CHAPTER 5
OBSERVATIONS

5.1 Radar Observing and Reporting Plans

5.1.1 General Description

The Departments of Defense, Commerce, and Transportation operate a national network of Doppler weather surveillance radars designated WSR-88D. Within the Department of Transportation (DOT), the Federal Aviation Administration (FAA) operates three other radar systems: long-range radar, Airport Surveillance Radar (ASR) 9 and 11, and the Terminal Doppler Weather Radar (TDWR).

5.1.2 Observing and Reporting

The WSR-88D Radar Product Generator (RPG) and Terminal Doppler Weather Radar (TDWR) Supplemental Product Generator (SPG) generate graphic products that are distributed to users for detection and evaluation of weather features generally associated with precipitation and storms. The National Weather Service (NWS) centrally collects these graphic products, known as Level III products, from 155 WSR-88D radars and 45 TDWR radars as part of the Radar Product Central Collection Dissemination Service (RPCCDS). Information on how to obtain the products through various methods can be found at http://www.weather.gov/tg/rpccds.html.

Raw radar data, known as Level II data, from most of the NEXRAD WSR-88D radars are now transmitted to the National Centers for Environmental Prediction (NCEP), the National Climatic Data Center (NCDC), and other users (e.g., other government agencies, laboratories, universities, and commercial entities) in real time. The WSR-88D Radar Operations Center is implementing an updated network architecture. The latest information on the WSR-88D Level II Data Collection and Distribution Network, and information on other NEXRAD WSR-88D improvements, can be found at http://www.roc.noaa.gov/WSR88D/

The FAA's long-range radars show reflectivity on displays in the Air Route Traffic Control Center (ARTCC) for en route controllers. An interface was developed that allows these radars to be integrated into AWIPS and is currently used in South Dakota for snow events. However, this interface has potential for severe storms as well. The range is about 200 miles, and the display uses the standard three-color, six-level depiction that is common in the aviation community. The second type of radar equipment includes the ASR 9 and ASR 11, both of which have a weather channel that provides weather information to terminal controllers. This information is used by the Integrated Terminal Weather System (ITWS) to develop mosaics for terminal areas. The mosaics depict microbursts, wind shear, and other current weather parameters, as well as forecasting conditions out to 1 hour. The third radar type, the TDWR, will be installed at 45 locations. It provides information similar to ITWS but not at the level of detail necessary to detect microbursts and forecasts. The FAA intends to eventually make all these data and products available to users, probably through a combination of direct connections and Internet sites. Controllers are encouraged to give pilots the weather information displayed on controllers'

radar scopes. The FAA radar product development team (research) is investigating ways to integrate these radars with the WSR-88D system so all the available radar data can be used in detection and forecasting.

5.1.3 National Profiler Network

The NOAA Profiler Network (NPN), consisting of 35 unmanned Doppler radar sites located in 18 central U.S. States and Alaska, provides hourly vertical wind profile data. The data are distributed to the NWS, environmental research groups, and universities. Wind profilers are specifically designed to measure vertical profiles of horizontal wind speed and direction from near the surface to above the tropopause. Profiler locations are concentrated in the central U.S. where most severe weather occurs. See Figure 5-1 for profiler locations. Current information on the NPN can be obtained at http://www.profiler.noaa.gov/npn/.

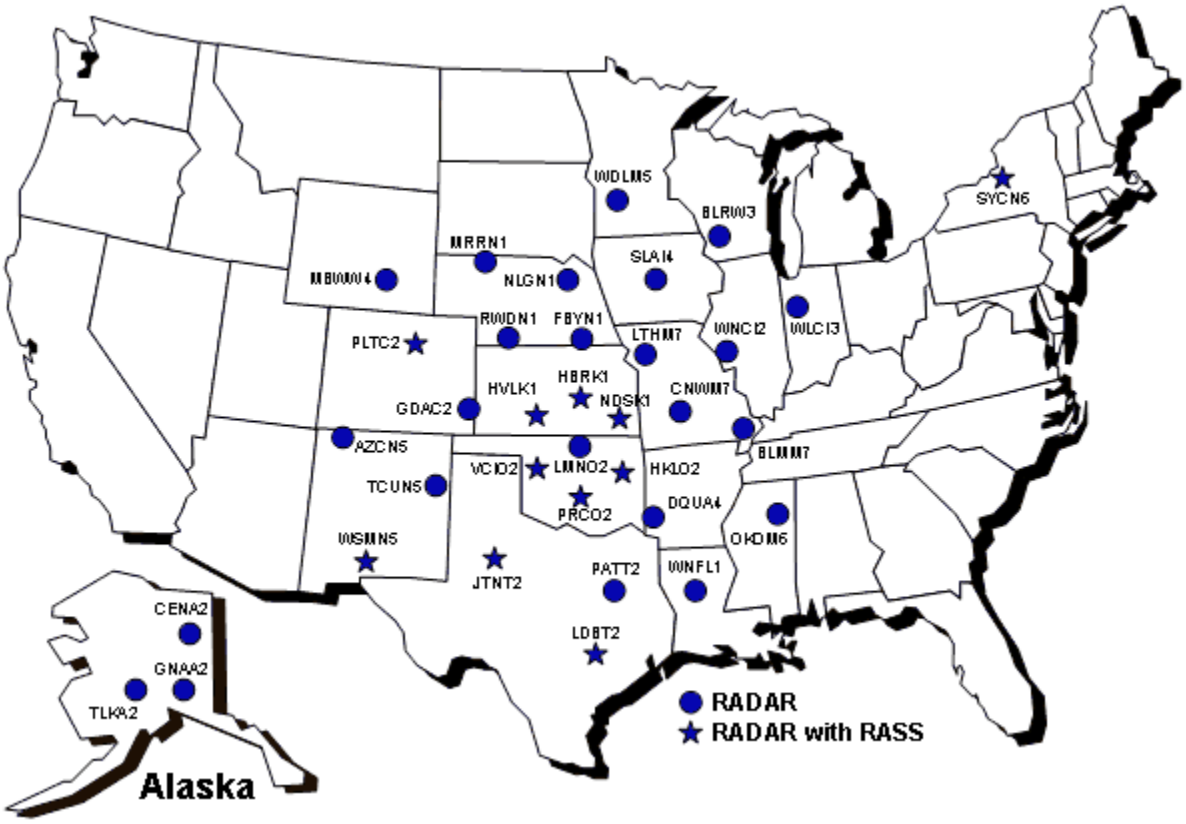

Figure 5-1. Location of National Profiler Network Sites

5.2 Rawinsonde Observing Stations

5.2.1 NWS Network Stations

Rawinsonde observations (RAOB) are made each day at 00:00 UTC and 12:00 UTC at 92 NWS stations—69 in the conterminous United States, 13 in Alaska, 9 in the Pacific, and 1 in Puerto

Rico. See Figure 5-2 for station locations. These stations will take special observations, when requested by the Storm Prediction Center (SPC), in support of severe weather forecasts. Upper-air data from the surface to heights exceeding 30 km are encoded and transmitted to the NWSTG for distribution to Federal agencies and other data users. The NWS Upper-air Observations web page provides further information on the NWS rawinsonde network: http://www.ua.nws.noaa.gov/.

NWS has begun an effort to replace its current network of obsolete rawinsonde observing systems with a modern system that improves the quantity, availability, and accuracy of upper-air data. The new system will utilize Global Positioning System (GPS) radiosondes, which measure winds aloft more accurately than obtained with the current system.

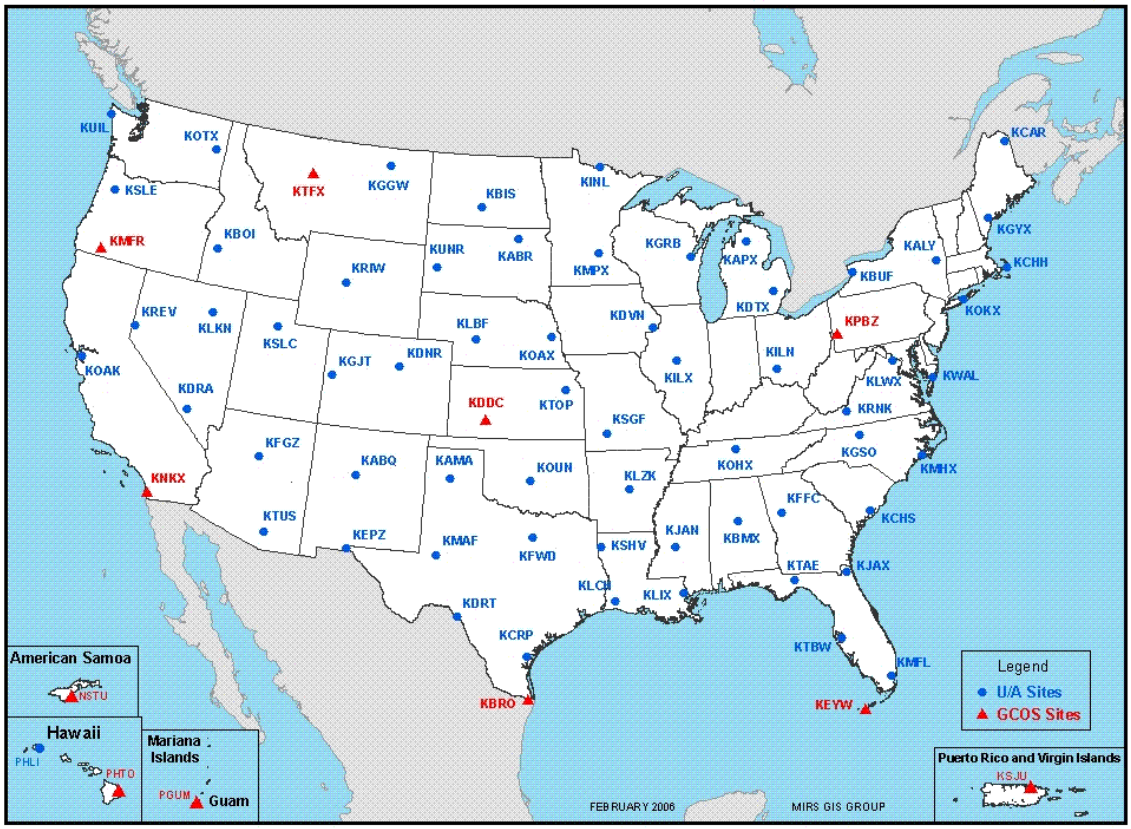

Figure 5-2. Location of RAOB Sites

5.2.2 Other Network Stations

There are approximately five rawinsonde network stations operated by the Department of Defense (DOD), along with additional sites operated by NASA and other Federal agencies, that take and disseminate soundings at 00:00 UTC and/or 12:00 UTC. These sites may not be available to take special soundings in support of severe weather forecasting.

5.2.3 Non-Network Stations

DOD, DOE, and NOAA's Environmental Research Laboratories take unscheduled upper-air observations at mobile locations and Federal facilities in support of weather/climate research programs. Some of these programs encode and disseminate the observations in real time for operational use.

5.2.4 Requests for Special Observations

Any special rawinsonde or pilot balloon (PIBAL) observations needed during the continuous weather monitoring underway at SPC and the Air Force Weather Agency (AFWA) are authorized and will be requested when needed. When special upper-air network soundings are required, the requests should normally be made for 0600Z or 1800Z. The lead forecaster at SPC will initiate the request to the NWS and NASA stations. The Commander, AFWA, will similarly request soundings from DOD stations. SPC will then coordinate with the NCEP Central Operations (NCO). Although WFOs have the authority to request special upper air observations during periods of potentially severe storms of all types, requests for special soundings during periods of potentially severe local storms should be made by SPC. The agency taking the special sounding is responsible for funding. Military requests for NWS or NASA soundings should be made to the lead forecaster at SPC (405-579-0702). NWS requests for USAF soundings should be made to the AFWA duty officer (402-294-2586 or FTS 866-2586).

5.3 Lightning Detection System (LDS)

The NWS and other government agencies currently incorporate lightning data into their day-to-day operations. Since 1996, the Federal government has purchased lightning data from a private contractor with the NWS serving as the contract administrator. The FAA's Automated Lightning Detection and Reporting System (ALDARS) incorporate these data into automated surface observations and some prototype systems that combine information from several sources. The Bureau of Land Management (BLM) uses lightning strike location and polarity information in managing wildland fires. NASA uses lightning data in support of its spaceflight operations. The DOD uses lightning data for decision-making related to refueling and munitions handling activities. These agencies are exploring ways of using lightning data in concert with data from other sources and sensors.

Research continues in the use of space-based lightning mappers and other technology and in the development of capability to depict total lightning strikes as a forecasting and warning tool.

5.4 Surface Weather Observational Network

5.4.1 Land Surface Observations

To provide the basic weather data needed for analyses performed by NCEP, SPC, AFWA, and FNMOC, all available surface data are used. Data are provided through the following sources:

- WFOs/Data Collection Offices (DCOs), Automated Meteorological Observing Stations (AMOS), Supplementary Aviation Weather Reporting Stations (SAWRS), and A-Paid Stations (private contractors paid to take an aviation surface observation).

- DOT/FAA and U.S. Coast Guard (USCG) weather reporting stations, including flight service stations, towers, bases, and contract weather observing stations.

- DOD weather reporting stations.

- Automatic surface observing systems such as the Automated Surface Observing System (ASOS), the Automated Weather Observing System (AWOS), and their replacements.

- Department of the Interior weather and hydrological reporting stations (Remote Automated Weather Station [RAWS] and Snowpack Telemetry Data [SNOTEL]).

- State DOT Environmental Sensor Station observations used in Road Weather Information Systems, available through surface weather observing systems, e.g., Meteorological Assimilation Data Ingest System [MADIS] or *Clarus*.

Augmentation and Backup of Automated Surface Observing Systems

Augmentation is accomplished at staffed locations and is defined as the process of manually observing and adding weather information to an automated surface observing system's observation that the system is not capable of providing. At designated airport locations, NWS and FAA observers are required to augment ASOS observations as defined by the ASOS Service standards listed under each FAA Aviation Service Level (Figure 5-3). At all sites, the minimum required augmentation is to report tornadic activity, hail, virga, volcanic ash, and/or thunderstorms (except where ALDARS is available).

NWS and FAA observers also are required to backup ASOS at designated locations to ensure missing or nonrepresentative data are corrected. Backup is the manual observation and reporting of elements that the system would normally report but are missing or considered not representative. To support daily climatological records, all NWS staffed sites, collocated with an ASOS, are also required to provide other specified data in a daily Supplementary Climatological Data product.

5.4.2 Marine Surface Observations

Marine surface observations are taken by observers at land stations, on ships, and by automated reporting from automated reporting stations. The National Data Buoy Center (NDBC) maintains automated reporting stations in the Gulf of Mexico, in the coastal and offshore areas of the Atlantic and Pacific Oceans, and in the Great Lakes. These data acquisition systems obtain measurements of meteorological and oceanographic parameters for operations and research purposes. Maps showing locations of all buoy and C-MAN stations can be found at: http://www.ndbc.noaa.gov.

“D” Service Level:
No augmentation required - stand alone ASOS

“C” Service Level:
Thunderstorm occurrence
Funnel clouds
Hail
Virga
Volcanic Ash
Tower visibility

“B” Service Level:
all “C” Level required data
Long-line Runway Visual Range (RVR) at designated sites
(RVR 10 minute mean or instantaneous reading)
Freezing drizzle or freezing rain
Ice pellets
Snow depth on ground
Snow increasing rapidly remark (SNOINCR)
Thunderstorm/lightning location remark
Observed significant weather not at station

“A” Service Level:
all “C” and “B” required data
Long-line RVR at designated sites
(RVR 10 minute mean or visibility increments
down to 1/8, 1/16, and 0)
Sector visibility
Variable sky
Cloud types
Cloud layers above 12,000 feet
Widespread dust, sand, and smoke obstructions
Volcanic eruptions

Figure 5-3. Civilian Airports With ASOS. Civilian airports with ASOSs are assigned a specific FAA Aviation Service Level (A, B, C, and D), which has associated ASOS Service standards as specified above. These standards specify what additional data, if any, are required to be observed and added to each ASOS observation.

Personnel on USN, USCG, and NOAA ships, along with civilian Volunteer Observing Ships (VOS) at sea, take and transmit marine observations back to the United States. About 1,600 ships

participate in the VOS program, which is managed by NWS, by taking and transmitting the marine observations every 6 hours.

Data Acquisition

Moored buoy and C-MAN stations routinely acquire, store, and transmit data every hour; a few selected stations report every half hour. Data obtained operationally include sea-level pressure, wind speed and direction, peak wind, and air temperature. Sea-surface temperature and wave spectra data are measured by all moored buoys and a limited number of C-MAN stations. Relative humidity is measured at many moored buoy and C-MAN stations where most beneficial to forecast operations.

5.5 Pilot Reports (PIREPs)

5.5.1 Observations

Pilots are encouraged to report weather conditions along the route of flight to confirm forecasted conditions or to indicate conditions differing significantly from the conditions forecasted. Pilots should report any weather conditions they encounter that are hazardous to flight.

5.5.2 Accept/Solicit Reports

All FAA air traffic facilities are required to accept PIREPs. They are also required to solicit PIREPs when current or forecast conditions are below a ceiling of 5,000 feet; visibility is less than 5 miles; and/or when thunderstorms, turbulence, or icing are occurring or forecast. Additionally, Automated Flight Service Stations and Flight Service Stations end all pilot weather briefings with a request for PIREPs.

5.6 Reports by Non-Meteorological Agencies and Individuals

The NWS uses observations of severe local storms, particularly tornadoes, from many non-meteorological agencies and personnel such as: utility companies, State highway patrols, local police departments, road maintenance patrols, citizen spotters (network), cooperative NWS climatological observers, amateur radio groups, local Civil Defense organizations, radio and television station mobile units, city employees, and individual citizens. Local Storm Reports are received by various means and are not uniform at each office. The means include amateur radio or Civil Defense radio facilities with a transceiver often located in the WFOs and operated by local cooperators, police radio, direct telephone lines with unlisted numbers, the National Warning System (NAWAS), State highway patrols, and teletypewriter circuits. Local Storm Reports are disseminated to mass news disseminators, other NWS WFOs, SPC, and safety agencies via NWS circuits (first priority, except for a more expedient means in some local areas). These reports are also verbally disseminated by NAWAS, telephones (hotlines and commercial), and Civil Defense radio facilities. The "fan-out" principle is used wherever practical.

5.7 Severe Storm Surveillance by Meteorological Satellites

5.7.1 Geostationary Operational Environmental Satellite (GOES)

The GOES system consists of two operational spacecraft: GOES-13 (or GOES-East) at 75 degrees west longitude, and GOES-11 (or GOES-West) at 135 degrees west longitude. Upon the successful launch and checkout of GOES-13 in May 2006, GOES-13 replaced GOES-12 in April 2010 and the latter was subsequently moved to 60 degrees west longitude to provide enhanced coverage of South America as part of the Global Earth Observation System of Systems (GEOSS) initiative. The current GOES series (beginning with GOES-8) introduced a 3-axis stabilized geosynchronous satellite to NOAA operations. These satellites ushered in a new era of products and services, providing improved real-time satellite data to the NWS forecast offices and national centers. The GOES-13 satellite provides the same capabilities as GOES-12 and GOES-11, but with a redesigned spacecraft bus for increased navigation and calibration accuracy and increased battery performance, negating the need for eclipse cancellations. GOES-13 represents the first in the next series of GOES satellites, with GOES-14 launched in 2009 and GOES-15 launched in 2010. GOES-14 was successfully checked out and validated in early 2010 and remains on-station at 105 degrees west longitude to provide X-ray sensor data to the Space Weather Prediction Center. GOES-15 completed the NOAA Science Test on September 15, 2010, and is positioned at 90 degrees west longitude as a standby satellite. GOES-11 carries a 5-band imager capable of producing CONUS area images routinely every 15 minutes, at 4 km resolution in the infrared and 1 km in the visible. GOES-13 also carries a 5-band imager but substitutes an 8 km resolution, 13.3 micron band in place of the 12 micron band on GOES-11. The 13.3 micron band is used to measure carbon dioxide emissivity and provides more accurate height measurements of water and ice clouds. The 12 micron band onboard GOES-11 is used in combination with the 10.9 micron band to highlight the emissivity of airborne volcanic ash, which is critical to aviation forecasting. Both satellites employ a 19-band sounder instrument capable of scanning parts of the Northern Hemisphere and CONUS every hour. The sounder provides derived products for storm forecasting, hydrology, fire weather, and input into numerical weather prediction models, as well as providing hourly soundings in clear air.

GOES Scan Operations

The GOES spacecraft routinely scan the United States every 15 minutes, except that every 3 hours a full-disk image is scanned, which takes nearly 30 minutes. Forecasters now view GOES data more frequently and with greater spatial resolution. The GOES-11 and GOES-13 spacecraft were also designed for flexible scanning of the Earth. Any variation of scan or sector coverage at regular time intervals can be scheduled in a 30 minute time frame. Rapid Scan Operations (RSO) and Super Rapid Scan Operations (SRSO) are available on the current generation of GOES satellites. RSO and SRSO operations allow for small sections of the Earth to be scanned more frequently, at up to 1-minute intervals. However by doing so, other portions of the Earth are scanned with less regularity. Definitions of the GOES RSO and SRSO scanning coverage and scanning times can be found at http://www.ssd.noaa.gov. See “GOES Scanning Schedules” on this website.

Requests for Special Satellite Sectors

NWS sites may request, via the NCEP Senior Duty Meteorologist (SDM), RSO and SRSO GOES data on critical severe storm days. The SDM will coordinate this operational request through NESDIS, Satellite Services Division (SSD), Satellite Analysis Branch (SAB). DOD and research requests are taken directly by SAB, which coordinates the request with the NCO SDM.

RSO data are made available to the NWS field offices and NWS National Centers through AWIPS. SRSO data are not made available through AWIPS. During SRSO, AWIPS users will see the standard GOES "routine" schedule.

The details of these procedures are described in the NESDIS/NWS plan, *Satellite Schedule Coordination and Dissemination Procedures*, which is available at the SSD website (http://www.ssd.noaa.gov/PS/SATS/satops/) for users within the government and selected other users (e.g., CIRA and COMET).

Special Products

GOES dissemination schedules for special products are coordinated and provided through NESDIS/SSD and are detailed in the NESDIS/NWS plan, *Satellite Schedule Coordination and Dissemination Procedures*. Visit http://www.ssd.noaa.gov/PS/SATS/satops/ or call 301-763-8444 for more information.

GOES Imagers

GOES-11 and GOES-13 host an imager capable of detecting atmospheric temperature and moisture measurements in five spectral bands at high resolutions, including 3.9 micron and 12.0 micron wavelengths (12.0 micron on GOES-11 only). GOES-11 and GOES-12 also have the feature of transmitting these five spectral bands simultaneously, affording the user community continuous views of atmospheric measurements in various wavelengths, each with its own meteorological and hydrological applications. The five channels and respective resolutions are as follows:

- Channel 1 (visible, 0.55 to 0.75 microns) 1 km resolution
- Channel 2 (infrared, 3.8 to 4.0 microns) 4 km resolution
- Channel 3 (water vapor, 6.5 to 7.0 microns) 4 km resolution on GOES-13 and beyond, 8 km resolution on GOES-11
- Channel 4 (infrared, 10.2 to 11.2 microns) 4 km resolution
- Channel 5 (infrared, 11.5 to 12.5 microns) 4 km resolution (GOES-11 only)
- Channel 6 (infrared, 13.3 microns) 8 km resolution (GOES-13 and beyond only)

GOES Products

The principal GOES-11 and GOES-13 products (see Table 5-2a) are half-hourly pictures with navigation and calibration files included. The most critical products for real-time monitoring of severe storm development are the cloud and moisture imagery indicated as products 1 through 5 in Table 5.2a. During the daylight hours, 1, 2, 4, and 8 km resolution, visible fixed standard sectors are produced for AWIPS/NOAAPort distribution. The infrared sectors (4 km resolution), including both the cloud and water vapor channels (the latter remapped to 4 km) are available 24 hours a day. Satellite raw and remapped imagery, with navigation and calibration, are available to Regional and Mesoscale Meteorological Team Advanced Meteorological Satellite Demonstration and Interpretation System users within the NWS and NESDIS community (see http://www.cira.colostate.edu/cira/RAMM/rmsdsol/main.html for more information), as well as users of the ESPC distribution servers (SATEPSDIST). Products derived from the GOES sounder, including lifted index, land surface temperature, cloud-top pressure, cloud amount, and total precipitable water, are generated hourly at 10 km spatial resolution and provide useful information on trends in large-scale convective activity that could lead to outbreaks of severe weather. Operational and experimental GOES sounder–derived products can be viewed at http://www.ssd.noaa.gov/PS/PCPN/pcpn-na.html#SNDR.

5.7.2 NOAA Polar-Orbiting Satellites

These satellites traverse the United States twice each day at 12hour intervals for each geographical area near the equatorial crossing times listed in Table 5.2a. Data are available via direct readout (HRPT or APT) or central processing. The current primary morning and afternoon polar-orbiting satellites are the Metop-A satellite of the European Organization for the Exploitation of Meteorological Satellites' (EUMETSAT) and the NOAA-19 satellite, respectively, although older satellites still have limited capabilities. The use of the European Metop platforms to fill the primary morning slot is the result of a cooperative effort for data exchange between NOAA and EUMETSAT under the Initial Joint Polar-Orbiting Operational Satellite System (IJPS). In addition to carrying most of the NOAA instruments, the Metop platform hosts instruments with significantly enhanced capabilities for atmospheric sounding (Infrared Atmospheric Sounding Interferometer, or IASI) and marine surface wind vectors (Advanced Scatterometer, or ASCAT). Also, the analog-based APT service has been replaced by the digital-based Low Resolution Picture Transmission (LRPT) service on Metop, which was adopted on NOAA-19. The NOAA-11, NOAA-12, and NOAA-14 platforms were formally decommissioned in June 2004, August 2007, and May 2007, respectively. NOAA-15 and NOAA-16 have been designated as secondary morning and afternoon satellites, and NOAA-18 is designated as a secondary afternoon satellite. NOAA-17 is designated as the morning backup. However, NOAA-17 has an inoperable AMSU instrument, which significantly degrades its capabilities for severe weather monitoring, and NOAA-17's Advanced Very High Resolution Radiometer (AVHRR) has a degraded scan motor that causes periodic noise in the AVHRR images. Daily updates pertaining to the operational status of the various NOAA platforms and the individual instruments can be found at http://www.oso.noaa.gov/poesstatus/.

Polar-Orbiting Environmental Satellite Products

The Polar-Orbiting Environmental Satellite (POES) measurements provide detailed information on the 3-dimensional structure of the atmosphere through the Advanced TIROS Operational Vertical Sounder (ATOVS) package, which consists of the HIRS and AMSU instruments, as well as critical information on bulk cloud and aerosol properties, sea and land surface temperatures, fire and smoke detection, and true color imagery from the high resolution AVHRR instrument. Hydrometeorological parameters such as total precipitable water and cloud liquid water (over ocean), rain rate, ice water path, and snow water equivalent are also available via the multi-channel microwave measurements collected by the AMSU and MHS instruments flown aboard the polar orbiters. In addition, calibrated and navigated radiances from the AMSU and HIRS instruments are provided to NCEP for assimilation into global forecast models. Future plans call for the inclusion of Metop/IASI data. A summary of environmental satellite products generated from NOAA and EUMETSAT polar orbiters is included in Table 5-2a.

Table 5-2a. GOES and NOAA Satellite and Satellite Data Availability for the Severe Local Storms Season

SATELLITE	TYPE OF DATA	LOCAL TIME	PRODUCTS
GOES-13 at 75W(East Ops) GOES-14 at 105W (backup) GOES-15 at 90W (on orbit storage) GOES-11 at 135W (West Ops) GOES-12 at 60W (South America Ops)	Multispectral Imager and Sounder 5 Channels for Imager 19 Channels for Sounder	Every 30 min, in Routine Scan Mode, provides 3 sectors with prescribed coverages: Northern Hemisphere (NH) or Extended NH; Continental U.S. or Pacific U.S.; and Southern Hemisphere (SH). Exception is transmission of full disk every 3 hours. (Available Rapid Scan Operations yield increased transmissions to 7.5 minute intervals to capture rapidly changing, dynamic weather events).	1. 1, 2, 4, and 8 km resolution visible standard sectors. 2. 4 km equivalent resolution IR sectors. 3. Equivalent and full resolution IR enhanced imagery. 4. Full disk Infrared every 3 hours. 5. 4 km water vapor sectors. 6. Clear Sky Brightness Temperatures 7. Quantitative precipitation estimates; high density cloud and water vapor motion wind vectors; and experimental visible and sounder winds. 8. Operational moisture sounder data (precipitable water) in four levels for inclusion in NCEP numerical models. Other sounder products including gradient winds, vertical temperature and moisture profiles, mid-level winds, and derived product imagery (total precipitable water, lifted index, effective cloud amount and surface skin temperature). 9. Tropical storm monitoring and derivation of intensity analysis. 10. Volcanic ash monitoring and dissemination of Volcanic Ash Advisory Statements. 11. Daily northern hemisphere snow cover analysis. 12. Daily fire and smoke analysis over CONUS. 13. Low Cloud / Fog Product

Table 5-2a (cont). GOES and NOAA Satellite and Satellite Data Availability for the Severe Local Storms Season

SATELLITE	TYPE OF DATA	LOCAL TIME	PRODUCTS
Metop-A	AVHRR GAC and LAC (recorded), HRPT & LRPT, AMSU-A, MHS, HIRS, ASCAT, GOME-2, IASI	2130D/0930A (primary morning sat)	1. 1 km resolution HRPT and Local Area Coverage (LAC) data. 2. 4 km resolution APT and Global Area Coverage (GAC) data. 3. Polar Visible and IR mapped imagery. 4. Bulk cloud and aerosol properties 5. Sea-surface temperature analysis. 6. Temperature profiles 7. Moisture profiles. 8. Remapped GAC sectors. 9. Sounding-derived products--total precipitable water, rain rate, cloud liquid water, ice water path, snow water equivalent 10. Daily northern hemisphere snow cover analysis. 11. Twice daily fire and smoke analysis over specific areas within CONUS. 12. Total ozone and stratospheric ozone profiles
NOAA-19		0138D/1338A (primary afternoon sat)	
NOAA-18	AVHRR GAC and LAC (recorded), HRPT & APT, HIRS, AMSU-A, MHS, SBUV-2	0136D/1336A (secondary afternoon sat) 003D/2203A (morning backup)	
NOAA-17	Same as NOAA-18 except AMSU-B in place of MHS(AMSU-A inoperable)	0422D/1622A(secondary afternoon sat)	
NOAA-16	Same as NOAA-17	0510D/1710A (secondary morning sat)	
NOAA-15	Same as NOAA-16 except no SBUV-2		

AMSU	Advanced Microwave Sounding Unit
GVAR	GOES Variable
LRPT	Low Rate Picture Transmission
(1.1 km) GAC	Global Area Coverage (recorded reduced resolution data for HRPT - High Resolution Picture Transmission (1.1 km) central processing)
APT	Automated Picture Transmission (4 km)
LAC	Local Area Coverage (recorded high-resolution data, limited amount)
AVHRR	Advanced Very High Resolution Radiometer
ATOVS	Advanced TIROS-N Operational Vertical Sounder
SBUV	Solar Backscatter Ultraviolet
MHS	Microwave Humidity Sounder

Under Local Time heading:

D	Descending orbit equator crossing time
A	Ascending orbit equator crossing time

5.7.3 Defense Meteorological Satellite Program (DMSP) Polar-Orbiting System

The DMSP constellation consists of at least two primary operational spacecraft, each placed in sun-synchronous orbits best suited to support military operations (one in an early morning orbit, with equatorial crossing times near the darkness-to-sunlit "terminator" [F-17], and the other with

an equatorial crossing time in the mid-morning, near 0830/2030 local time [F-16]). The present constellation also includes several additional secondary operational spacecraft, each with varying capabilities due to degraded sensors, data recorders, command/control systems, etc. In addition to very high-resolution visible and infrared imagery, DMSP provides a variety of remotely sensed terrestrial and space environmental data. A suite of microwave radiometers provides microwave imagery, as well as surface characteristics and upper-air temperature and moisture measurements. Currently, data from the DMSP F-14, F-15, F-16, F-17, and F-18 spacecraft are provided to users However, in 2006, the United States Strategic Command (USSTRATCOM) directed activation of a radar calibration beacon on F-15 that has severely degraded the performance of the 22V GHz channel. This change has in turn impacted the generation of several environmental products derived either directly or indirectly from this channel. The Naval Research Laboratory (NRL) has developed software corrections to mitigate this contamination. Starting with the launch of the first Block 5D3 DMSP spacecraft (F-16) in October, 2003, the capabilities of the SSM/I, SSM/T-1, and SSM/T-2 were combined into a single sensor designated the Special Sensor Microwave Imager/Sounder (SSMIS). DMSP data collection activities are coordinated through AFWA's Second Weather Group request cell (2WXG/DOR). See Table 5-2b.

5.7.4 Shared Processing Program (SPP)

The SPP is a joint Department of Commerce and DOD program whereby NOAA, the Department of the Navy, and the Department of the Air Force cooperate in the acquisition, processing, exchange, and long-term archive of unclassified environmental satellite data and products. Currently, the SPP enables users to access (via NESDIS) information processed by the Navy's Fleet Numerical Meteorology and Oceanography Center (FNMOC) from the SSM/I and SSMIS sensors, including total precipitable water, instantaneous rain rate, soil moisture, snow depth, surface temperature, and ice characteristics. SSM/T-1 data are also made available (via the SPP) at NESDIS for derivation of atmospheric profiles (there are no remaining operational SSM/T-2 sensors)

Table 5-2b. DMSP Satellite and Satellite Data Availability for the Severe Local Storms Season

SATELLITE	TYPE OF DATA	LOCAL TIME (as of 1/22/08)	PRODUCTS
DMSP F-14	OLS Imagery (recorded and direct), SSM/I, SSM/T-1	0505D/1705A	1. 0.3 nm (regional) and 1.5 nm (global) resolution (visible and infrared) imagery available via stored data recovery through AFWA.
DMSP F-15	OLS Imagery (recorded and direct), SSM/I, SSM/T-1, and SSM/T-2 all inop	0714D/1914A	2. Regional coverage at 0.3 nm and 1.5 nm resolution (visible and infrared) imagery available from numerous DOD tactical terminals.
DMSP F-16	OLS Imagery (recorded and direct), SSM/I (22Ghz degraded by radar calibration beacon), SSM/T-1, (SSM/T-2 inop)	0757D/1957A	3. SSM/T-1, SSM/I, SSMIS data transmitted to NESDIS from FNMOC (no remaining SSM/T-2 sensors)
DMSP F-17	OLS Imagery (recorded and direct), SSM/IS imagery	0530D/1730A	
DMSP F-18	OLS Imagery (recorded and direct), SSMIS imagery (derived products currently in cal/val)	0801D/2001A	

DMSP Defense Meteorological Satellite Program
OLS Operational Linescan Subsystem
SSM/I Special Sensor Microwave Imager
SSM/IS Special Sensor Microwave Imager Sounder
SSM/T-1 Special Sensor Microwave Temperature Sounder
SSM/T-2 Special Sensor Microwave Moisture Sounder

Under Local Time heading:
D Descending orbit equator crossing time
A Ascending orbit equator crossing time