



WEATHER OPERATIONS PROCESSES

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Department of the Air Force (DAF) weather personnel execute eight processes—**collection, processing, analysis, prediction, tailoring, dissemination, integration, and mitigation**—to analyze and forecast the natural environment and integrate environmental effects information.

COLLECTION

Weather collection is the process of gathering and storing raw data in databases from which weather products are later derived. The data includes surface, air, and space-based observations, including meteorological satellite imagery and weather radar data from military, civilian, government, and commercial sources. Since each collection capability has limitations, DAF weather operations seek an optimal blend of measurements from land, sea, air, and space-based sensors. Although the Department of Defense owns many of these sensors, international data is obtained via data-sharing agreements with other countries, to include freely shared data under the auspices of international organizations such as the [World Meteorological Organization](#) and [International Civil Aviation Organization](#).

Commanders should include [nontraditional](#) weather collection efforts throughout planning and operations to ensure receipt of adequate weather information in a timely manner. Nontraditional weather data sources, such as intelligence, surveillance, and reconnaissance platforms and unmanned aircraft systems can significantly enhance the quality and quantity of theater weather data collections. Inadequate sources or availability of weather data causes problems in regions where military operations occur. The DAF maintains the capability to deploy weather personnel and tactical sensors with joint and coalition forces to establish weather support for military operations.

A single piece of accurate weather information, regardless of the source, may provide the critical piece of information pivotal to mission success. Therefore, continuous collection of weather information and cooperation with outside sources are needed to ensure the optimal accuracy of weather products.

PROCESSING

Weather processing is the act of converting raw data into usable weather information. Collected weather data flows into a net-centric repository where much of it is processed into usable information. Usable information can be in the form of gridded data for weather personnel, or as tactical decision aides for decision makers. Observed conditions are first input into predictive weather models. High-speed computers run empirical and physics-based simulations of the environment and develop outputs representing the spatial and temporal evolution of the environment. The processed data serves as the basis for other processes: *analysis, prediction, tailoring, integration, and mitigation*. Data and information may be further processed and repeatedly refined to support military operations.

ANALYSIS

Weather analysis is the process of interpreting, fusing, and evaluating collected and processed environmental data and information to develop forecasts and recommendations in support of decision-making processes. It entails building a coherent, integrated depiction of the past and current state of the natural environment over a specified region. An effective analysis of collected weather data helps ensure the accuracy of the weather forecast provided to decision makers. It enables identification of weather features and conditions requiring subsequent study and monitoring. The analyzed data is processed and disseminated to net-centric databases to provide inputs that weather personnel use in building specification and forecast products to support decision-making.

PREDICTION

Weather prediction is the process of describing the future state of the atmosphere and space environment using analyzed weather information, sophisticated numerical models, and human judgment. Weather operations leverage collected environmental data as well as processed and analyzed weather information to predict how future weather conditions (such as temperature, cloud cover, and ionospheric scintillation) may affect operations. Prediction accuracy is highly dependent on the timeliness, accuracy, and quality of the initial input. Weather personnel rely on constant feedback from updated weather collections of actual conditions and continually adjust and assess prediction information to improve their forecasts.

TAILORING

Weather tailoring is the process of transforming relevant weather data and information into actionable, decision-grade information by aligning it with weapons systems' environmental sensitivities and details about planned operations. Weather information should be tailored to unique operational requirements. Weather personnel match products against mission, system, and platform requirements.

Weather products should be customized based on specific environmental sensitivities of, and effects on, operations and systems. Some examples of tailored weather products include decision aids, weather effects matrices, terminal aerodrome forecasts, drop zone forecasts, and target-area depictions.

DISSEMINATION

Weather dissemination is the process of delivering weather data and information to users in a suitable form. Dissemination occurs across other weather processes and ensures that products created through the collection, analysis, prediction, and tailoring processes are received by the appropriate end-user. These users may be weather personnel or decision makers, depending upon which output product is being used. Processed weather data may be disseminated to weather personnel for use in analysis or prediction products. Tailored forecasts may be disseminated to operators for use in the decision-making cycle so that leaders can act based upon the information. Because of its importance to other weather processes, dissemination should occur in a timely, reliable manner. Interruption of the process of dissemination at any stage can disrupt the flow of accurate and relevant data to the decision makers, significantly affecting their ability to integrate weather information.

INTEGRATION

Weather integration is the process of infusing tailored decision-grade weather and weather effects information into planning and decision-making cycles. Effective integration enables decision makers to maintain battlespace awareness and optimize the employment of military capabilities while marginalizing the benefit of the environment to the enemy, thereby creating an advantage for friendly forces. Informed with timely, relevant, and accurate information, decision makers can anticipate the weather's effects on planned operations and exploit those conditions to help facilitate achievement of the commander's objectives. Timeliness is critical to effective integration, and commanders should ensure weather effects information are fully integrated into decision-making processes and [command and control](#) (C2) systems in time to inform the appropriate decision makers. Likewise, weather personnel should be proactive and place great importance in reaching out to supported units to ensure integration occurs early in decision-making cycles. DAF weather operations use a net-centric repository of weather and operational effects information to facilitate such integration. A net-centric repository allows weather personnel to fuse relevant weather effects information with other operational information into an operational picture tailored to the mission.

Some C2 systems allow decision makers to extract mission-specific weather information from a net-centric weather data repository through machine-to-machine interfaces without consulting weather personnel and without knowing if the information was tailored by weather personnel. Because decision makers or other end-users may lack a thorough understanding of the strengths and weaknesses of the available weather

information, it is critical that weather personnel remain integrated in all phases of the planning and execution processes.

MITIGATION

Weather mitigation is the process of providing decision makers with options and courses of action, based on tailored and integrated weather information, so they can adjust operational plans and exploit weather effects to operations. Large-scale weather events can have strategic impacts that can be devastating to military operations. Weather personnel provide this information to commanders, enabling them to determine the best employment packages and courses of action for those weather conditions. When leaders use weather information to effectively mitigate environmental impacts, they can adjust plans and achieve optimal mission effectiveness. The process of mitigation gives decision makers options on beddown of forces, desired operational capabilities, and resource protection actions. Weather personnel should articulate their level of confidence in predictions to decision makers to be of value when leaders assess and manage risk in an operation. Weather personnel who are properly integrated and have established a relationship of trust and relevancy with their supported decision makers have greater influence in the mitigation process.
