adversary/enemy operations/capabilities. This is especially true when operating in environments where the effects of the weather are complex and not easily determined. The SWO contributions to IPB aids commanders in reducing uncertainty by evaluating how the weather may affect operations and decision making. The environmental effects information and products developed during IPB are continually refined throughout the operation. This updated current and predictive environmental effects information is incorporated into the MEF as new information is obtained and further analysis is conducted during situation development. This refinement ensures that the commander's decisions are based on the most current weather information available. More information on IPB and how weather is integrated can be found in ATP 2-01.3, *Intelligence Preparation of the Battlefield*.

Figure 9.1. Intelligence Preparation of the Battlefield.



9.9.2. The SWO contributes to the first step of IPB by analyzing the significant weather effects and thresholds (of the physical environment) that can affect friendly forces employment of the six warfighting functions (C2, movement and maneuver, intelligence, fires, sustainment, and protection) and enemy operations. Failure to identify or misidentify the weather effects can hinder decision making. Additional information on the warfighting functions can be found in chapter 5 of ADP 3-0.

9.9.3. The SWO applies Step 2 of the IPB process by describing how the weather may affect friendly and threat operations/capabilities in general, since evaluation focuses on the general capabilities of each force until threat/adversary COAs are developed in step 4 of IPB and friendly COAs are developed later in MDMP. Success results in allowing the commander to exploit weather to best support the mission. The consequence of failure in this step is the commander may not have the information needed to exploit the opportunities the weather provides.

9.9.4. The SWO applies Step 3 of IPB by engaging with the G-2 (who has outreach to other agencies and the intelligence community) to obtain information about weather-limiting thresholds on the enemy's military capabilities as well as enemy weather prediction capabilities. Based on these weather-limiting thresholds, the SWO evaluates the current and predictive weather effects on the enemy's military capabilities. This evaluation informs how a threat/adversary force may react in certain situations based on a relative advantage or disadvantage in its employment of military capabilities against the friendly force given current and predictive weather conditions in the operational area.

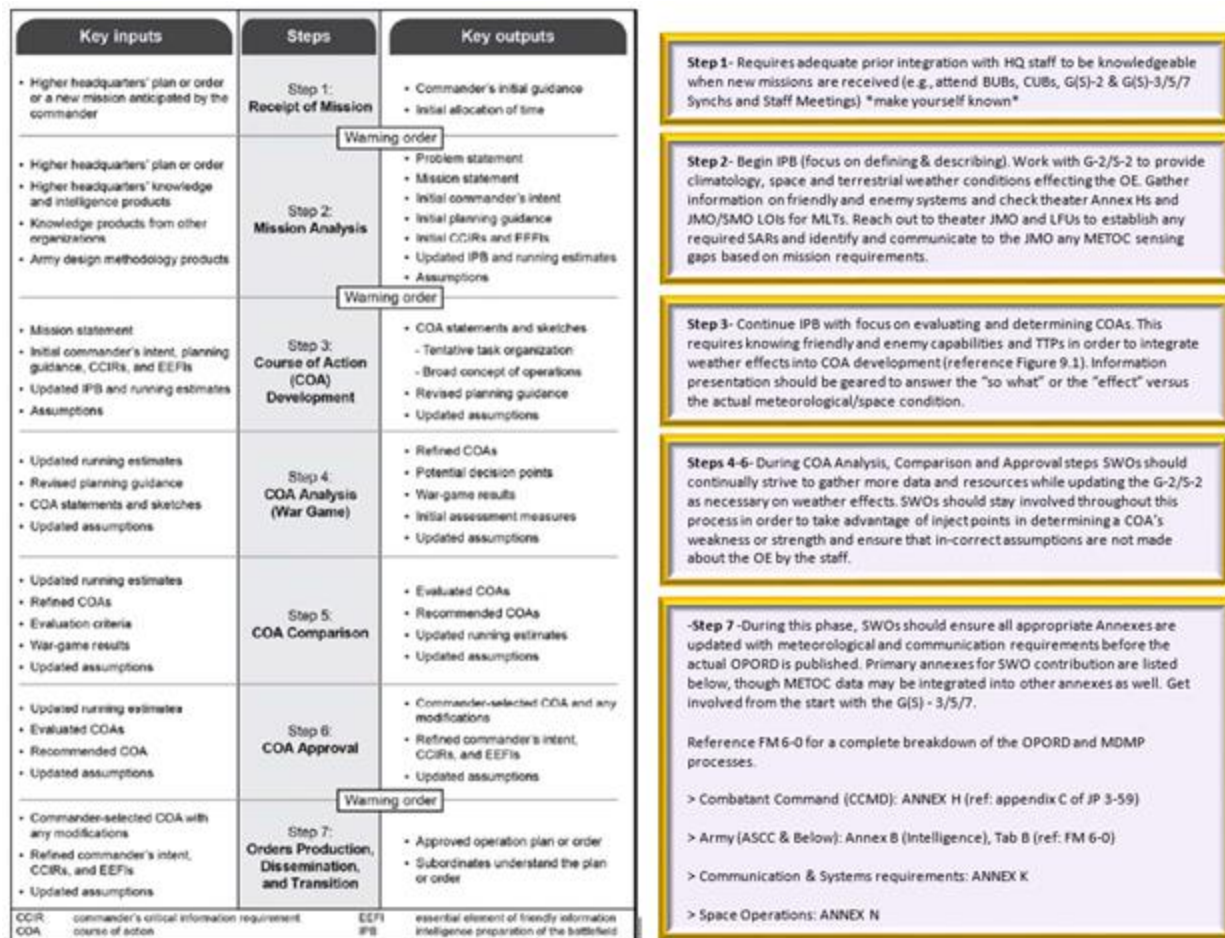
9.9.5. During step 4 of IPB, the SWO integrates weather effects information to inform the intelligence staff's development of possible threat/adversary COAs that can affect accomplishing the friendly mission. These assessments inform the staff's evaluation and prioritization of the likelihood of the threat force adopting each COA. This information is critical to exploiting the resultant asymmetric advantage of our friendly force's ability to operate in certain weather conditions the threat forces are unable to operate in. This analysis should be used to help determine the enemy's most likely and most dangerous COA to use during friendly COA analysis. Weather parameters are factored in determining what advantages or disadvantages weather conditions can have on the enemy forces, and how the enemy can use anticipated weather conditions to move against friendly forces.

9.9.6. Decision making refers to selecting a COA as the one most favorable to accomplish the mission. Commanders make decisions in part based on predictive weather effects analysis developed during initial IPB and on the refinement of that weather effects analysis throughout the operations process. Commanders require accurate, timely, and relevant weather effects information for the OE in order to make informed and good decisions. Throughout IPB, the SWO aids the commander's understanding of how the weather influences the OE and affects operations. Weather information is essential in helping the commander to understand, visualize, and describe the OE; make and articulate decisions; and assess military operations. Understanding operations involves concluding how the interrelationships, dynamics, and interactions between weather and the mission, enemy, terrain and civil considerations cause changes in the OE. Visualization involves developing situational understanding, determining an end state, and envisioning the sequence of events the force accomplishes to achieve the end state. All environmental products and information developed during IPB are essential in aiding the commanders in visualizing the situation.

Commanders then use these and staff products developed during IPB to communicate their vision to their staffs and subordinate commands.

9.10. Military Decision Making Process. The MDMP begins with the receipt of the mission and combines the conceptual and detailed components of planning. See [Figure 9.2](#) for a more detailed overview of MDMP.

Figure 9.2. Military Decision-Making Process Overview.



9.10.1. Mission Analysis. Most G-2 staff section actions during mission analysis support the commander's situational understanding. The G-2 staff generates intelligence, products, and knowledge to support mission analysis. As stated earlier, the intelligence portion of mission analysis is an evaluation of threats, terrain and weather, and civil considerations during IPB. Mission analysis also identifies gaps in information required for further planning and decision making. During mission analysis, the staff develops information requirements, those information elements the commander and staff require to successfully conduct operations: that is, all elements necessary to address the METT-TC mission variables. Some information requirements are of such importance to the commander that they are nominated to the commander to become CCIRs. Commanders continuously review CCIRs during the planning process and adjust them as situations change. The initial CCIRs developed during mission analysis normally focus on decisions the commander needs to make to focus planning. Once

the commander selects a COA, the CCIRs shift to information the commander needs in order to make decisions. Intelligence section actions during mission analysis result in the development of an initial information collection plan and refinement of intelligence and weather estimates and intelligence and MEFs. Mission analysis begins with an analysis of the HHQ's order. The unit G-2 staff focuses its analysis on determining how the HHQ's commander and G-2 staff view threats and other relevant aspects of the OE. The G-2 performs IPB and leads the staff through the IPB process. The other staff sections including the SWO assist the G-2 staff in developing the IPB products required for planning. IPB starts immediately upon receipt of the mission, is refined throughout planning, and continues during preparation and execution based on the continuous assessment of operations.

9.10.2. During mission analysis, the SWO:

9.10.2.1. Supports the commander's situational understanding.

9.10.2.2. Generates weather information, products, and knowledge in support of the intelligence staff's evaluation of METT-TC during IPB.

9.10.2.3. Focuses the analysis on relevant weather aspects of the physical environment.

9.10.2.4. Assists the G-2 staff in developing the IPB products required for planning.

9.10.2.5. In coordination with the intelligence staff, is responsible for providing the commander with a thorough understanding of weather effects on friendly and threat capabilities and operations.

9.10.2.6. Receives weather sensitivity/weather-limiting thresholds for threat forces from the G-2 in coordination with military intelligence and the intelligence community.

9.10.2.7. Receives weather sensitivity/weather-limiting thresholds for friendly force warfighting function capabilities from the G-3.

9.10.2.8. Integrates weather effects assessments into G-2 staff to include in primary intelligence products (intelligence estimates, INTSUMs, and the intelligence portion of the COP).

9.10.2.9. Assists the G-2 and staff to produce weather displays, graphic COP overlays, and weather effects tactical decision aids displaying weather effects (includes terrestrial, aviation, space, and electromagnetic spectrum) on friendly and threat forces capabilities (e.g., information collection assets (platforms and sensor payloads).

9.10.3. The SWO should tailor operational climatology for long-range planning (several weeks to a year) and predictive products (numerical models, regional forecasts, etc.) from METOC centers for crisis action planning (less than 10 days) for specific times and locations considered in the planning process to determine environmental effects. Planning may also require in-depth climate analysis provided by the 14 WS.

9.10.4. The SWO should fully understand the mission as well as commander's intent. Discerning the threshold weather values that can affect operations is identified through a weather factors/forecast effects matrix. The weather effects matrix identifies the specific missions the unit performs and is usually tailored for each mission type. Understanding the environmental and space-based effects on friendly and enemy operations allows the commander to quickly choose and exploit the physical environment's mission variables (weather and terrain) to accomplish the mission. **NOTE:**Focus on the "so what?" Commanders do not care how much rain is forecast to fall but instead are interested in how it affects the ability of his/her unit to accomplish the mission.

9.10.5. Terrain and Weather. Terrain aspects and weather conditions are inseparable, directly influence each other, and impact military operations based on the METT-TC mission variables. Terrain analysis involves the study and interpretation of natural and manmade features of an area, their effects on military operations, and the effects of weather and climate on these features. Terrain analysis is a continuous process. Analyzing military aspects of terrain includes collection, analysis, evaluation, and interpretation of geographical information on natural and manmade features of the terrain. Then analysts combine other relevant factors with the terrain and weather to predict their effects on military operations. Commanders assess terrain using the five military aspects of terrain expressed in the memory aid OAKOC: observation and fields of fire, avenues of approach, key and decisive terrain, obstacles, and cover and concealment.

9.10.5.1. While some effects of weather on the terrain may currently be beyond the scope of the SWO, such as the condition of the ground or flooding levels, other staff elements such as engineers require information from the SWO in order to properly conduct their part of terrain analysis. Consider the existing situation as well as conditions forecast to occur during mission execution. When briefing, identify parts of the AO that favor, disfavor, or do not affect each course of action. **NOTE:**Weather personnel should not confuse engineer terrain teams with Geospatial Intelligence (GEOINT) elements. GEOINT elements are tasked to collect intelligence using overhead and aerial imagery from multiple sources. When establishing a new observation point, SWOs can request the GEOINT team produce site maps with range rings to assist in developing a tactical visibility chart. SWOs should work closely with the GEOINT teams in order to provide the most accurate and precise environmental analysis for the commander.

9.10.5.2. In certain cases, there may be critical weather information needed to address battlespace awareness gaps. Commanders continuously review CCIRs during the planning process and adjust them as situations change. As the intelligence staff completes the mission analysis and finalizes the initial IPB products, intelligence/weather gaps are identified and the staff develops an initial information collection strategy to address these gaps. Time permitting; the staff briefs the commander on its mission analysis. The G-2 staff presents a summary of the intelligence running estimate and SWO provides an assessment on predictive weather effects. This helps the commander and staff as a whole to focus on the interrelationships among the METT-TC mission variables and to develop a deeper understanding of the situation.

9.10.6. COA Development. The purpose of COA development is to update the running estimates and prepare COA options for the commander's consideration. A COA is a broad potential solution to an identified problem. The COA development step of the MDMP generates options for follow-on analysis and comparison that satisfy the commander's intent and planning guidance. The staff develops friendly COAs based on facts and assumptions identified during mission analysis. Incorporating mission analysis results into COA development ensures that each friendly COA takes advantage of the opportunities the threat situation and OE offer and attempts to mitigate the most significant risks. The SWO informs COA development by providing operational climatology/weather effects assessments for warfighting function capabilities to be used in each COA. The SWO collaborates closely with the rest of the staff to analyze the weather effects on relative combat power in the development of friendly COAs. All friendly COAs are developed based on the threat situation template, the threat event template and matrix produced during mission analysis.

9.10.7. COA Analysis. Analysis of COAs, sometimes referred to as wargaming, relies heavily on an understanding of doctrine, tactical judgment, and experience. An effective wargame requires participants to come prepared with the full knowledge of their warfighting function or subject matter expertise. The SWO integrates predictive weather effects assessments into warfighting function capabilities under consideration in each COA. The COA analysis also identifies critical points in time and space during operations where intelligence/weather should support commanders' decisions. Using the threat situation template as a start point and the event template and matrix as a guide, the G-2 staff develops critical threat decision points in relation to friendly COAs, projects threat reactions to friendly actions, and projects threat losses. The G-2 staff captures the results of each threat action and counteraction as well as the corresponding friendly and threat strengths and weather vulnerabilities.

9.10.8. COA Approval. Following an analysis and comparison of the COAs, the staff identifies its preferred COA and makes a recommendation to the commander. This usually occurs during a decision briefing presented by the G-3. During this briefing, the G-2 staff briefs any changes to the threat situation and terrain specific to the COA selected, and civil considerations. The SWO provides an updated predictive weather effects assessments for all warfighting function capabilities to be employed within the preferred COA.

9.10.9. Plan or Order Development. SWOs should assist in the expansion of the approved COA into a detailed OPLAN or OPORD. They also develop the weather sections as required for inclusion in an OPLAN/OPORD. The guidance that outlines the weather information and knowledge necessary for inclusion in an OPLAN/OPORD can be found in Appendix C to JP 3-59. While weather information and knowledge is scattered throughout a plan or order, Annex H is reserved for METOC use within CCMD OPLANs/OPORDs. Furthermore, communications and systems requirements for METOC functions should be integrated into Annex K.

9.10.9.1. SWOs should understand that when inserting weather information and knowledge into an Army OPLAN/OPORD (ASCC and below), it is not stored in Annex H as JP 3-59 states. Army FM 6-0 identifies weather information and knowledge to be stored in Tab B to the Intelligence annex (Annex B). Annex H should contain weather information and knowledge for Joint OPLANS/OPORDs only. Since ASCC and corps echelons can act either as a Land Component HQ or Joint HQ, SWOs should remain engaged with the planning staff to ensure weather information and knowledge is located in the appropriate annex. SWOs should continue to reference Appendix C to JP 3-59 and FM 6-0 for other areas to include weather information and knowledge into the Army operations planning process.

9.11. Preparation. Preparation consists of activities that units perform to improve their ability to execute an operation. Preparation creates conditions that improve friendly forces' opportunities for success. Preparation activities help commanders, staffs, and Soldiers understand a situation and their roles in upcoming operations, as well as setting conditions for successful execution. The SWO should be fully engaged in the following preparation activities: conduct confirmation briefings; improve situational understanding; and conduct rehearsals. Commanders often direct information collection early in planning that continues in preparation and execution. During preparation, commanders may realize that the initial understanding they developed during planning may be neither accurate nor complete. As such, commanders strive to validate assumptions and improve their situational understanding, as they prepare for operations. The SWO should provide collection managers with predictive weather effects assessments to inform the selection of ISR assets (platforms and sensor payloads) based on each asset's weather limiting thresholds to optimize the information collection plan. Optimal use of these assets is critical to collecting timely and accurate information to help satisfy CCIRs and other information requirements.

9.11.1. Commanders use rehearsals to ensure staffs and subordinates understand the concept of operations and commander's intent. Effective rehearsals imprint a mental picture of the sequence of the operation's key actions and improve mutual understanding and coordination of subordinate and supporting leaders and units. The SWO should fully participate in ROC drills to reemphasize the predictive weather effects assessments for the six warfighting function capabilities as they are employed in time and space on the battlefield to execute the operation.

9.12. Execution. Execution puts a plan into action by applying combat power to accomplish the mission and by using situational understanding to assess progress and make execution and adjustment decisions. During execution, commanders, staffs, and subordinate commanders focus their efforts on translating decisions into actions. Recall that to execute operations, commanders conceptualize capabilities in terms of combat power. Combat power is the total means of destructive, constructive, and information capabilities that a military unit or formation can apply at a given time. Combat power is made up of leadership, information and the six warfighting functions. The warfighting functions are the physical means that tactical commanders use to execute operations and accomplish missions. Commanders apply combat power through the warfighting functions to seize, retain, and exploit the initiative to gain and maintain a position of relative advantage. It is incumbent on the SWO to provide the staff with continual updates of the current and predictive weather effects assessments for all warfighting function capabilities used during an operation.

9.12.1. Commanders make execution and adjustment decisions throughout execution. An execution decision is normally tied to a decision point—a point in space or time the commander or staff anticipates making a key decision concerning a specific course of action. An adjustment decision is the selection of a course of action that modifies the order in response to unanticipated opportunities or threats. An adjustment decision may include a decision to reframe the problem and develop an entirely new plan. The SWO should be fully integrated with the G-3/5/7 staff, so they can provide weather effects assessments to inform development of new plans. Most G-3/5/7 staffs hold regular syncs that can be attended in order to gain overall SA on upcoming plans. From there action officers are normally allocated per plan.

9.12.2. Variances. Variances can occur at any time during the course of an operation and are determined based on a difference between the actual situation during an operation and what the plan forecasted the situation would be at that time or event. The commander and staff evaluate emerging variances. If necessary, staffs update the conclusions and recommendations of their running estimates for the commander, who directs the necessary action. Correspondingly, the SWO should update their forecasts and predictive weather effects assessments for the staff. In some instances, the variance is so extreme that no branch or sequel (see Terms for definition of branches and sequels in planning) is available or the current plan lacks enough flexibility to respond to the variance and the commander and staff may have to execute the rapid decision making and synchronization process (RDSP), a decision making and synchronization technique that commanders and staffs commonly use during execution. While MDMP seeks the optimal solution, the RDSP seeks a timely and effective solution within the commander's intent, mission, and concept of operations. Under the RDSP, leaders combine their experience and intuition to quickly reach situational understanding. Air Force SWOs should integrate predictive weather effects assessments into MDMP to inform the staff's development of all workable COAs.

9.12.3. Assessment. Assessment is the determination of progress toward accomplishing a task, creating an effect, or achieving an objective and is a continuous activity of the operations process. During planning, assessment focuses on understanding current conditions of an OE. It also involves continuously monitoring and evaluating the OE to determine what changes might affect the conduct of operations. During execution, assessment focuses on evaluating progress of the operation. Based on their assessment, commanders direct adjustments to the order, ensuring the operation stays focused on accomplishing the mission. Assessment involves the continuous monitoring and evaluation of the current situation to determine progress of an operation. Assessment helps the commander determine progress toward achieving the desired end state, attaining objectives, and performing tasks. The SWO should integrate predictive weather assessments into the following systems and processes: running estimates, the COP and AARs. The SWO should continually refine the accuracy of the MEF (e.g. weather effects assessments for warfighting function capabilities) and update the COP. The SWO should routinely conduct AARs to assess how to better integrate weather effects assessments throughout the operations process in order to improve the commander's situational understanding and decision making.

Chapter 10

PUTTING IT ALL TOGETHER

10.1. This handbook should be utilized in conjunction with applicable AF, Army, and Joint publications, as well as guidance, policy, and direction from HHQ. Supporting a sister Service can be difficult at times. I highly encouraged all SWOs take the time to get to know their Army counterparts, Army culture and values, and the history of their supported units. Oftentimes the Army runs on personal relationships. Knowing more about the supported unit and establishing personal connections with the Soldiers can benefit you and the unit in the long-term. These relationships create, build, and strengthen team cohesion that helps get the job done when deployed. Taking the time to make an office call and shake a hand will pay greater dividends than hundreds of phone calls or e-mails. Get out of your comfort zone, leave your office, and meet the Soldiers you support...integrate. HUA!

JOSEPH T. GUASTELLA,
Lt General, USAF
Deputy Chief of Staff, Operations

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TRADOC Pamphlet 525-2-1, *The U.S. Army Functional Concept for Intelligence*, February 2017

TRADOC Pamphlet 525-3-1, *The U.S. Army in Multi-Domain Operations 2028*, November 2018

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Abbreviations and Acronyms

A-ISR—aerial-intelligence, surveillance, and reconnaissance

AAR—after action report

ACC—Air Combat Command

ACOM—Army Command

ADCON—administrative control

ADP—Army doctrine publication

AETF—Air expeditionary task force

AF—Air Force

AFC—Army Futures Command

AFFOR—Air Force Forces

AFI—Air Force instruction

AFMAN—Air Force manual

AFPD—Air Force policy document

ALO—Air Liaison Officer

AMC—Army Materiel Command

ANG—Air National Guard

AO—area of operations

AOI—area of interest

AOR—area of responsibility
ARFOR—Army Forces
ARNG—Army National Guard
ASCC—Army service component command
ATC—authority to connect
ATO—authority to operate
ATP—Army techniques publication
AVN BN—aviation battalion
BCT—brigade combat team
BDA—battlefield damage assessment
BDE—brigade
BN—battalion
BUB—Battle Update Brief
C2—command and control
C2E—command and control element
CAB—combat aviation brigade
CAC—Combined Arms Center
CATCODES—category codes (Army real property)
CBRN—chemical, biological, radiological, nuclear
CBRNE—chemical, biological, radiological, nuclear, and explosive
CCIR—commander’s critical information requirements
CCDR—combatant commander
CCP—contingency command post
CCMD—combatant command
CJCSI—Chairman Joint Chiefs of Staff Instruction
CJTF—Combined Joint Task Force
CMR—combat mission readiness
COA—course of action
COMAFFOR—Commander of Air Force Forces
CONOPS—concept of operations
CONUS—continental United States
COP—common operational picture

CPOF—Command Post of the Future
CTC—Combat Training Center
CUB—commander’s update brief
CUOPS—current operations
CWS—combat weather squadron
DCGS-A—Distributed Common Ground System – Army
DPW—Department of Public Works
DZ—drop zone
EASOG—Expeditionary Air Support Operations Group
EECP—early entry command post
eMIB—expeditionary - military intelligence brigade
EWXS—expeditionary weather squadron
EXORD—execution order
FARP—forward arming and refueling point
FDO—foreign disclosure officer
FFIR—friendly force information requirements
FM—field manual
FMC—fully mission capable
FORSCOM—Forces Command
FRAGO—fragmentary order
FSO—fire support officer
GCC—geographic combatant command
GEOINT—geospatial intelligence
HF—high frequency
HHQ—higher headquarters
HQ—headquarters
HQDA—Headquarters Department of the Army
HUMINT—human intelligence
IMCOM—Installation Management Command
INTSUM—intelligence summary
IPB—intelligence preparation of the battlefield
ISR—intelligence, surveillance, and reconnaissance

JFC—Joint Force Commander

JFLCC—Joint Force Land Component Commander

JLOTS—joint logistics over-the-shore

JMC—Joint Modernization Command

JMO—joint METOC officer

JMRC—Joint Multi-national Readiness Center

JP—joint publication

JTF—Joint Task Force

JWA—Joint Warfighter Assessment

LFU—lead forecast unit

LOI—letter of instruction

LRE—Launch Recovery Element

LVC—live, virtual and constructive (training)

LZ—landing zone

MAIN—main command post

MAJCOM—major command

MC—mission commander

MDMP—military decision-making process

MDO—Multi-Domain Operations

MEDEVAC—medical evacuation

MEF—mission execution forecast

MEFP—mission execution forecast process

METOC—meteorological and oceanographic

METT-TC—mission, enemy, terrain and weather, troops and support available, time available, and civil considerations (mission variables)

MI BN—military intelligence battalion

MIB—military intelligence brigade

MPA—military personnel appropriations

MR—mission readiness

MTOE—modified table of organization and equipment

MUM-T—manned un-manned teaming

NAI—named area of interest

NIPRNET—non-classified internet protocol router network

NGB—National Guard Bureau

OC/T—observer, coach/trainer

OE—operational environment

OPCON—operational control

OPLAN—operation plan

OPORD—operation order

OWS—operational weather squadron

PACE—primary, alternate, contingency, emergency (plan)

PC—planning charrette

PDR—project definition review

PIR—primary intelligence report

PMESII-PT—political, military, economic, social, information, infrastructure, physical environment, and time (operational variables)

PMSV—Pilot-to-Metro Service

PZ—pick-up zone

RFF—request for forces

RDSP—rapid decision making and synchronization process

RSTA—reconnaissance, surveillance, and target acquisition

SAR—support assistance request

SFAB—security force assistance brigade

SIPRNET—secure internet protocol router network

SMO—senior METOC officer

SOP—standard operating procedure

SSA—space situational awareness

SSE—space support element

SWO—staff weather office(r)

SWOP—supplemental weather observation program

TAC—tactical command post

TACMET—tactical meteorological (equipment)

TACON—tactical control

TACVIS—tactical visibility

TB(X)—transportation brigade (expeditionary)

TMOS—tactical meteorological observation system

TOC—tactical operations center
TOE—table of organization and equipment
TP—TRADOC pamphlet
TRADOC—Training and Doctrine Command
TTP—tactics, techniques and procedures
UAS—unmanned aircraft system
UHF—ultra high frequency
ULO—Unified Land Operations
USAREUR—U.S. Army Europe
UTC—Unit Type Code
WF—weather flight
WFX—warfighter exercise
WIN-T—warfighter information network – tactical
WMD—weapons of mass destruction
WMP—war mobilization plan
WP—weather product
WS—Weather Squadron

Terms

Administrative Control (ADCON)—Direction or exercise of authority over subordinate or other organizations in respect to administration and support.

Assign—1. To place units or personnel in an organization where such placement is relatively permanent, and/or where such organization controls and administers the units or personnel for the primary function, or greater portion of the functions, of the unit or personnel. 2. To detail individuals to specific duties or functions where such duties or functions are primary and/or relatively permanent.

Attach—1. The placement of units or personnel in an organization where such placement is relatively temporary. 2. The detailing of individuals to specific functions where such functions are secondary or relatively temporary.

Branch—The contingency options built into the base plan used for changing the mission, orientation, or direction of movement of a force to aid success of the operation based on anticipated events, opportunities, or disruption caused by enemy actions and reactions.

Command and Control—The exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of a mission. There are four main components to the element of command: authority, responsibility, decision making, and leadership. There are four main components to the element of control: direction, feedback, information, and communication.

Data—(Army) In the context of decision making, unprocessed observations detected by a collector of any kind (human, mechanical, or electronic).

Deployment/Redeployment Order (DEPORD/REDEPORD)—1. A directive for the deployments of forces for operations or exercises. 2. A directive from the Secretary of Defense, issued by the Chairman of the Joint Chiefs of Staff, that authorizes the transfer of forces between combatant commanders, Services, and Department of Defense agencies and specifies the authorities the gaining combatant commander will exercise over the specific forces to be transferred.

Direct Support (DS)—A mission requiring a force to support another specific force and authorizing it to answer directly to the supported force's request for assistance.

Execute Order (EXORD)—1. An order issued by the Chairman of the Joint Chiefs of Staff, at the direction of the Secretary of Defense, to implement a decision by the President to initiate military operations. 2. An order to initiate military operations as directed.

Fragmentary Order (FRAGO)—An abbreviated operation order issued as needed to change or modify an order or to execute a branch or sequel.

General Support (GS)—1. That support which is given to the supported force as a whole and not to any particular subdivision thereof. 2. A tactical artillery mission.

Information—In the context of decision making, data that has been organized and processed in order to provide context for further analysis.

Knowledge—In the context of decision making, information that has been analyzed and evaluated for operational implications.

Mission Command—The Army's approach to C2 that empowers subordinate decision making and decentralized execution appropriate to the situation. Enabled by the principles of: competence, mutual trust, shared understanding, commander's intent, mission orders, disciplined initiative, and risk acceptance.

Operation Order (OPORD)—A directive issued by a commander to subordinate commanders for the purpose of effecting the coordinated execution of an operation.

Operational Control (OPCON)—The authority to perform those functions of command over subordinate forces involving organizing and employing commands and forces, assigning tasks, designating objectives, and giving authoritative direction necessary to accomplish the mission.

Sequel—The subsequent operation or phase based on the possible outcomes of the current operation or phase.

Situational Understanding—The product of applying analysis and judgment to relevant information to determine the relationships among the operational and mission variables.

Tactical Control (–TACON)—The authority over forces that is limited to the detailed direction and control of movements and maneuvers within the operational area necessary to accomplish missions or tasks assigned.

Title 10—Title 10, U.S. Code refers to the Armed Forces and outlines its roles, mission, and organizations. More information on U.S. Codes can be found at <https://uscode.house.gov/>.

Title 32—Title 32, U.S. Code refers to the National Guard. The Army National Guard and Air National Guard are integral to first line defenses of the U.S. and are to be maintained at all times. If Congress determines more units and organizations and units are need for national security than the regular components can provide, the Guard may be ordered to active Federal duty (at which time Title 10 applies) and retained as long as needed. More information on U.S. Codes can be found at <https://uscode.house.gov/>

Attachment 2
SAMPLE WEATHER FLIPBOOK

Figure A2.1. Weather Flipbook Example.

Effects on Land	Seaunk's term	Wind Speed (mph)	Beaufort #
Calm, smoke rises vertically, smoke drift indicates wind direction, waves do not move.	Calm	Under 1	0
Wind felt on face, leaves rustle, waves begin to move.	Light Breeze	4 - 7	2
Leaves, small twigs in constant motion, light flags extended.	Gentle Breeze	8 - 12	3
Coat, leaves and loose paper raised up, small branches move.	Moderate Breeze	13 - 18	4
Small trees begin to sway, large branches of trees in motion, whistling heard in lanes.	Fresh Breeze	19 - 24	5
Large branches of trees in motion, whistling heard in lanes.	Strong Breeze	25 - 31	6
Moderate trees in motion, resistance felt in walking against wind.	Moderate Gale	32 - 38	7
Waves and spray on beaches, tops of trees broken off.	Fresh Gale	39 - 46	8
Slight structural damage, waves storm from roofs.	Strong Gale	47 - 54	9
Season experienced on land, trees broken, structural damage occurs.	Whole Gale	55 - 63	10
Very rarely experienced on land, usually with widespread damage.	Storm	64 - 72	11
Violence and destruction.	Hurricane Force	73 or higher	12



Dust
Blowing dust is common in dry areas when strong winds occur and can extend several hundred feet into the air.

Haze
Haze occurs in good weather and calm conditions when dust, smoke, and other dry particles are trapped in the air.

Mist
Mist forms under calm conditions when there is a moderate amount of moisture at the surface, however visibility remains >1/2mi.

Fog
Fog is similar to mist except it occurs when there is an abundance of moisture at the surface and visibility is restricted to less than 1/2mi.

Cloud Layer or "Ceiling" is at 5000ft

Cloud Layer or "Ceiling" is at 2500ft

If MTN is not visible, VIS must be below 4mi.

4 Miles (6000m)

Intensity	Criteria	Estimating Intensity of Rain or Freezing Rain
Light	Scattered drops that, regardless of duration, do not completely wet and exposed surface up to a condition where individual drops are easily seen.	
Moderate	Individual drops are no clearly identifiable, spray is observable just above pavements and other hard surfaces.	
Heavy	Rain seemingly falls in sheets; individual drops are not identifiable; heavy spray to height of several inches is observed over hard surfaces.	
Intensity	Criteria	Intensity of Snow Based on Visibility
Light	Visibility > 1/2 mile (800 meters).	
Moderate	Visibility > 1/4 mile (400 meters) but < or = to 1/2 mile (800 meters).	
Heavy	Visibility < or = to 1/4 mile (400 meters).	

Other Significant Weather You Should Report:

- Cumulonimbus
- Wall Cloud
- Storm/Lightning
- Rotor Cloud
- Valley Fog
- Heavy Snow
- Heavy Rain
- HAIL
- Pea - 0.25"
- Penny - 0.75"
- Nickel - 0.88"
- Quarter - 1"
- Half Dollar - 1.25"
- Ping Pong Ball - 1.5"
- Golf Ball - 1.75"
- Lime - 2"
- Tennis Ball - 2.5"
- Baseball - 2.75"
- Large Apple - 3"
- Softball - 4"
- Grapefruit - 4.5"
- CD/DVD - 5"

Attachment 3 SAMPLE WEATHER PRODUCT

Figure A3.1. Weather Product Example.

3d WEATHER SQUADRON - FORT HOOD MISSION PLANNING / EXECUTION FORECAST													
DATE:	3-Nov-14		VALID TIME:	3/0000Z - 3/1200Z			MEF#	03 A		REV#	TIME:		
FORECASTER:	3d WS Homepage: www.hood.army.mil/3ws						RGAAF METRO:	306.5 UHF					
SOLAR / LUNAR DATA							SPACE WEATHER IMPACTS						
DATE	BMNT	SR	SS	EENT	MR	MS	ILLUM	MOON ANGLE ≥ 30°		GPS	G	Unlikely Degradation	
3-Nov-14	0555L	0648L	1741L	1835L	1538L	0315L	91%	1807 - 4/0148		UHF	G	Unlikely Degradation	
4-Nov-14	0555L	0649L	1740L	1834L	1619L	0419L	96%	1847 - 5/0253		HF	G	Unlikely Degradation	
FLIGHT LEVEL WINDS (KNOTS) AND TEMPERATURES (°C) - FORT HOOD RESERVATION													
500' AGL	1,000' AGL	2,000' AGL	3,000' AGL	5,000' MSL	6,000' MSL	8,000' MSL	10,000' MSL						
FLIGHT HAZARDS FOR LOCAL FLYING AREA (IAW FHR 95-1)													
HAIL, SEVERE TURB/ICING, HEAVY PRECIP, LIGHTNING & WIND SHEAR EXPECTED IN & NEAR T-STORMS											PLEASE PROVIDE FEEDBACK		
CAT II ACFT: UN-60, AH-64, CH-47, UN-72, BE-20, UC-35, C-208 // CAT I ACFT: HUNTER, SHADOW, GRAY EAGLE UAS													
HAZARDS	INTENSITY/COVERAGE		LEVELS (MSL)		LOCATION								
THUNDERSTORMS	NONE		MAX TOPS										
ICING	NONE												
TURB CAT II	NONE												
TURB CAT I (FHR ONLY)	NONE												
MIN FREEZING LEVEL													
												160	MSL
FORT HOOD RESERVATION AREA FORECAST (INCLUDES RGAAF, HAAF, LONGHORN AND SHORTHORN AUXILIARY AIRFIELDS)													
VALID TIME	MIN CIG (AGL)	MIN VIS (sm)	SIG WX	SURFACE WIND	MAX TEMP		MAX DPT	RH %	MIN ALSTG	RGAAF		HAAF	
					°C	°F				°C	MAX PA	MAX DA	MAX PA
0000Z - 0200Z						32		100%			#DIV/o!		#DIV/o!
0200Z - 0400Z						32		100%			#DIV/o!		#DIV/o!
0400Z - 0600Z						32		100%			#DIV/o!		#DIV/o!
0600Z - 0800Z						32		100%			#DIV/o!		#DIV/o!
0800Z - 1000Z						32		100%			#DIV/o!		#DIV/o!
1000Z - 1200Z						32		100%			#DIV/o!		#DIV/o!
FORT HOOD PLAIN LANGUAGE FORECAST / OUTLOOK FOR THE NEXT 24-HOURS													
TEST FLIGHT AREA (TFA) // (IAW FHR 95-1)							WESTERN TRAINING AREA // (IAW FHR 95-1)						
VALID TIME	0000 - 0400Z						VALID TIME	0000 - 0400Z					
LOCATION	TFA III	TFA IV	TFA V	TFA VI			LOCATION	NE	SE	SW	NW		
MIN CIG (AGL)							MIN CIG (AGL)						
MIN VIS (SM)							MIN VIS (SM)						
SIG WX							SIG WX						
SFC WND							SFC WND						
VALID TIME	0400 - 0800Z						VALID TIME	0400 - 0800Z					
LOCATION	TFA III	TFA IV	TFA V	TFA VI			LOCATION	NE	SE	SW	NW		
MIN CIG (AGL)							MIN CIG (AGL)						
MIN VIS (SM)							MIN VIS (SM)						
SIG WX							SIG WX						
SFC WIND							SFC WIND						
VALID TIME	0800 - 1200Z						VALID TIME	0800 - 1200Z					
LOCATION	TFA III	TFA IV	TFA V	TFA VI			LOCATION	NE	SE	SW	NW		
MIN CIG (AGL)							MIN CIG (AGL)						
MIN VIS (SM)							MIN VIS (SM)						
SIG WX							SIG WX						
SFC WIND							SFC WIND						

Attachment 4

ARMY WEATHER SUPPORT CONSIDERATIONS AND LESSONS LEARNED

Figure A4.1. Army Weather Support Considerations and Lessons Learned.

	Considerations
1	Train and exercise on DoD-approved communication tools and applications to ensure access to weather information and knowledge (e.g., MARK IVB, Google Earth™, HURREVAC®, etc.). This also includes chat applications for collaboration between OWS and in-theater units.
2	During RIP/TOA: <ul style="list-style-type: none"> • Ensure the incoming unit formally states a requirement for a SWO as soon as the unit is identified to relieve the current unit • Ensure the TACMET does not need to be shifted and communications for the sensor network are fully operational within the joint operations area • Ensure that all network certification documentation is up-to-date and coordinated with the incoming unit, to include firewall exemption letters
3	Theater weather information collection/dissemination plan evolves with Army operations. Consistent coordination with JMO is essential for proper management.
4	Utilize weather effects to facilitate Soldier rest cycles to maximize down time.
5	During redeployment, risks to operations increase as the sensing footprint decreases and SWO support becomes more reliant on reach back support. SWOs should coordinate with Army leaders to mitigate negative effects.
	Lessons Learned
1	A SWO is his/her best advocate. If a SWO does not integrate into their Army unit staff and demonstrate the importance of a SWO's capabilities in IPB and MDMP, do not expect to be considered for anything more than as an afterthought.
2	ALWAYS plan accordingly and conduct a 100% operations check of gear and equipment BEFORE deployment.
3	KNOW your unit's capability to support an operation. They may be tasked to provide equipment and/or personnel to support other deployed weather units.
4	While deployed, every SWO should find the dividing line between supporting the tasked Army unit, helping the team, and performing tasks that exceed guidance in accordance with AFI 15-157/AR 115-10 (IP) paragraph 1-5, d.(1).
5	Produce and maintain a current set of weather support SOPs and/or TTPs that are tailored to the supported Army unit.
6	Action officer decision briefings contain large amounts of data; seek to provide accuracy and to convince the decision maker on a solution/decision. However, an O-6 and General Officer level briefing contains small amounts of data, seeks to provide clarity on an issue, and compels the decision maker to make a solution/decision. Ask yourself, does your brief describe, "what you have done to get to this decision" or does it describe, "what you are there for...a decision."
7	Exploit weather information to support HUMINT source development and source information validation; HUMINT teams can also be SWOP candidates.

Attachment 5
SAMPLE PACE PLAN

Figure A5.1. Example PACE Plan.

RECEIVING PRIORITY	MIN DELIVRY FRQ	PRODUCT	DATA SOURCE	NOTES	ASSUMPTIONS
Primary: Aligned unit provided NIPR/SIPR network Alternate: UHF SATCOM Contingency: HF Data & Voice Emergency: Preloaded/Cache Data					
ACRONYMS: 557 WW: 557th Weather Wing at Offut AFB AOI: Area of Interest METSAT: Meteorological Satellite Imagery MOAF/JOAF: Mission Operations Area Forecast / Joint Operations Area Forecast OWS: Operational Weather Squadron at Hickam, Kapaun AS (Germany), DM, Barksdale, Shaw, and Scott					
Primary					Assumption: Most, if not all, of the Authoritative Data is available via aligned units' NIPR/SIPR network(s)
Alternate					Assumption: All Alternative/Contingency/Emergency product sets are available via SATCOM
8	15 min	Radar for AOI	557 WW	Global Synthetic Weather Radar could meet this requirement. Does need to be a loop.	Assumption: All of these products & below alternate cut-line are products that are considered a minimum required but can have enhance the timeliness and accuracy of wx operations if made available more frequently.
9	15 min	Lighting Data for AOI	557 WW		
10	1 hour	Space Wx Impacts	557 WW		
11	Incr freq of 82-10	Products #1-10	see above	as more bandwidth is available need to increase freq of products #1-10	
Contingency					Assumption: All Contingency product sets are available via HF Network
2	12 Hour	Model Grid Extractions w/in AOI	557 WW	Although available in 1 hour intervals going to 3 hour intervals reduces file size and is assumed to be "good enough" for limit data forecasting	Assumption: Contingency, combined with Emergency lists together are "good-enough" for AF wx personnel to deliver full mission capability. This is the minimum baseline dataset.
3	1 Hour	Alphanumeric Wx Data w/in AOI	557 WW / OWS	This would include obs, TAFs, WWAs, PIREPs, weather bulletins, space wx bulletins	
4	1 hour	METSAT for AOI	557 WW	Multiple options for data source. Potential pushed direct to tactical units via SATCOM	
5	12 Hour	MOAF/JOAF for AOI	OWS	If required / produced; can be alphanumeric and/or graphical	
6	12 hour	Threat Assessment for AOI	OWS	This could fall into the Alphanumeric requirement if a text bulletin is produced	
7	3 Hour	Aviation Hazard Charts for AOI	OWS	Regional product sets	
Emergency					
		Climate Data	14 WS	14 WS's Climate Go-kit is the new tactical application that could meet need	List of "static" wx data/applications required that could be preloaded on to laptop/system
		Solar/Lunar Data	557 WW	Needs to be formatted to pull this data for any grid point w/in the AOI	
		Visualization Application	557 WW	Software application on laptops that could visualize/map and cache the broadcasted data IOT allow lower bandwidth solutions	
1	5 min	Local sensors	Sensor/Manual Obs kit	Data flow would need to be to local laptop and to strategic center or higher echelon wx units	In non-emergency comm scenarios, sensor data needs to be pushed to 557 WW or higher echolen wx units