

## CHAPTER 4

## WEATHER SUPPORT BY ARMY ELEMENTS

The Army organization which provides weather and environmental support directly to Army users has a decentralized structure. It is composed of individual elements which are assigned support missions at various Army operational and tactical echelons. This decentralization permits immediate response to diverse requirements. Army meteorological services are specialized to satisfy unique military requirements and are under the direct control of the supported unit. Mobility and responsiveness to command and combat readiness requirements are characteristic of these organizations.

This chapter provides information on the Army weather collection and analysis process and identifies the types of data and sources available within the Army tactical structure.

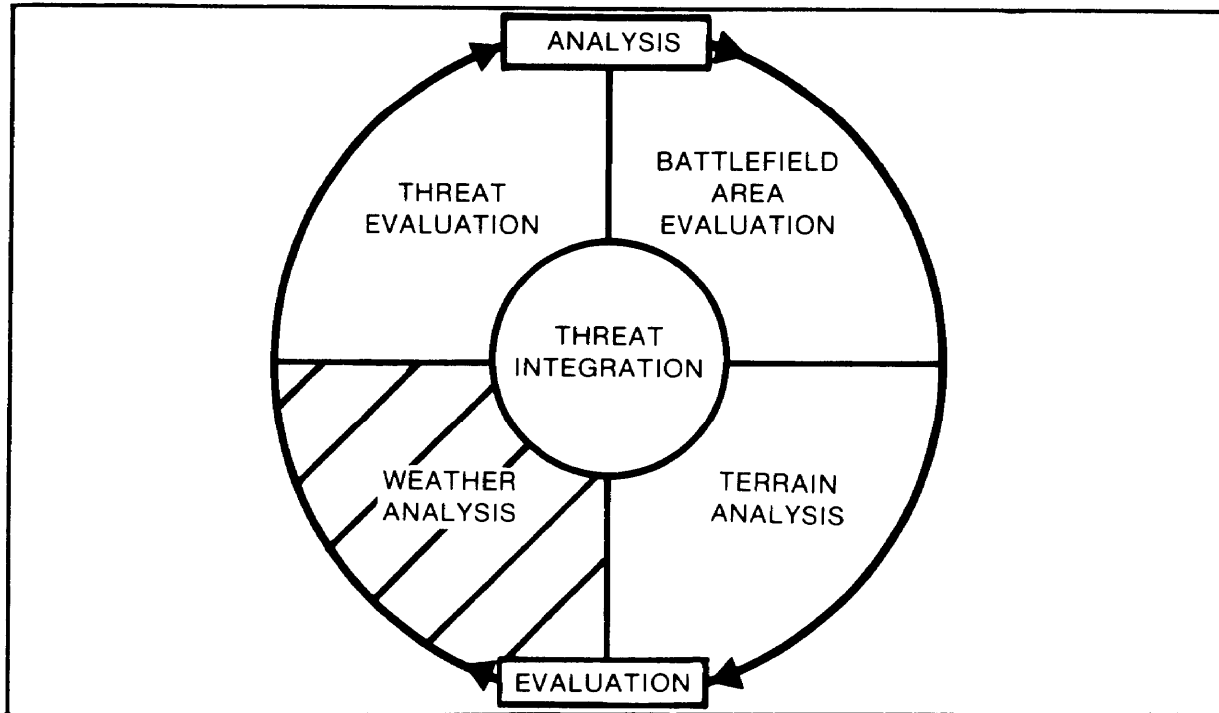
INTELLIGENCE PREPARATION OF THE BATTLEFIELD

The IPB process directs the collection and analysis effort of the SWO at all echelons. IPB requires the dedicated efforts of the entire IEW staff, as well as the support of numerous other elements of the command. IPB is routinely performed at all echelons in combat, CS, and CSS units.

As the intelligence coordinator, the G2 is responsible for coordinating the IPB effort. The G2 is assisted by the integrated efforts of order of battle (OB) technicians and intelligence analysts of the all-source production section (ASPS), the engineer detachment (terrain), and the Air Force WETM. The G2 ensures that IPB focuses on the intelligence, terrain, and weather needs of the commander.

The ASPS assembles the threat data base, converts it to graphics where possible, and integrates it with weather and terrain information. The ASPS develops the IPB products that are used to support combat operations. The engineer detachment analyzes terrain and weather data to determine their integrated impact on friendly and enemy tactical and logistic operations. The engineer detachment, supported by its EAC engineer topographic battalion, provides special terrain and map products. The WETM provides climate and weather products to support the IPB effort.

IPB orients on the AI and the enemy forces that are expected to be operating in that vicinity. Figure 4-1 shows the five-function cycle of the IPB process. These functions are discussed below.



**Figure 4-1. IPB process.**

#### BATTLEFIELD AREA EVALUATION

The first function of the IPB process is battlefield area evaluation. When the AO and AI are identified and applied to the battlefield, the staff's and SWO's attention are focused on a specific geographical area for enemy, terrain, and weather effects analysis.

#### TERRAIN ANALYSIS

The second function of the IPB process is terrain analysis. This function is focused on the military aspects of the terrain and its effects on friendly and enemy capabilities to move, shoot, and communicate. This includes the five military aspects of the terrain:

- ° Observation and fields of fire.
- ° Concealment and cover.
- ° Obstacles.

- Key terrain.
- Avenues of approach and mobility corridors.

The terrain analysis process emphasizes the use of graphics to portray the effects of trafficability and visibility on operations. A series of overlays are prepared to develop a terrain graphic data base.

Terrain analysis guides the selection of terrain and weather factor overlays needed to analyze the battlefield.

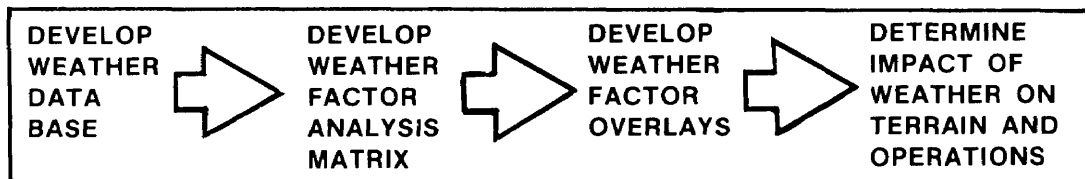
Terrain factor overlays graphically portray the military aspects of terrain (types and spacing of vegetation, soil, and climate conditions and variations) in the AO and AI.

The final step of the terrain analysis process is the identification of the avenues of approach that support friendly and enemy capabilities to move, shoot, and communicate.

#### WEATHER ANALYSIS

The third function of the IPB process is weather analysis. Weather has a significant impact on both friendly and enemy capabilities. Analyzing the weather in detail to determine how it affects friendly and enemy capabilities to move, shoot, and communicate is critical to this function of IPB. Because weather has a tremendous effect on terrain, terrain and weather analyses are inseparable factors of intelligence.

Weather and engineer terrain teams work together during much of the analysis process. The WETM analyzes climatic or forecast data to determine the characteristics of weather in the battlefield area. The terrain team analyzes the effects of weather on terrain and integrates climatic, forecast, and current weather data with terrain analysis. This information is integrated into a four-step operation known as the weather analysis process. This process is shown in Figure 4-2.



**Figure 4-2. Weather analysis process.**

Weather input to the IPB process is in two forms: climatological information and current forecasts. Climatological information is used for general planning purposes. It is combined with terrain data to produce synthesized products. Current operational forecasts up to 96 hours are used in actual planning for weapons and tactics.

During peacetime, climatic averages are used to determine significant weather parameters in the battlefield area. The weather data base is updated periodically and is used as the foundation for analyzing the effects of weather on tactical operations. Alternate sources should be considered to fill gaps in the data base.

To attempt a logical approach to IPB, the SWO must determine the needs of the commander in reference to the mission--combat arms, CS, and CSS. The SWO must have knowledge of the mission, weapons, and personnel of the unit. This information must be updated as new weapons or IEW systems are fielded. Critical values must be determined to see what the threshold weather values are that affect Army weapons, equipment, tactics, mission, and logistics. From this process a matrix of weather factors can be built.

The weather factor matrix identifies the specific operations the unit performs. Then critical values can be overlaid to show the weather effects on these operations. The matrix is tailored to the unit. Different matrixes can be developed for different scenarios. Color codes are used to show the impact for each use and parameter. Figure 4-3 is an example of a weather factor analysis matrix. Appendix B contains detailed data on the effects of weather on friendly and enemy forces. Appendix C discusses meteorological critical values which reduce the effectiveness of tactical operations and weapon systems.

#### THREAT EVALUATION

The fourth function of the IPB process is threat evaluation. It consists of a detailed study of enemy forces, their composition and organization, tactical doctrine, weapons and equipment, and supporting battlefield functional systems. The thrust of this function is to determine enemy capabilities and how they operate as prescribed by their doctrine and training.

#### THREAT INTEGRATION

The nucleus of the IPB process is the integration of enemy doctrine with weather and terrain data. The objective of threat integration is to determine how the enemy will fight as influenced by weather and terrain. Threat integration, a sequential process, is accomplished through the development of situation, event, and decision support templates. More information on IPB can be found in FM 34-130.

MISSION AREA OR USE	FAVORABLE	MARGINAL	UNFAVORABLE
Airborne/(Drop Zone) Static Line	CIG/VIS > 2500 and 3 SFC Wind ≤ 13 knots Wind at Alt ≤ 30 knots	CIG/VIS ≤ 1000 and 2 but ≥ 500 and 1	CIG/VIS < 500 and 1 SFC Wind > 13 knots Wind at Alt > 30 knots
Airmobile (Landing Zone)	CIG/VIS ≥ 300 and 1-1/2 miles  No icing or turbulence SFC winds at ≤ 20 knots	CIG/VIS ≤ 300 and 1-1/2 miles but ≥ 200 and 1/2 mile Light icing and turbulence SFC Wind > 20 knots but < 30 knots	CIG/VIS < 200 and 1/2 mile Moderate icing and turbulence SFC Wind > 30 knots
Night Vision Goggles (PVS-5) and starlight scope	Sky clear moon > one quarter Elevation > 30°	SCT clouds New moon to one quarter	Overcast clouds or new moon
C-130 Operations to penetration landing	CIG/VIS > 1000 and 2 miles	CIG/VIS < 1000 and 2 miles but > 500 and 1 mile	CIG/VIS < 500 and 1 mile
MOPP IV wear	Temp ≤ 70°F RH ≤ 50%	Temp 70° to 85°F RH 50% to 70%	Temp > 85°F or RH > 70%
PSYOP Leaflet drop Loudspeaker  NBC	SFC wind < 10 knots SFC wind < 20 knots  Temp Inversion aloft Winds toward threat force SFC wind 3 to 7 miles	SFC Wind 10 to 20 knots SFC Wind 20 to 35 knots  No inversion Wind light/variable Neutral lapse rate Wind 3 to 7 knots	SFC Wind > 20 knots SFC Wind > 35 knots  Inversion aloft with wind toward friendly force SFC winds > 10 knots
Weapon sighting	VIS > 1000 meters	VIS < 1000 but > 500 meters	VIS < 500 meters
Ground Reconnaissance	VIS > 3200 meters	VIS < 3200 but > 1000 meters	VIS < 1000 meters
<p>Key:</p> <p>≥ Greater than or equal to.</p> <p>&gt; Greater than.</p> <p>≤ Less than or equal to.</p> <p>&lt; Less than.</p> <p>CIG - Ceiling or height above ground level to base of clouds.</p> <p>VIS - Optical visibility in miles or meters.</p> <p>SFC wind - Wind speed at the surface from any direction.</p> <p>Temp - Temperature in degrees Fahrenheit or Celcius.</p> <p>Inversion - A layer of air above the ground where temperature rises rather than continuing to cool as height increases.</p> <p>RH - Relative Humidity</p>			

Figure 4-3.. Weather factor analysis matrix.

### WEATHER DATA SOURCES

The following represents the most significant sources of weather data within the Army tactical structure:

- ° ARTYMET sections.
- ° ATC units.
- ° Engineer units.
- ° Ground reconnaissance and surveillance elements.
- ° Imagery interpretation elements.
- ° Brigade and battalion intelligence personnel (FALOP).

Each element possesses a limited measuring capability designed to meet its own immediate needs. Consequently, their weather observing capabilities are supplemental to their primary mission. They should not be viewed as a replacement or substitute for USAF WETM support. USAF weather observation responsibility ends at the division CP. Army responsibility to take weather observations is from the division CP across the FLOT except at locations such as ACRs or separate brigades which have a USAF WETM assigned. If USAF weather support elements are destroyed or support is disrupted, Army elements can provide temporary support. Generally, temporary support is limited to observing and reporting current local conditions.

### ARTILLERY METEOROLOGICAL SECTIONS

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

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

Meteorological sections are located where they can best sound the atmosphere through which weapon trajectories will pass. The section should be well forward and within the general proximity of a compatible

communications facility. Considerations in selecting the position for a meteorological section are--

- ° Prevailing winds.
- ° Location of artillery units.
- ° Communications facilities and capabilities.
- ° Administrative support.
- ° Local security.

ARTYMET sections are equipped to perform electronic and visual upper-air observations employing a balloon-sounding method. If this is not available to provide upper-air density and pressure. It may be extracted from surface data climatological tables available to the ARTYMET section. Normally, they are equipped with FM radio and HF RATT communications.

ARTYMET sections in a corps area communicate with each other and exchange data on the corps ARTYMET net. Artillery units obtain meteorological data by monitoring this net at specified times. DIVARTY units may also obtain meteorological data over the DIVARTY command or fire direction RATT net and through tactical fire direction computer system (TACFIRE) automatic data processing (ADP) systems.

ARTYMET sections sound the atmosphere to heights of 98,424 feet (30,000 meters), day or night, and in all types of weather except during severe surface winds.

A limiting factor is the time required for a sounding balloon to reach a required height. Where high altitude soundings and several types of messages are required, meteorological sections are capable of sounding the atmosphere every 4 hours. A meteorological section in position is capable of producing a ballistic message for light artillery 30 minutes after releasing the balloon. The minimum time required to produce a maximum height fallout message is about 2 hours.

If electronic equipment fails, sections have an alternate, but limited, method of measuring upper-air winds by observing pilot balloons (PIBALs). Upper-air densities and temperature are computed by using climatological tables with the current surface values of each element (assuming there is no low cloud cover).

All ARTYMET sections are trained to produce--

- ° Ballistic meteorological messages.

- Computer meteorological messages.
- Fallout messages.
- Upper-air data for transmission to AWS.
- Target acquisition meteorological messages.

The meteorological sections are also capable of reporting limited surface weather observations.

Normally, the ARTYMET staff officer at division is a warrant officer assigned to the DIVARTY meteorological section. At corps, usually a commissioned officer from the corps artillery S3 section fills the position.

The ARTYMET staff officer--

- Supervises the operation of the meteorological section in the publication of ballistic and fallout meteorological messages, meteorological data for artillery computers, and meteorological data for the Air Force WETM.
- Provides liaison on meteorological matters with higher headquarters, adjacent DIVARTY units, and AWS detachments.

#### AIR TRAFFIC CONTROL UNITS

ATC units may have weather observing instruments to include measurement of surface pressure, temperature, and surface wind velocity. In addition, aircrews, flight operations personnel, and control tower operators visually estimate horizontal visibility and obstructions to visibility; they observe such special phenomena as lightning, thunderstorms, and tornadoes. Control tower operators assigned to ATC units are trained by the AWS to make limited weather observations.

#### ENGINEER UNITS

Engineer elements can measure surface pressure, temperature, humidity, and precipitation to determine the effects of weather on the terrain. The engineers can provide stream flow measurements and predictions of river stages and floods. The Engineer Flood Prediction Service (EFPS) relies on the WETM for precipitation forecasts in support of river crossings, airheads, and defensive positions.

## GROUND RECONNAISSANCE AND SURVEILLANCE ELEMENTS

Cavalry units provide the corps and division principle ground reconnaissance capability. Cavalry and maneuver battalions have organic ground reconnaissance capability that may be used to obtain information related to weather, terrain, and overall environmental conditions requested by the G2 or S2.

In addition, long-range surveillance units (LFSUs) at division and corps may be required to take weather observations deep across the FLOT based on specific weather requirements meeting the given situation.

## IMAGERY INTERPRETATION ELEMENTS

These units can provide information on visibility, cloud cover, trafficability, and flooding.

## ACR, BRIGADE, BATTALION, AND SQUADRON INTELLIGENCE PERSONNEL

ACR, brigade, battalion, and squadron intelligence officers are tasked by the G2 to provide weather observations as part of the FALOP. The frequency of observations depends on the IPB process which identifies critical areas where adverse weather may have a major impact on Army weapons, personnel, and tactics. High priority must be placed on these messages to transmit them immediately to the SWO at the division main CP.

## FORWARD AREA LIMITED OBSERVING PROGRAM

Doctrinally, the Army is responsible for collecting weather and environmental data forward of the division main CP in support of Army operations. For this reason, a FALOP is required. FALOP is a weather data collection program. The S2 at brigade transmits the FALOP observations promptly to the division. These observations require a high priority to ensure transmission within 15 minutes of the time they are taken.

The G2 specifies the FALOP observations that are required and ensures that these observations are passed directly to the USAF WETM, which handles further distribution. The G2, FSE, chemical officer, A<sup>3</sup>C<sup>2</sup> element, aviation brigade, terrain team, and higher echelons all require observations in the forward areas. In particular, the terrain team needs them to evaluate trafficability and avenues of approach for the IPB process; the G3 and fire support coordinator (FSCOORD) need them to help direct smart munitions and deep operations. The FALOP observations serve as the basis for the G2 and SWO to determine the effects of adverse weather on Army systems, operation, and tactics.

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

The collected data in a FALOP weather observation include--

- ° Measurement of temperature.
- ° Wind direction and speed.
- ° Cloud information.
- ° Visibility estimate.
- ° Type of precipitation and intensity.
- ° Atmospheric pressure.
- ° Road, ground, and water conditions.

FALOP observations are taken using an expendable belt weather kit identified by a national stock number (NSN 666-001-0242638, Belt Weather Kit). The G2 obtains and maintains the belt weather kit. The FALOP observation is disseminated through intelligence reporting channels or other communications links. The approximate time needed to take, record, encode, and transmit a single observation is 15 minutes.

Figure 4-4 shows the FALOP reporting channels and the Army units and echelons responsible for FALOP observation and reporting. Appendix A gives a detailed description of encoding and decoding a FALOP observation and a list of belt weather kit component parts.

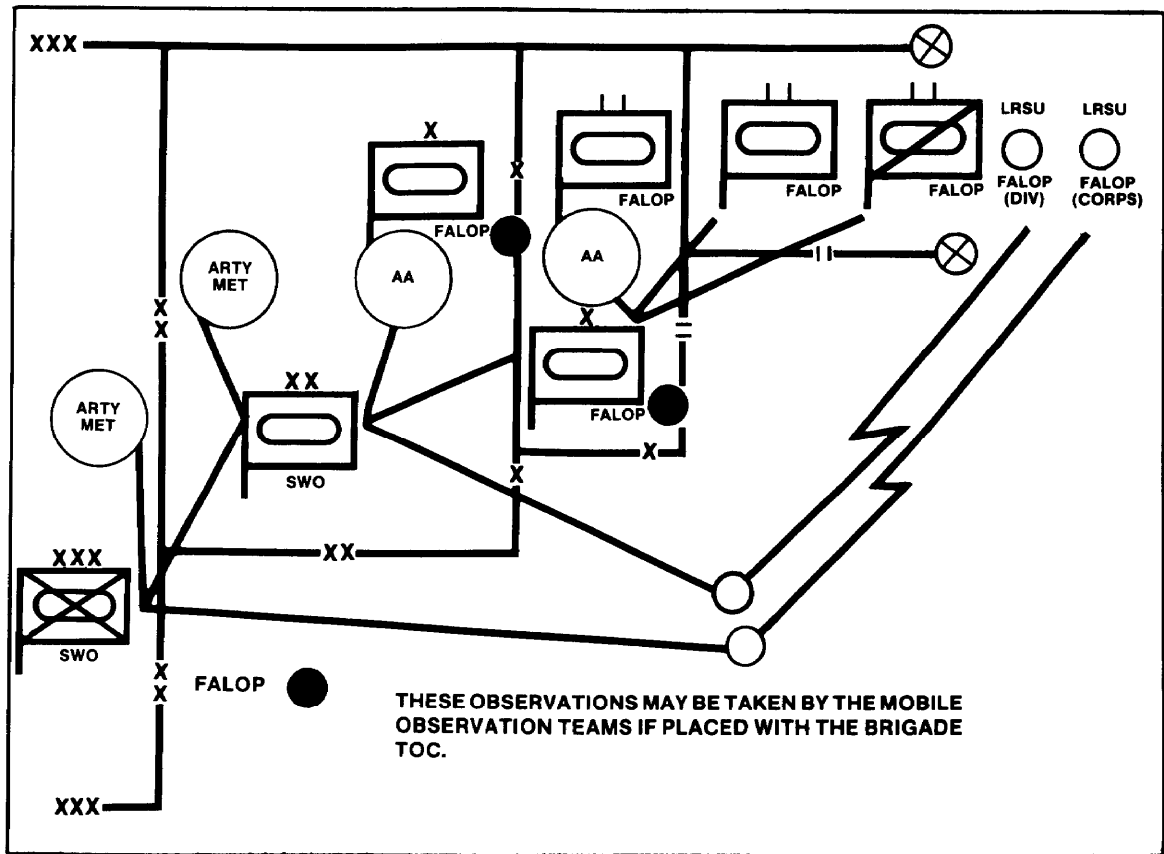


Figure 4-4. Army FALOP reporting channels.