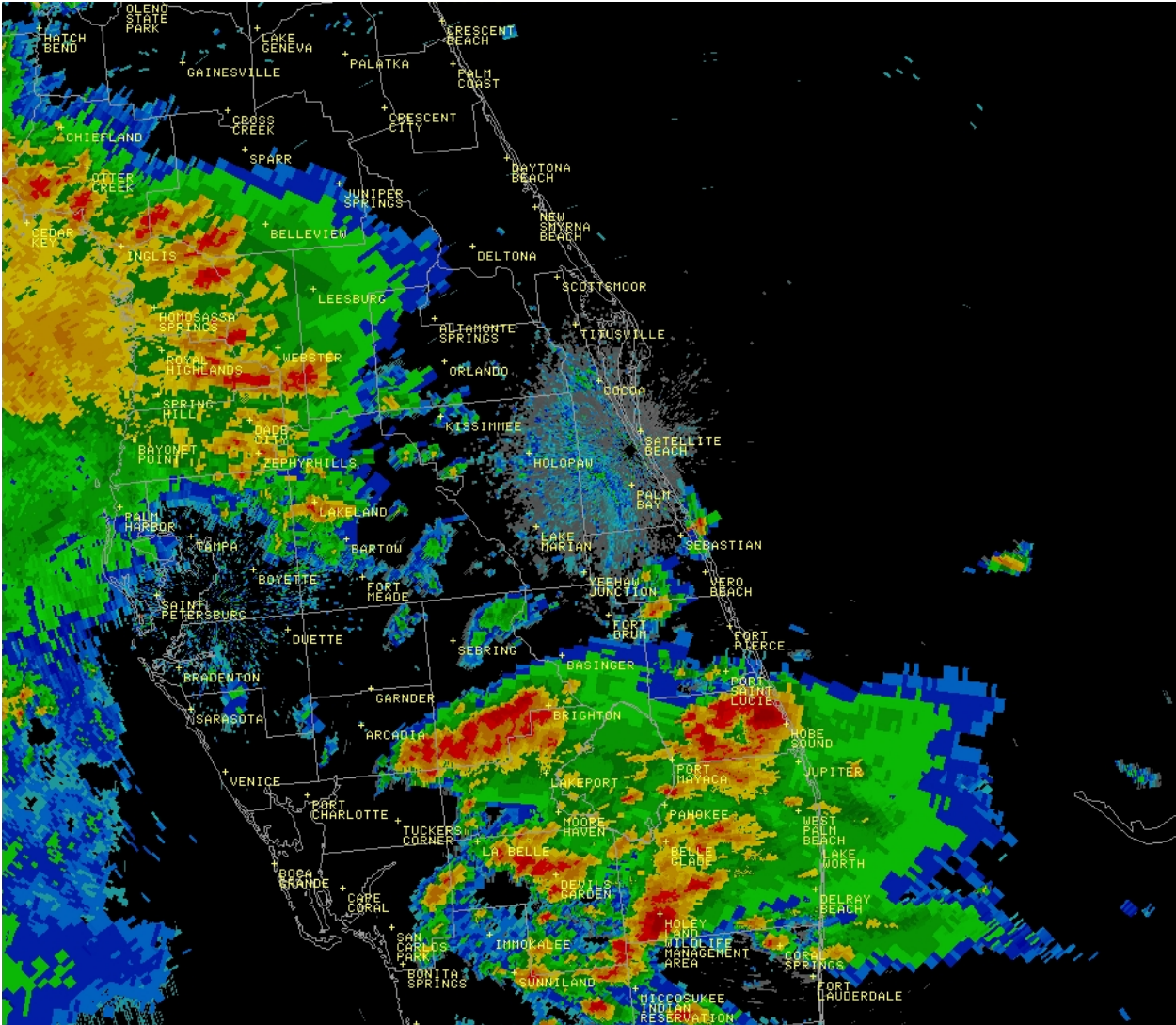


NATIONAL SEVERE LOCAL STORMS OPERATIONS PLAN

FCM-P11-2008



August 2008

Office of the Federal Coordinator for Meteorological Services
and Supporting Research

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Front Cover Photo Credit

Composite reflectivity radar image of a severe thunderstorm in Martin County, FL, on 6 March 2008 at 20:42 UTC. Radar indicated a severe thunderstorm capable of producing nickel-sized hail and damaging winds. Wind gust observed at 97 mph. As the storm moved across the Witham Field airport area the winds damaged several aircraft and hangars. (Courtesy of NOAA, <http://www.osei.noaa.gov>)

Federal Committee for Meteorological Services
and Supporting Research (FCMSSR)

Interdepartmental Committee for Meteorological Services
and Supporting Research (ICMSSR)

Committee for Environmental Services, Operations and Research Needs (CESORN)

Joint Action Group for Severe Local Storms Operations (JAG/SLSO)

NATIONAL SEVERE LOCAL STORMS OPERATIONS PLAN

Office of the Federal Coordinator for
Meteorological Services and Supporting Research

8455 Colesville Road, Suite 1500
Silver Spring, Maryland 20910
301-427-2002
www.ofcm.gov

FCM-P11-2008
Washington, DC
August 2008

CHANGE AND REVIEW LOG

Use this page to record changes and notices and reviews.

Change Number	Page Numbers	Date Posted	Initials
1			
2			
3			
4			
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7			
8			
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Changes are indicated by a vertical line in the margin next to the change.

Review Date	Comments		Initials

FOREWORD

This is the twenty-fifth *National Severe Local Storms Operations Plan* that was developed after a 1967 request to the Federal Coordinator for Meteorological Services and Supporting Research. This plan is one of several operations plans produced under the auspices of the Federal Coordinator. It outlines the responsibilities of the various United States federal agencies that provide meteorological services in observing, forecasting and warning of severe local storms. It also defines meteorological terms used by the agencies preparing severe local storms forecasts and warnings; identifies differing operational warning criteria and procedures; and discusses communications, observations and some public release aspects of severe storms warnings.

This plan supersedes the 2001 version and incorporates significant revisions and changes recommended by the participating agencies through their representatives on the Committee for Environmental Services, Operations and Research Needs (C/ESORN) Joint Action Group for Severe Local Storms Operations (JAG/SLSO). The mission of the JAG/SLSO is to optimize cooperation among federal agencies sharing responsibilities for watches and warnings of, or appropriate response to, severe thunderstorms and tornados, in order to protect life and property. I am grateful to the members of the JAG/SLSO who volunteered to apply their valuable time, experience and knowledge to update this plan.

Additional information describing the warning programs of the participating agencies can be found in the following agencies' documents: Air Force Instruction 15-128, *Aerospace Weather Operations Roles and Responsibilities*; Air Force Manual 15-129, *Aerospace Weather Operations: Processes and Procedures*; Air Force Instruction 10-229, *Responding to Severe Weather Events*; National Weather Service Instruction (NWSI) 10-313, *Special Marine Warnings*; NWSI 10-511, *WFO Severe Weather Products Specification*; NWSI 10-512, *National Severe Weather Products Specification*; NWSI 10-922 *WFO Hydrologic Product Specification*; NWSI 10-811, *Airport Weather Warnings*; NWSI 10-811, *Enroute Forecasts and Advisories*; Marine Corps Warfighting Publication (MCWP) 3-35.7, *MAGTF (Marine Air-Ground Task Force) Meteorological and Oceanographic Support*; OPNAV INSTRUCTION 3140.24F, *Adverse and Severe Weather Warnings and Conditions of Readiness*; NAVMETOCCOMINST 3140.1L, *United States Navy Meteorological & Oceanographic Support System Manual*; and Department of Homeland Security, *The National Response Plan*

Because of their intensity, small spatial scale, and a tendency for rapid development, severe local storms present a great challenge both to meteorological science and to inter-agency cooperation in disseminating information rapidly. The purpose of this plan is to ensure that federal agencies work together efficiently to provide the greatest margin of safety for the United States.

Samuel P. Williamson
Federal Coordinator for Meteorological Services and
Supporting Research

Table of Contents

Foreword.....v

1 RESPONSIBILITIES OF COOPERATING AGENCIES 1-1

1.1 General..... 1-1

1.2 Scope..... 1-1

1.3 Department of Commerce (DOC) Responsibilities 1-1

1.3.1 National Weather Service (NWS)..... 1-1

1.3.2 National Environmental Satellite, Data, and Information Service (NESDIS)..... 1-2

1.4 Department of Defense (DOD) Responsibilities 1-3

1.4.1 U. S. Air Force (USAF) 1-3

1.4.2 U. S. Army (USA)..... 1-3

1.4.3 U. S. Navy (USN) and U. S. Marine Corps (USMC) 1-3

1.5 Department of Transportation (DOT) Responsibilities 1-4

1.5.1 Federal Aviation Administration (FAA)..... 1-4

1.5.2 Federal Highway Administration (FHWA) 1-4

1.6 Department of Homeland Security (DHS)..... 1-5

1.6.1 Federal Emergency Management Agency (FEMA) Responsibilities..... 1-5

1.6.2 U.S. Coast Guard (USCG) 1-5

1.7 Department of Energy (DOE) Responsibilities 1-5

1.8 Department of the Interior (DOI) Responsibilities 1-6

1.9 Exchange of Data, Products and Forecasting Techniques Between Agencies 1-6

2 DEFINITIONS AND CRITERIA 2-1

2.1 General..... 2-1

2.2 Severe Local Storm..... 2-1

2.3 Severe Local Storms Season(s)..... 2-1

2.4 Squall Line..... 2-1

2.5 Density/Risk of Severe Thunderstorms 2-1

2.6 Thunderstorm Intensity Categories..... 2-2

2.7 Funnel Cloud..... 2-2

2.8 Tornado..... 2-2

2.9 Waterspout..... 2-2

2.10 Flash Flood 2-3

2.11 Other Warning Criteria 2-3

2.12 Convective SIGMETs..... 2-4

2.13 Collaborative Convective Forecast Product (CCFP)..... 2-4

2.14 Special Marine Warnings (SMW) 2-4

3 GENERAL OPERATIONS AND PROCEDURES 3-1

3.1 General..... 3-1

3.2 National Weather Service (NWS) Watch/Warning Procedures 3-1

3.2.1 General..... 3-1

3.3 DOD Watch/Warning Procedures 3-5

3.3.1 USAF 3-5

3.3.2 USN and USMC..... 3-6

3.4 Backup Operations for SPC and AWC..... 3-7

4 COMMUNICATIONS 4-1

4.1 DOC/NOAA Communications Systems..... 4-1

4.1.1 NOAA Weather Wire Service (NWWS) 4-1

4.1.2 NOAA Weather Radio (NWR) 4-1

4.1.3 Emergency Managers Weather Information Network (EMWIN) 4-2

4.1.4 Interactive Weather Information Network (IWIN) 4-3

4.1.5 NOAA Family of Services 4-3

4.1.6 NOAAPort 4-3

4.1.7 Data Collection and Distribution 4-4

4.2 Department of Homeland Security (DHS)..... 4-5

4.2.1 Federal Emergency Management Agency (FEMA) Communications System 4-5

4.2.2 USCG Marine Weather Broadcasts Systems 4-6

4.3 Federal Communications Commission (FCC) Communications System..... 4-7

4.3.1 Emergency Alert System (EAS) 4-7

4.4 DOD Communications Systems 4-8

4.4.1 Air Force Communications Systems..... 4-8

4.4.2 Navy Communications Systems 4-8

4.4.3 Data Collection 4-9

4.5 DOT Communications Systems 4-9

4.5.1 Federal Aviation Administration (FAA) Systems 4-9

4.6 Interagency Shared Processing Program 4-10

4.7 Distribution of Severe Local Storm Watch and Warning Bulletins 4-10

5 OBSERVATIONS..... 5-1

5.1 Radar Observing and Reporting Plans..... 5-1

5.1.1 General Description 5-1

5.1.2 Observing and Reporting 5-1

5.1.3 National Profiler Network..... 5-1

5.2 Rawinsonde-Observing Stations..... 5-2

5.2.1 NWS Network Stations..... 5-2

5.2.2 Other Network Stations..... 5-3

5.2.3 Non-network Stations 5-3

5.2.4 Requests for Special Observations..... 5-4

5.3 Lightning Detection System (LDS) 5-4

5.4 Surface Weather Observational Network 5-7

5.4.1 Land Surface Observations 5-7

5.4.2 Marine Surface Observations..... 5-8

5.5 Pilot Reports (PIREPs) 5-9

5.5.1 Observations..... 5-9

5.5.2 Accept/Solicit Reports 5-9

5.6 Reports by Non-meteorological Agencies and Individuals 5-9

5.7 Severe Storm Surveillance by Meteorological Satellites..... 10

5.7.1 Geostationary Operational Environmental Satellite (GOES) 5-10

5.7.2 NOAA Polar-Orbiting Satellites 5-12

5.7.3 Defense Meteorological Satellite Program (DMSP) Polar-Orbiting System..... 5-13

5.7.4	Shared Processing Program (SPP)	5-13
6	PUBLICITY	6-1
APPENDIX A	TEXT PRODUCT EXAMPLES	A-1
APPENDIX B	CONUS MILITARY BASES AND CORRESPONDING WEATHER FORECAST OFFICES	B-1
APPENDIX C	CONTINGENCY BACKUP OPERATIONS	C-1
APPENDIX D	STATE CONTACTS FOR NAWAS NETWORK	D-1
APPENDIX E	ABBREVIATIONS AND ACRONYMS	E-1

Figures

Figure 3-1 Severe Weather Product Generation.....	3-6
Figure 4-1 NOAA Port Flow of Operational Data and Products	4-4
Figure 4-2 The National Warning System (NAWAS) is FEMA’s Operational Hotline Telephone System.....	4-5
Figure 4-3 Distribution of Severe Weather Watch and Warning Bulletins	4-11
Figure 5-1 Location of National Profiler Network Sites.....	5-2
Figure 5-2 Location of RAOB Sites.....	5-3
Figure 5-3 Civilian Airports With ASOS.....	5-8

Tables

Table 2.1 Types of NWS Messages - General Categories.....	2-3
Table 5-1 Non-Network Upper Air Stations That Might be Sources of Data	5-5
Table 5-2a GOES and NOAA Satellite and Satellite Data Availability for the Severe Local Storms Season.....	5-14
Table 5-2b DMSP Satellite and Satellite Data Availability for the Severe Local Storms Season.....	5-16

1

RESPONSIBILITIES OF COOPERATING AGENCIES

1.1 General

Cooperation and communication among agencies that provide essential meteorological data, information, and dissemination services is the basis for ensuring that users receive the best possible warnings and forecasts of severe local storms. This coordination is achieved through the activities of the Committee for Environmental Services, Operations and Research Needs (C/ESORN) and the Joint Action Group for Severe Local Storms Operations (JAG/SLSO) in the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM). The Departments represented in this National Severe Local Storms Operations Plan (NSLSOP) have agreed to arrangements to promote the most effective use of their weather-related assets with respect to severe local storm operations. Between major revisions to this plan, changes will be promulgated by a Change Notice. Once received, the changes should be made to the plan and noted in the Change and Review Log on page iv.

1.2 Scope

The procedures and agreements contained herein apply to all of the 50 United States and the US Territories of Puerto Rico, Virgin Islands, American Samoa, and Guam. The plan defines the roles of the individual agencies participating in the severe local storm warning service when more than one agency is involved in the delivery of service in a specific area. When a single agency is involved in any specific area, that agency's procedures should be contained in internal documents and, to the extent possible, be consistent with the NSLSOP practices and procedures.

1.3 Department of Commerce (DOC) Responsibilities

The Department of Commerce (DOC), through the National Oceanic and Atmospheric Administration (NOAA), is charged with the overall responsibility to implement a responsive, effective national severe local storms warning service.

1.3.1 National Weather Service (NWS)

The NWS shall provide timely dissemination of forecasts, warnings and all significant information regarding severe local storms to the appropriate agencies, marine and aviation interests, and the general public. Specifically, NWS will provide:

- Basic surface, upper air, buoy, and radar observations from its network of observing sites.
- Additional observations, when required. These observations will be transmitted to any requesting agency by the appropriate communications technologies.

- Basic analyses, forecast charts, and radio facsimile charts through the National Centers for Environmental Prediction (NCEP) Central Operations (NCO), Camp Springs, Maryland.
- Severe Local Storm Outlooks and Watch Bulletins through the NCEP Storm Prediction Center (SPC), Norman, OK.
- Dissemination of severe weather and flash flood warnings and statements issued by Weather Forecast Offices (WFO) throughout the United States.
- Aviation In-flight Weather Advisories issued through the NCEP Aviation Weather Center (AWC) with aviation responsibilities for periods up to 6 hours for aircraft (civilian and military) and amendments as appropriate.
- A concerted effort to collect and relay Pilot Reports (PIREPs) in conjunction with the FAA.
- Appropriate public educational materials concerning the severe local storms/flash flood watch/warning service and development of community preparedness plans.
- Point of Contacts from SPC and AWC to coordinate with Air Force Weather Agency (AFWA) on backup.

1.3.2 National Environmental Satellite, Data, and Information Service (NESDIS)

The NESDIS shall:

- Operate satellite systems capable of providing coverage of selected portions of the United States and adjoining coastal areas.
- Receive and respond to requests for coverage of specific areas and times. These requests may come from NCEP, a WFO, or appropriate USAF stations through the NCEP Senior Duty Meteorologist (SDM) in NCO and NESDIS Satellite Analysis Branch (SAB), according to the NESDIS/NWS Satellite Schedule Coordination and Dissemination Procedures (August 2000).
- Provide appropriate satellite data to authorized research facilities.
- Provide multi-disciplinary environmental analyses to support disaster mitigation and warning services for U.S. Federal agencies and the international community

1.4 Department of Defense (DOD) Responsibilities

1.4.1 U. S. Air Force (USAF)

The Air Force Weather is responsible for weather support to USAF, U.S. Army, Army and Air National Guard, and Air Force and Army Reserve units, and other DOD customers throughout the world. They will provide:

- Basic surface, upper air, and radar observations from its network of stations making such observations.
- Additional observations when required and make selective, non-sensitive reports available to civil agencies through existing communications with Federal Aviation Administration (FAA) or, with prior DOD approval, directly.
- A concerted effort to collect and relay all PIREPs.
- Transmission of NWS products for severe weather to Continental U.S. (CONUS) DOD agencies via the USAF communications system.
- Through the Air Force Weather Agency (AFWA) at Offutt Air Force Base (AFB), Nebraska:
 - Mesoscale model backup to NCEP's NCO during emergency situations when requested.
 - Immediate backup to NCEP (SPC and AWC) during emergency situations.
- Through Operational Weather Squadrons (OWSs) at Barksdale AFB, LA; Scott AFB, IL; Davis Monthan AFB, AZ; and Hickam AFB, HI, provide weather watch, warning, and advisories for all Air Force and Army installations including Guard and Reserve forces in their assigned areas of responsibility.

1.4.2 U. S. Army (USA)

The Active, National Guard, and Reserve components of the Army rely on the appropriate Air Force OWS as their primary weather provider, with back-up from another OWS. Within the CONUS, the Army will rely on SPC and NWS severe weather products and NOAA Weather Radio (NWR) when its assigned OWS and backup agencies are unable to provide the support.

1.4.3 U. S. Navy (USN) and U. S. Marine Corps (USMC)

The USN and USMC Meteorological and Oceanographic (METOC) Forecast Centers provide severe local storm warnings in support of the Department of Navy. Within the conterminous United States and offshore waters, requirements for early warnings of hazardous flying conditions and local destructive phenomena are met by using NWS, AFWA, and Fleet Numerical Meteorology and Oceanography Center (FNMOC) products interpreted by personnel

of the Naval Meteorology and Oceanography Command (NAVMETOCOM) and the Marine Corps METOC Service units. Full use is made of information received from NOAA dissemination sources, as well as other military and civil weather circuits. They will provide:

- Basic surface, upper air, and radar observations, including those taken at sea, from its worldwide network of stations making such observations.
- Additional observations when required and make all such reports available to civil agencies through existing communications with Federal Aviation Administration (FAA) or, with prior DOD approval, directly.
- A concerted effort to collect and relay PIREPs.
- Limited backup of NCO through FNMOC.

1.5 Department of Transportation (DOT) Responsibilities

1.5.1 Federal Aviation Administration (FAA)

The FAA shall provide:

- Basic surface weather observations from its network of observing sites and NEXRAD data per tri-agency agreement.
- Preflight and in-flight pilot weather briefings, within designated airspace, which include Airmen's Meteorological Information (AIRMETs), Significant Meteorological Information (SIGMETs), Convective SIGMETs, urgent pilot reports (UUAs), and Center Weather Advisories (CWAs) to pilots on a routine basis.
- Dissemination/broadcast of AIRMETs, SIGMETs, Convective SIGMETs, UUAs, CWAs, and other hazardous weather advisories via voice and recorded broadcasts. These broadcasts include the Hazardous In-flight Weather Advisory Service (HIWAS), which is a recorded broadcast available on certain air-to-ground frequencies. HIWAS is updated when conditions warrant. Air Traffic Controllers advise pilots to monitor HIWAS by broadcasting a HIWAS Alert when the HIWAS has been updated. Other broadcasts include the TWEB broadcasts for Alaska, the Telephone Information Broadcast (TIBS), and the VOLMET broadcast for international flights arriving into the domestic airspace.

1.5.2 Federal Highway Administration (FHWA)

The FHWA will:

- Assist in making use of Intelligent Transportation Systems as a means of disseminating severe local storm information to both transportation managers and road users.
- Work towards assimilating Road Weather observations into the broader weather observation networks.

- Work with vehicle manufacturers and others to explore the collection of surface observations from mobile sources (e.g., cars and trucks).

1.6 Department of Homeland Security (DHS)

1.6.1 Federal Emergency Management Agency (FEMA) Responsibilities

FEMA will:

- Develop and maintain communications systems in partnership with NWS to ensure that the emergency management community is provided with access to a set of NWS products at no recurring cost.
- Operate an interstate hot line telephone system (National Warning System [NAWAS]) that connects FEMA Warning Points and WFOs.
- Revise and update a HAZUS-MH model that can estimate risk, damage and losses for earthquakes, floods, and hurricane winds, both on an annualized loss basis and on a deterministic basis. (See http://www.fema.gov/plan/prevent/hazus/hz_models.shtm)

1.6.2 U.S. Coast Guard (USCG)

The USCG will provide:

- Communications circuits for relay of weather observations to NWS in selected areas.
- Coastal broadcast facilities at selected locations for weather forecasts, watches and warnings.
- Personnel, vessel, and communications support to the National Data Buoy Center (NDBC) for development, deployment, and operation of moored environmental data buoy systems.
- Surface observations to NWS from its coastal facilities and vessels.

1.7 Department of Energy (DOE) Responsibilities

Other than forwarding surface observations to appropriate points of contact during a severe storm, DOE and the National Nuclear Security Administration (NNSA) do not have the capability to provide forecasts or warnings to others. The DOE and NNSA sites/facilities rely on the NWS for forecasts, warnings and all significant information regarding severe local storms.

DOE and NNSA may provide resources, assets, personnel and expertise to others following a severe local storm either through the DOE Emergency Assistance Program or through an Energy Emergency response (per DOE Order 15 1. 1C). These activities may be initiated to support interagency plans, Presidential direction, and State, local, or Tribal agreements of mutual aid.

In the event of a severe storm at a DOE or NNSA site, DOE may activate its Headquarters Emergency Operations Center to receive, coordinate and disseminate emergency information to the White House, other Federal agencies, and other appropriate emergency points of contact.

1.8 Department of the Interior (DOI) Responsibilities

The U.S. Geological Survey will provide water level and stream flow data on a near-real-time basis needed for the National Weather Service River Forecast Centers to issue flash flood warnings at locations throughout the United States.

1.9 Exchange of Data, Products and Forecasting Techniques Between Agencies

There shall be a mutual exchange of relevant data and products on the part of all concerned agencies outlined in Chapter 1. SPC and AFWA are the units responsible for preparing centralized severe weather forecasts. These forecast products will be exchanged between them, since AFWA provides limited backup for SPC. NESDIS, National Severe Storms Laboratory (NSSL), and SPC are actively engaged in developing objective severe weather forecasting and analysis techniques. These organizations will engage, whenever possible, in a joint technique development program and will exchange any objective techniques developed.

2

DEFINITIONS AND CRITERIA

2.1 General

This chapter defines those common meteorological terms, subject to multiple interpretations, that are used by agencies preparing severe local storms forecasts and warnings.

2.2 Severe Local Storm

A severe local storm is a tornado, waterspout, or a thunderstorm with winds of 50 knots (25 m/s or 58 mph) or greater and/or hail 3/4 inch (20 mm) or greater in diameter at the ground. Significant wind damage (several downed trees) or sightings of large hail or a tornado can help supplement official observations (METAR and SPECI) to determine where severe local storms occur.

2.3 Severe Local Storms Season(s)

Tornadoes and severe thunderstorms may occur anywhere and at any time of the year. The months and location of greatest frequency of severe thunderstorms and tornadoes shifts from the southeast U.S. in the early Spring, to the southern and central Plains and lower Midwest during the rest of the Spring, and into the northern Plains and upper Midwest during the late Spring and early summer. The lowest frequency of occurrence is west of the Rockies.

2.4 Squall Line

A squall line refers to a line of active thunderstorms, either continuous or with breaks, including contiguous precipitation areas resulting from the existence of the thunderstorms. Squall lines can extend hundreds of miles in length, and can be especially disruptive to aviation activities.

2.5 Density/Risk of Severe Thunderstorms

The Storm Prediction Center issues daily severe weather outlooks describing forecast coverage of severe thunderstorms across the conterminous U.S. Three risk categories (Slight, Moderate, and High) are used to symbolize the coverage and intensity of the expected severe weather. Their definitions are:

- Slight risk - Well-organized severe thunderstorms are expected, but in small numbers and/or low coverage. Depending on the size of the area, approximately 5-29 reports of 3/4 inch diameter or larger hail, and/or 5-29 wind events, and/or 3-5 tornadoes would be possible.
- Moderate risk - A potential for a greater concentration of severe thunderstorms than the slight risk, and in most situations, greater magnitude of the severe weather. Within a

moderate risk area, at least 30 reports of hail 1 inch diameter or larger, or 6-19 tornadoes, or numerous wind events (at least 30 reports that likely would be associated with a squall line, bow echo or derecho).

- High risk - A major severe weather outbreak is expected, with a high concentration of severe weather reports and an enhanced likelihood of extreme severe (i.e., violent tornadoes or very damaging convective wind events occurring across a large area). In a high risk, the potential exists for 20 or more tornadoes, some possibly F2 or stronger, or an extreme wind event potentially causing widespread wind damage and higher end wind gusts (80+ mph) that may result in structural damage

2.6 Thunderstorm Intensity Categories

Primary hazards in a thunderstorm are wind, hail, flash flooding, and lightning. Flash flooding and lightning may be mentioned in severe weather watches/warnings, if it will have a significant impact on the general public. The following thunderstorm intensity classes will be used in the forecasting and warning functions of concerned agencies:

- Thunderstorm - Wind gusts less than 50 knots and hail, if any, of less than 3/4 inch diameter at the surface.
- Severe Thunderstorm - Thunderstorm related surface winds (sustained or gusts) of 50 knots or greater and/or surface hail 3/4 inch diameter or larger. Wind or hail damage may be used to infer the occurrence/existence of a severe thunderstorm. The word "hail" in a watch bulletin implies hail at the surface as well as aloft, unless a qualifying phrase such as "hail aloft" is used.

NOTE: The USAF uses an additional intensity definition: Moderate Thunderstorm - Wind gusts between 35 and 50 knots, and/or hail, if any, of 1/2 inch diameter up to 3/4 inch diameter at the surface.

2.7 Funnel Cloud

A condensation cloud, typically funnel-shaped and extending outward from a cumuliform cloud, associated with a rotating column of air that may or may not be in contact with the ground.

2.8 Tornado

A violently rotating column of air, in contact with the ground, either pendant from a cumuliform cloud or underneath a cumuliform cloud, and often (but not always) visible as a funnel cloud.

2.9 Waterspout

In general, any tornado over a body of water. Consists of an intense columnar vortex (usually containing a funnel cloud) that occurs over a body of water and is connected to a cumuliform cloud.

2.10 Flash Flood

A rapid and extreme flow of high water into a normally dry area, or a rapid water level rise in a stream or creek above a predetermined flood level, beginning within six hours of the causative event (e.g., intense rainfall, dam failure, ice jam). However, the actual time threshold may vary in different parts of the country. Ongoing flooding can intensify to flash flooding in cases where intense rainfall results in a rapid surge of rising flood waters.

2.11 Other Warning Criteria

All phenomena, other than those classified as severe local storms, paragraph 2.2, described in the various warnings, bulletins, and advisories should be categorized as "other warning criteria" and are not called severe weather phenomena. Such other warning criteria will be listed separately in the appropriate NOAA/NWS publications.

Table 2.1 Types of NWS Messages - General Categories

Product	Lead time	Certainty of event	Purpose/outcome
Outlook	Hours to a few days	<i>Possible</i> occurrence of hazardous weather	Adequate notice to those who need hours to longer lead times
Watch	Less than 1 day for severe weather (e.g., thunderstorms, flash floods, tornadoes) 1-2 days for large-scale events (e.g., winter storms, hurricanes)	Risk of hazardous weather has increased but not necessarily occurred	Notify public to carefully monitor local weather conditions; prepare to protect life/property
Advisory	Hours for large-scale events	A hazardous weather event is occurring, is imminent, or has a very high probability of occurrence	Conditions <i>may</i> require immediate action to protect life and property; impacts are generally not as severe as with a warning
Warning	Hours for large-scale events Minutes for severe weather	A hazardous weather event is occurring, is imminent, or has a very high probability of occurrence	Conditions <i>require</i> action to protect life and property

2.12 Convective SIGMETs

Convective SIGMET bulletins are issued as scheduled products hourly at 55 minutes after the hour (H+55), and, as non-scheduled specials, by AWC for thunderstorms occurring or expected to occur in lines, for areas covering at least 3,000 square miles and for severe or embedded thunderstorms. Special Convective SIGMET bulletins cover the conterminous United States and the adjacent coastal waters. For thunderstorm areas less than 3,000 square miles, the Center Weather Service Unit (CWSU) may issue Center Weather Advisories (CWAs) within their Center boundaries.

2.13 Collaborative Convective Forecast Product (CCFP)

The CCFP is a graphical representation of expected convective weather at 2-, 4- and 6-hours after issuance time, produced through a collaborative process involving NWS meteorologists at the Aviation Weather Center (AWC), the Center Weather Service Units (CWSUs), and airline meteorologists. The CCFP is issued every 2 hours, and supports the strategic system-wide planning for the National Airspace System (NAS), and is intended to help reduce traffic flow disruptions caused by convective weather.

2.14 Special Marine Warnings (SMW)

SMWs are for hazardous over-water events of short duration (up to 2 hours), and not adequately covered by existing marine warnings and forecasts. These events include convective activity, squalls or wind shift lines, waterspouts, cold air funnels and other localized short-lived phenomena. The nationwide criteria for the SMW issuance is forecast winds of 34 knots, and/or hail 3/4 inch or more in diameter, and/or a waterspout.

3

GENERAL OPERATIONS AND PROCEDURES

3.1 General

Every effort has been made to standardize terminology, adopt common definitions, and adjust criteria to a common base; however, each agency has different operational watch and warning criteria that must be met. Although standardization will be used wherever possible in forecasts and warnings, each agency retains the right to specify the forecast, watch and warning criteria needed to carry out its mission.

3.2 National Weather Service (NWS) Watch/Warning Procedures

3.2.1 General

The NWS has statutory responsibility for providing severe local storms watch and warning service for all 50 States. This responsibility is fulfilled by the National Centers for Environmental Prediction (NCEP) Storm Prediction Center (SPC) and the NWS Weather Forecast Offices (WFOs). NCEP Central Operations (NCO), as the central data processing center for the NWS, issues prognostic charts, discussions, and other forecast data and information, that are used by the WFOs, SPC, and NCEP's Aviation Weather Center (AWC) in fulfilling their severe local storm responsibilities.

Geographical Responsibilities

For the conterminous U.S., the SPC issues Severe Weather Outlooks and Watches. SPC does not issue severe local storm watches for Alaska or Hawaii. The WFOs at Anchorage and Honolulu have the responsibility for maintaining weather watches and issuing warnings as needed for their respective states. Each WFO in the 50 states and the U.S. territories, located in the NWS Pacific and Southern Regions, issues a Thunderstorm Outlook/Hazardous Weather Outlook for a forecast of and Warnings for an imminent threat of severe thunderstorms and/or tornadoes.

Watch/Warning Criteria

Any or all of the criteria listed in paragraph 2.2 Severe Local Storms, paragraph 2.5 Density/Risk of Severe Thunderstorms, and paragraph 2.6 Thunderstorm Intensity Categories/Severe Thunderstorms may be mentioned in severe weather watches/warnings to indicate more fully that severe weather is expected. Severe weather watches/warnings that mention tornadoes or waterspouts imply that thunderstorm activity, usually severe, also is expected/occurring.

Outlooks

The SPC issues separate Convective Outlooks for severe weather for Day One, Day Two, and Day Three. Each forecast covers 24 hours (see Appendix A, page A-1 for a text example of a

Convective Outlook), in both a text and graphical format. The outlook conveys forecasts of expected severe weather coverage as defined in Chapter 2. Additionally, the Day 1 and Day 2 Outlook cover the general thunderstorm outlook, where greater than a 10 percent chance of a thunderstorm is forecast. A Day 4-8 Severe Weather Outlook is also issued to indicate areas where a severe potential exists several days in the advance. A relatively high confidence for severe weather has to be expected before an area is indicated, given the greater uncertainty. Each WFO issues a Thunderstorm Outlook/Hazardous Weather Outlook to outline the severe convective threats of the day, public watches based on SPC watches, and public warnings for imminent severe thunderstorms and/or tornadoes.

Mesoscale Discussions

The SPC issues Mesoscale Discussions (MD) to convey to CONUS WFOs, the public, media, and emergency managers the current meteorological reasoning for different types of short-term hazardous weather concerns. MDs are non-scheduled, event-driven products. For severe potential and convective trends SPC will issue a MD 1 to 2 hours prior to a watch issuance. SPC will also issue a MD for severe weather potential when an area is being monitored for a potential convective watch, or when thunderstorm development is potentially severe, but will not have enough areal coverage or duration to need a convective watch issuance. MDs are normally issued at least every 2 to 3 hours for each convective watch that is in effect and focus on mesoscale and storm scale features within the watch area. For an example of a MD see Appendix A, page A-2.

The following descriptions are used in the MD “CONCERNING...” line to better identify the reasoning behind the particular SPC discussion:

Severe Potential
Watch Unlikely
Watch Possible
Watch Likely
Tornado Watch Likely
Severe Thunderstorm Watch Likely
Watch Needed Soon

Public Watches

SPC Public Watches

The SPC collaborates on watch issuances with the local Weather Forecast Offices and issues watches where severe thunderstorms and/or tornadoes are expected (see Appendix A, page A-3 for an example of a Severe Thunderstorm Watch). A Watch Outline Update (WOU) is also issued that lists all of the counties, and if applicable, coastal zones that are in the watch issuance (see Appendix A, page A-4 for an example of a WOU). The watch type reflects the anticipated predominant threat. A tornado watch is issued where multiple weak tornadoes or at least one strong tornado is anticipated. A severe thunderstorm watch is issued when hail and/or thunderstorms producing damaging winds or large hail are expected to be the primary threat.

Following the issuance of a severe thunderstorm or tornado watch, the Storm Prediction Center issues hourly watch status messages indicating which areas remain under the threat of severe weather (see Appendix A for an example of a Watch Status message).

Accompanying the Public severe thunderstorm or tornado watch is the Aviation version of the same watch, which outlines the watch area for plotting purposes (see Appendix A, page A-5 for an example of an Aviation Watch). This watch also includes the expected maximum hail size, strongest thunderstorm wind gusts and storm motion vector of severe thunderstorms in the watch area.

WFO Public Watch

Once a watch is issued by SPC, the WFO issues a Watch County Notification (WCN) listing of the counties within the watch in its area of responsibility (see Appendix A, page A-5 for an example of a Watch County Notification). As the event unfolds, the WCN products are issued by the WFO to clear counties from each watch until the watch has expired. The WCN may also be used to add counties to the watch and also extend it in time.

Public Warnings

Tornado Warning (TOR)

Each WFO issues tornado warnings (see Appendix A, page A-7 for an example of a tornado warning) where there is radar or satellite indication and/or reliable spotter reports of a tornado. Valid times are usually 15 to 45 minutes. Warnings are often updated with a severe weather statement while the warning is in effect. The warnings use a ‘bullet’ format to highlight the most important warning parameters, such as type of warning, when a warning is in effect, basis for the warning, and an optional pathcast forecasting the times and locations of the severe weather.

Severe Thunderstorm Warning (SVR)

Each WFO issues severe thunderstorm warnings (see Appendix A, page A-7 for an example of a severe thunderstorm warning) when there is radar or satellite indication and/or reliable spotter reports of wind gusts equal to or in excess of 50 knots (58 mph) and/or hails size of 3/4 inch (penny) diameter or larger. Valid times are usually 30 to 60 minutes. Warnings are often updated with a severe weather statement while the warning is in effect. The warnings use a ‘bullet’ format to highlight the most important warning parameters, such as type of warning, when a warning is in effect, basis for the warning, and an optional pathcast forecasting the times and locations of the severe weather.

Flash Flood Warning (FFW)

Each WFO issues flash flood warning (see Appendix A, page A-8 for an example of a flash flood warning) when:

- a. Flash flooding is imminent or occurring; and/or
- b. A dam or levee failure is imminent or occurring; and/or

- c. A sudden failure of a naturally-caused stream obstruction (including debris slide, avalanche, or ice jam) is imminent or occurring; and/or
- d. Precipitation capable of causing flash flooding is indicated by radar, rain gages, and/or satellite; and/or
- e. Local monitoring and prediction tools indicate flash flooding is likely; and/or
- f. A hydrologic model indicates flash flooding for locations on small streams; or
- g. A previously issued flash flood warning needs to be extended in time.

Warnings are often updated with a flash flood statement while the warning is in effect. The warnings use a 'bullet' format to highlight the most important warning parameters, such as type of warning, when a warning is in effect, basis for the warning, and locations impacted.

Special Marine Warnings (SMW)

The WFOs issue SMWs for hazardous over-water events of short duration (up to 2 hours) and for events inadequately covered by existing marine warnings and forecasts (see Appendix A, page A-9 for an example of an SMW). These events can include convective activity, squalls or wind shift lines, waterspouts, cold air funnels and other localized short-lived phenomena.

Convective SIGMETs

The AWC issues Convective SIGMET bulletins both hourly, at 55 minutes past the hour, and as required over the coterminous U.S. and adjacent coastal waters for areas greater than 3000 square miles (see Appendix A, page A-9 for an example of a Convective SIGMET). Negative bulletins are issued if none of the criteria specified in Chapter 2 are met. Convective SIGMETs alert in-flight interests for:

- tornadoes
- lines of thunderstorms
- embedded thunderstorms of any intensity
- active thunderstorms affecting at least 3000 square miles
- severe thunderstorms with hail greater than 3/4 inch diameter or greater or winds 50 knots or greater

National Convective Weather Forecast (NCWF) Product

The NCWF supplements the convective airmen's meteorological information (AIRMETs) and SIGMET products. The NCWF product provides forecasts of significant thunderstorm locations one hour in the future, and is updated every five minutes. This product is available via Internet from AWC's operational server: <http://www.awc-kc.noaa.gov/>.

Center Weather Service Unit (CWSU) Messages

The CWSU prepares the Center Weather Advisory message for the aviation community which can include severe weather convective SIGMETs for areas less than 3000 square miles.

3.3 DOD Watch/Warning Procedures

3.3.1 USAF

The Air Force provides weather warning support for both the Air Force and Army, including active and reserve components. All sites receive watches and warnings for thunderstorms, severe thunderstorms, tornadic thunderstorms, and lightning strikes. Warning lead-times are standardized to the greatest extent possible; specific mission needs may drive non-standard lead times and criteria. Standardized lead times are 90 minutes for moderate thunderstorms (those with 1/2 inch diameter hail and/or 35-49 knot winds associated), 2 hours for severe thunderstorms, 15 minutes for tornadoes, and 30 minutes (prior to a thunderstorm within 5 nm of the installation or airfield) for lightning watches. Lightning warnings are issued when lightning is observed within 5 nm of the installation.

Operational Weather Squadrons (OWSs)

The Air Force OWSs at Barksdale AFB, LA; Scott AFB, IL; Davis Monthan AFB, AZ; and Hickam AFB, HI provide forecast services for designated regions of the U.S. These squadrons provide weather warning support for Active Duty, Guard, and Reserve Air Force and Army installations within their areas of responsibility. Whenever possible CONUS OWSs will be included on severe weather conference calls between SPC and the WFOs prior to issuance of a severe weather watch. Figure 3-1 graphically represents relation between principal CONUS forecast centers in case of severe weather. Routine collaboration between military and civilian forecast centers will ensure forecast consistency and provide full benefit of meteorological expertise.

Severe Weather Product Generation

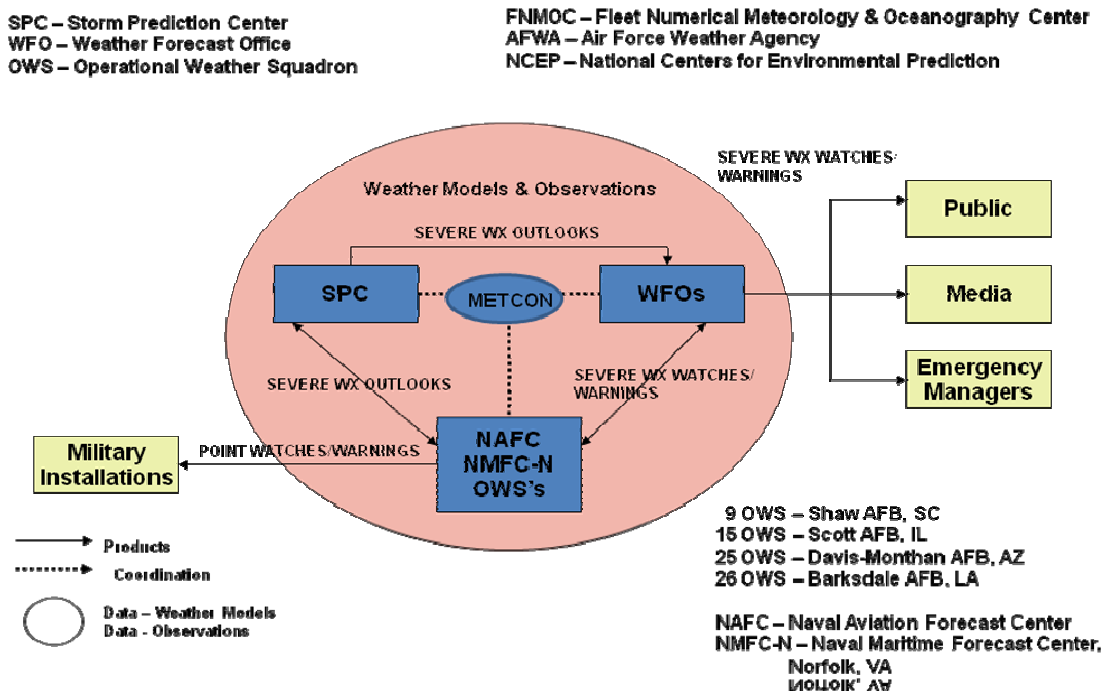


Figure 3-1 Severe Weather Product Generation

Local Unit Warning

At those locations where a USAF forecaster is on duty, the forecaster may issue warnings and advisories, mainly for observed criteria. The criteria and any lead-times for warnings are established locally, based on customer needs.

3.3.2 USN and USMC

Navy Meteorology and Oceanography (METOC) Command Centers and Marine Corps weather activities are responsible for the timely dissemination of hazardous or destructive weather warnings via designated area commands and activities. The Naval Aviation Forecast Center (NAFC) is the centralized aviation weather forecasting hub for continental United States shore-based Naval Aviation activities, providing a combination of 24/7 and after-hours forecasting, severe weather warning and flight weather briefing services to 22 Naval Air Stations across the United States. NAFC also exercises operational and administrative control over 2 Naval Aviation Forecast Detachments and 7 Components in Asia and Europe. The Naval Maritime Forecast Center Norfolk (NMFC-N) provides safety of navigation forecasting and route recommendations to a daily average of 70 U. S. Navy, Merchant Marine and contract carrier vessels operating in the Caribbean Sea, Atlantic Ocean and Mediterranean Sea. During the Atlantic hurricane season (01 June – 30 November) NMFC-N provides advisory services to U. S. Navy shore installations from Brunswick, Maine, to Corpus Christi, Texas, which include

National Hurricane Center track forecasts, onset of gale and storm force winds and storm surge model output for affected installations.

If USN and USMC weather activities are not available, full use should be made of storm warning information disseminated by other agencies (e.g. NWS, USAF, and local foreign meteorological services). In the U.S., NWS Bulletins are often heard first over television or radio, therefore prior familiarity with their terminology will enhance their value and avoid confusion when Warning Conditions are normally set by the local area commanders. For severe local storms, Conditions II and I are used to avoid or minimize loss and damage due to destructive weather phenomena and are based on all available weather information. Whenever possible NAFC and NMFC-N will be included on severe weather conference calls between SPC and the WFOs prior to issuance of a severe weather watch.

3.4 Backup Operations for SPC and AWC

The SPC, AWC and AFWA have agreed that the AFWA will provide limited backup capability for both SPC and AWC. Appendix C contains the Memorandum of Agreement that covers these backup arrangements, specifying the severe weather forecast and aviation products that AFWA will produce when required to backup either SPC or AWC. The coordination channel for backup plans and procedures and for exchange of data and products among SPC, AWC and AFWA shall be between the Commander, AFWA, and the Director, SPC or AWC, as appropriate. Unresolved differences will be worked out between the Director, NCEP and the Commander, AFWA.

4

COMMUNICATIONS

4.1 DOC/NOAA Communications Systems

Various distribution methods are used by NWS, as appropriate, to make warnings available to NWS field offices, other Federal agencies, National Centers, and to the public as rapidly as possible. The NWS Telecommunications Gateway (NWSTG) provides a majority of the connectivity between the producers and users of warnings for these distribution methods. Data collection is also accomplished by several methods within each agency and then shared between agencies. In addition, the NWSTG is the North and South American Regional Meteorological Telecommunications Network (RMTN) for the World Meteorological Organization (WMO) Global Telecommunications System (GTS) which provides global weather data and products to WMO members such as the U.S. It is also a network of interconnected military, civilian and foreign computer interfaces, used for collecting and distributing environmental data worldwide.

4.1.1 NOAA Weather Wire Service (NWWS)

The NWWS is the primary NWS medium for disseminating warning and forecasts to the media, emergency management agencies, and other users in the public and private sectors. It is a leased satellite communications system operated for the NWS by a private sector contractor. The NWWS will accept messages simultaneously entered from all NWS data entry nodes, primarily WFOs and the National Centers. The system delivers the information to subscribers through satellite broadcast with output in ASCII format. More information on this system is available via NWS web pages: <http://www.nws.noaa.gov/>.

4.1.2 NOAA Weather Radio (NWR)

NOAA Weather Radio (NWR) is a nationwide network of over 900 radio stations broadcasting continuous weather information direct from a nearby National Weather Service (NWS) office. NWR broadcasts NWS warnings, watches, forecasts, and other hazard information 24 hours a day. In conjunction with the Emergency Alert System, NWR provides an "all-hazards" radio network, making it a single source for comprehensive weather and emergency information. NWR also broadcasts warning and post-event information for all types of hazards: natural (e.g., earthquakes and volcano activity), manmade (such as chemical or environmental incidents), and terrorism-related.

NWS field offices equipped with NWR can transmit continuous weather information on one of following frequencies: 162.400, 162.425, 162.450, 162.475, 162.500, 162.525, and 162.550 MHZ. These radio transmitters provide continuous weather information to an area of about 40-mile (65 km) radius. Local radio and TV stations can record and rebroadcast the material even when land lines in the area have been disrupted. These transmitters have a tone alert capability used to activate specially designed commercially available receivers. The NWR network continually broadcasts coastal and marine forecasts. Recorded voice broadcasts are in the process of transitioning to voice synthesis or concatenated voice. The network provides near-

continuous coverage of the conterminous U.S., Great Lakes, Hawaii, Guam, and the populated Alaska coastline. Typical coverage is 25 nm offshore. A listing of all NOAA Radio stations can be found at: <http://www.weather.gov/nwr/nwrbro.htm>.

NWR 1050 Hz Warning Tone Alarm

An analog 1050 Hz warning alarm precedes many critical watch and warning issuances to activate receivers in a preset muted condition to alert listeners of impending hazards.

NWR Specific Area Message Encoder (SAME)

SAME is a device that puts a special digital code at the beginning and end of selected transmissions of voice messages. The NWS employs SAME with NWR. The SAME code specifies both the type of message (tornado warning, severe thunderstorm watch, etc.) and area (by county) to which the message applies. This provides users with a decoding device, within listening range of the NWR signal, the ability to choose which site-specific hazardous weather messages will automatically interrupt their normal programming. Users of SAME include radio and television stations, schools, and cable companies, businesses, and dispatchers. Although SAME will provide much more specificity in both message content and area alerted than the analog 1050 Hz warning alarm, the 1050 Hz warning alarm shall continue to be used since it is a long-standing feature of NWR. Many radio manufacturers have designed and developed SAME decoding capability in consumer and industrial grade NWR receivers.

4.1.3 Emergency Managers Weather Information Network (EMWIN)

EMWIN is a continuously supported 9.6 KBPS open and non-proprietary data broadcast from GOES East and GOES West satellites on a frequency of 1690.775 MHz. It contains real-time warnings, watches, advisories, and most routine products that are currently on the existing NWS system. EMWIN also contains satellite imagery and graphics. EMWIN was developed in partnership with FEMA to ensure the emergency management community access to a set of NWS products at no recurring cost.

The EMWIN data stream is also incorporated into the NOAA/NESDIS Low-Rate Information Transmission (LRIT) service provided by GOES-East and GOES-West satellites. This system provides uni-directional broadcast link connectivity between the originating uplink from the NOAA Command and Data Acquisition Stations (CDAS) at Wallops Island, Virginia (WCDAS) and a large number of outlying ground LRIT terminals (LRITT). These LRIT terminals are typically small receive-only stations. In addition to EMWIN data, GOES and Polar Orbiting Environmental Satellite (POES) imagery products are generated at the NESDIS Environmental Satellite Processing Center (ESPC) in Suitland, Maryland, and delivered to the CDAS as part of the LRIT data stream for rebroadcast via the GOES satellites. The LRIT downlink frequency of 1691 MHz is then converted to an intermediate frequency at the LRITT with a bandwidth that allows a data rate of up to 256 kbps. The transition to the digital LRIT system on the GOES satellites to replace the analog WEFAX system was completed on October 3, 2005.

4.1.4 Interactive Weather Information Network (IWIN)

IWIN is an Internet site with real-time data very similar to EMWIN data. It is open to all users and contains real-time warnings in addition to many routine categories of NWS products. IWIN depends on the availability of the Internet. This can be a problem during major weather events because of Internet bandwidth and connectivity limitations. The types of data include all standard warnings, watches, advisories, and routine data including state forecasts, short-term forecasts, zone forecasts, and most routine NWS products. The IWIN web site is: <http://iwin.nws.noaa.gov/>.

4.1.5 NOAA Family of Services

NWS provides external users access to weather information through a collection of data services called the Family of Services (FOS). The FOS is accessible via dedicated telecommunications access lines from the Washington, DC, area. Users may obtain the individual services from NWS for a one-time connection charge and an annual user fee. The part of FOS that specifically pertains to forecasts, watches and warnings are the Public Product Service (PPS) which carries all public warnings and watches, and various hydrological, agricultural, and miscellaneous forecasts and products and the Domestic Data Service (DDS) which carries basic observations and various aviation, marine and miscellaneous products.

4.1.6 NOAAPort

The NOAAPort broadcast system provides a one-way broadcast communication of NOAA environmental data, forecasts, and watch and warning information to NOAA and external users. This service is implemented by a commercial provider of satellite communications utilizing C-band. The Advanced Weather Interactive Processing System (AWIPS) Network Control Facility (NCF) routes the products and data to the appropriate NOAAPort channels for uplink and broadcast (see Figure 4-1). All products available on FOS, and NWWS are also available on NOAAPort. This includes access to digital Geostationary Operational Environmental Satellite (GOES) and NOAA polar orbiting satellite data. Satellite data is passed to NWSTG, NCF, and NOAAPort by the NESDIS Satellite Central Data Distribution Facility (CDDF) in Camp Springs, MD.

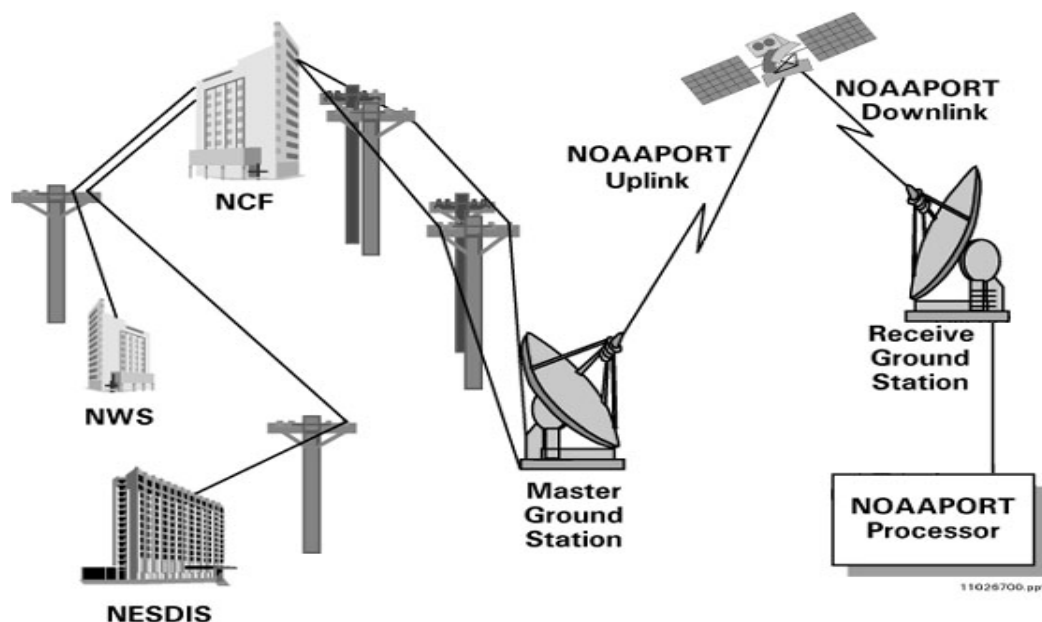


Figure 4-1 NOAAPort Flow of Operational Data and Products

4.1.7 Data Collection and Distribution

Weather data is collected by satellite environmental sensors and NWS observing systems, and processed to create products. Weather data from GOES and POES satellite environmental sensors and Federal agency observing systems such as NWS Field Offices, National Centers, DOD Automated Weather Network (AWN) and other agencies are collected by the NWSTG. The data are fed to the AWIPS NCF and NOAAPort channels. In addition, the NWSTG distributes the data to the nation's operational processing centers and other national and international users through direct links to the NWSTG, the Shared Processing Program (SPP) network, and the DDS. All WFOs have access to the digital GOES satellite data stream through AWIPS workstations. A large amount of satellite data are also available on a number of web site servers, both government operated and in the private sector.

Marine Data Collection Communications

Moored buoy and Coastal Marine Automated Network (C-MAN) data are transmitted by ultrahigh frequency communications via the Geostationary Operational Environmental Satellite (GOES) to the National Environmental Satellite, Data, and Information Service (NESDIS) and then are relayed to the NWS Telecommunications Gateway (NWSTG) for processing and dissemination. Drifting buoy data are telemetered through the NOAA polar orbiting satellites to the U.S. Argos Global Processing Center, Largo, MD.

Moored buoy observations are formatted into the World Meteorological Organization (WMO) FM 13-IX SHIP code. C-MAN measurements are formatted into C-MAN code, which is very similar to the WMO FM 12-IX SYNOP code. The full description of the C-MAN code is contained in the C-MAN Users' Guide, which is available from National Data Buoy Center (NDBC). Drifting buoy observations are processed and formatted by Service Argos into the

WMO FM 18 BUOY code. The messages are then routed to the NWSTG for distribution. Both the SHIP and BUOY codes are defined in the WMO *Manual on Codes*, Volume I.

Radar Products Central Collection/Distribution Services (RPCCCDS)

Through RPCCCDS, The AWIPS network collects radar products from NWS, DOD, and FAA WSR-88D radar sites and delivers them to central radar product collection servers integrated into the NWSTG. All radar products collected are available to users from RPCCCDS servers. For more information about RPCCCDS, link to: <http://www.nws.noaa.gov/oso/rpccds.html>

4.2 Department of Homeland Security (DHS)

4.2.1 Federal Emergency Management Agency (FEMA) Communications System

National Warning System (NAWAS)

NAWAS is the primary system for emergency communications from the Federal Government to both State and county warning points. This is the FEMA-operated hot line interstate telephone system that connects FEMA Warning Points, WFOs within each state and between states, and NOAA/NWS National Centers. Figure 4-2 gives the location of FEMA warning points, and Appendix D contains a list of state contacts.

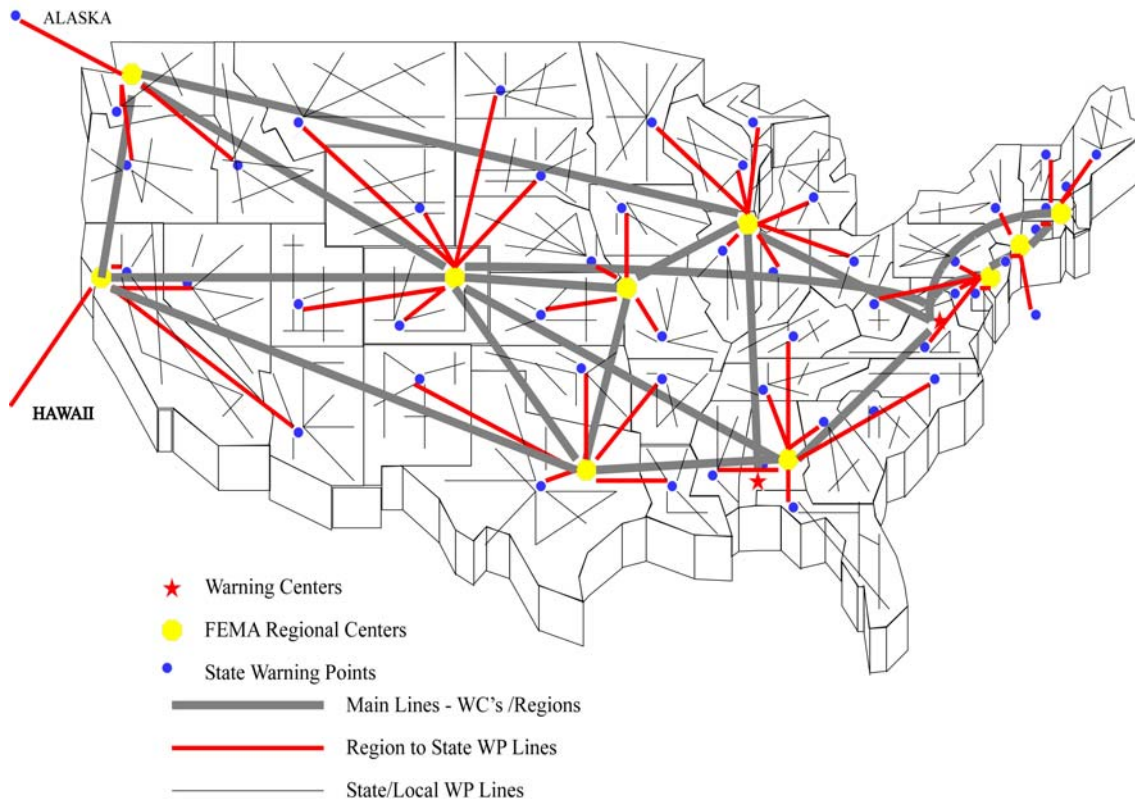


Figure 4-2 The National Warning System (NAWAS) is FEMA's Operational Hotline Telephone System

4.2.2 USCG Marine Weather Broadcasts Systems

The USCG broadcasts forecast, watch and warning products that include information on severe local storms issued by SPC, MPC, NWSFOs, and NWSOs. The broadcast of these products supports the U.S. participation in the Global Maritime Distress and Safety System, which provides the communications support to the International Maritime Organization's (IMO) global search and rescue plan.

Global Maritime Distress and Safety System (GMDSS)

The goals of GMDSS are to provide more effective and efficient emergency and safety communications, and to disseminate maritime safety information to all ships on the world's oceans regardless of location or atmospheric conditions. These goals are defined in the International Convention for the Safety of Life at Sea (SOLAS) 1974, as amended in 1988. GMDSS is based upon a combination of satellite and terrestrial radio services and has changed international distress communications from being primarily ship-to-ship based to ship-to-shore (rescue coordination center) based. GMDSS provides for automatic distress alerting and locating, and requires ships to receive broadcasts of maritime safety information which could prevent a distress from happening in the first place. The NWS participates directly in the GMDSS by preparing weather forecasts and warnings for broadcast via two primary GMDSS systems-NAVTEX and Inmarsat-C SafetyNET.

NAVTEX

NAVTEX is an international, automated system for instantly distributing maritime navigational warnings, weather forecasts and warnings, search and rescue notices, and similar information to ships. It has been designated by the IMO as the primary means for transmitting coastal urgent marine safety information to ships worldwide. NAVTEX is broadcast from the twelve USCG facilities. Coverage is reasonably continuous along the east, west, and Gulf coasts of the United States, as well as the area around Kodiak, Alaska, Guam, and Puerto Rico. The typical NAVTEX transmission coverage ranges from 200-400 nm.

SafetyNET

Satellite systems operated by the International Mobile Satellite Organization (Inmarsat) are an important element of the GMDSS. Inmarsat-C provides ship/shore, shore/ship, and ship/ship store-and-forward data and telex messaging; the capability for sending preformatted messages to a rescue coordination center; and the SafetyNET service. The Inmarsat-C SafetyNET service is a satellite-based worldwide maritime safety information broadcast service for high seas weather warnings, navigational warnings, radio navigation warnings, ice reports and warnings generated by USCG-conducted International Ice Patrol, and other information not provided by NAVTEX.

Coastal Maritime Safety Broadcasts

In addition to NAVTEX and NWR, the USCG and other government agencies broadcast maritime safety information, using a variety of different radio systems to ensure coverage of different ocean areas for which the United States has responsibility and to ensure all ships of every size and nationality can receive this vital safety information.

Very High Frequency (VHF) Marine Radio

The USCG broadcasts near shore and storm warnings of interest to the mariner on VHF channel 22A (157.1 MHz) following an initial call on the distress, safety, and calling channel 16 (156.8 MHz). Broadcasts are made from over 200 sites, covering the coastal areas of the U.S., including the Great Lakes, major inland waterways, Puerto Rico, Alaska, Hawaii, and Guam. All ships in U.S. waters over 20 meters in length are required to monitor VHF channel 16 and must have radios capable of tuning to the VHF simplex channel 22A. Typical coverage is 25 nm offshore.

Medium Frequency (MF) Radiotelephone (Voice)

The USCG broadcasts offshore forecasts and storm warnings of interest to mariners on 2670 kHz, after first being announced on the distress, safety, and calling frequency 2182 kHz.

Additional Information

Further information concerning these broadcasts can be found at the following Internet sites:

- <http://www.navcen.uscg.gov/marcomms/vhf.htm>.
- <http://weather.noaa.gov/fax/marine.shtml>

In addition, National Geospatial-Intelligence Agency (NGA) Publication 117 contains detailed information on USCG radio schedules. This publication is available from your local National Ocean Service chart agent; it can also be ordered by calling 1-800-638-8972 or 301-436-8301 or by visiting the Internet site at <http://chartmaker.ncd.noaa.gov>.

4.3 Federal Communications Commission (FCC) Communications System

4.3.1 Emergency Alert System (EAS)

Formerly known as the Emergency Broadcast System, the National EAS is a nationwide network of broadcast stations and cable systems that provide a readily available and reliable means to communicate emergency information to the American people. State and local authorities have their own EAS which may be used to broadcast information on major disasters or emergencies. The FCC designed the EAS as a tool for officials to quickly send out important emergency information targeted to a specific area. The EAS digital signal uses the SAME coding protocols that the NWS uses on NWR. This allows NWR signal to be decoded by the EAS equipment at broadcast stations and cable systems, facilitating almost immediate retransmission of NWS weather warning messages to their audiences. The EAS digital system architecture allows broadcast stations, cable systems, participating satellite companies, and other services to send and receive emergency information quickly and automatically even if those facilities are unattended. The EAS requires monitoring of at least two independent sources for emergency information, ensuring that emergency information is received and delivered to viewers and

listeners. EAS digital messages can be automatically converted into any language used by the broadcast station or cable system or to external devices used to alert special populations such as the hearing impaired.

4.4 DOD Communications Systems

4.4.1 Air Force Communications Systems

Joint Air Force and Army Weather Information Network (JAAWIN) and Joint Environmental Toolkit (JET)

JAAWIN provides access to products via the Internet for any user at a military computer (.mil extension) using digital authentication and encryption technologies. Non-military computer users must first request an account and be issued a user name and password. The Universal Resource Locator is: <http://weather.afwa.af.mil/>.

4.4.2 Navy Communications Systems

Meteorology and Oceanography Center (FNMOC)

The U.S. Navy's FNMOC (<https://www/fnmoc.navy.mil/>) plays a significant role in the National capability for operational weather and ocean prediction through its operation of sophisticated global and regional models, extending from the top of the atmosphere to the bottom of the ocean. FNMOC is linked with the data collecting and distributing networks of the U.S. Air Force (USAF), NOAA, and the World Meteorological Organization (WMO). Through these sources, FNMOC collects and assimilates massive volumes of global METOC data for input into its numerical models and distribution to DOD forces worldwide. Utilizing this collection of data, basic and applied numerically-generated (computer) meteorological and oceanographic (METOC) products are made available for distribution on Navy, Marine Corps and Joint Command, Control, Communications, Computers, and Intelligence (C⁴I) systems.

Many of FNMOC's products are distributed to users over the Web via the PC-based METCAST system, and subsequently displayed and manipulated on the user's PC with the Joint METOC Viewer (JMV) software. This includes all standard meteorological and oceanographic fields, synoptic observations, and satellite imagery. For those who require only graphical representation, FNMOC provides a Web-based capability called MyWxMap which can be accessed through a Web browser for quick display of meteorological and oceanographic fields for any user-defined geographical region.

Naval Oceanographic Office (NAVOCEANO)

NAVOCEANO, Stennis Space Center, MS, is a primary oceanographic production center for the Navy. It is responsible for collecting, processing, and distributing hydrographic, oceanographic and other geophysical data and derivative products. Products available from NAVOCEANO include ocean fronts and eddies analyses, and surface and three-dimensional ocean thermal fields which are distributed through the Navy, Marine Corps and Joint C⁴I systems. The NAVOCEANO web site for information is <https://www.navo.navy.mil/>.

4.4.3 Data Collection

The AWN provides the means for data collection within DOD and serves as the DOD link to the WMO GTS through the NWSTG. The AWN currently terminates at AFWA at Offutt AFB. In addition, the High-speed Asynchronous Transfer Mode (ATM) Weather Communications Network (HAWCNET) links Air Force, Navy, and NOAA's NESDIS and NWS centers to share data and products.

Alphanumeric support is provided to end users via the DOD Non-secure Internet Protocol NETWORK (NIPRNET). In addition, the Automatic Digital Network (AUTODIN) via landline, standard DOD C⁴I systems, and the Joint Operational Tactical System (JOTS) provide another means to send METOC data to FNMOC and AFWA and to distribute METOC data and products to users.

4.5 DOT Communications Systems

4.5.1 Federal Aviation Administration (FAA) Systems

Collection of Data and Distribution of Watches, Warnings, and Severe Weather Reports

All FAA air traffic facilities are required to accept and relay pilot reports. FAA satellite, voice and telecommunications will be used for the collection and distribution of severe local storms observations and products as follows:

- METAR Aviation routine weather report
- SPECI Aviation selected special weather report
- PIREP Pilot reports (UA/UUA)
- Convective SIGMETs
- Center Weather Advisories.

Weather Message Switching Center Replacement (WMSCR)

WMSCR is the FAA's main weather alphanumeric message switching system. It is designed to store and forward automatically all the various alphanumeric weather messages that contain a proper WMO header. The system consists of two sites, one in Atlanta, Georgia, and the other in Salt Lake City, Utah. These systems share the load but can support the entire system if the other one is not available.

Automated Flight Service Stations (AFSS)/Flight Service Stations (FSS)

The AFSS/FSS collect and disseminate PIREPs and broadcast weather information and alerts via air-to-ground radio, telephone recordings, and over navigational aids. Requests for information not available at the AFSS/FSS are forwarded to the appropriate NWS office for resolution. These stations also routinely pass information from observers, airport personnel and pilots to the

appropriate NWS office. The FAA and NWS have agreed on the communications methods used to pass on this information.

On February 1, 2005, the FAA awarded a contract for the services provided by the 58 AFSSs in the Continental United States, Puerto Rico, and Hawaii to the Lockheed Martin Corporation. Lockheed Martin assumed responsibility for providing AFSS flight services on October 4, 2005. With continued FAA oversight, Lockheed Martin will maintain deliverance of flight services according to the Agency's strict safety and service requirements. AFSS/FSS in Alaska continue to be operated by the FAA.

4.6 Interagency Shared Processing Program

Polar Orbiting Satellite Data are processed and exploited by the DOD and NOAA to meet their requirements, are forwarded to each other through the ATM/Shared Processing Program (SPP) network, and further distributed to other agencies and the public, as appropriate. The ATM/SPP network interconnects the five U.S. Operational Processing Centers at AFWA, FNMOC, NESDIS, NCEP, and NAVOCEANO, and the NWSTG. The USAF/USN piece of this SPP connection is referred to as the High-speed Asynchronous transfer mode Weather Communications Network (HAWCNET) and is also used for exchange of numerical weather prediction model products. NWS Headquarters (HQ) is working to make all satellite data available over AWIPS. These data are archived on tapes and passed to the National Geophysical Data Center (NGDC) at the University of Colorado for permanent archive.

4.7 Distribution of Severe Local Storm Watch and Warning Bulletins

The intra- and inter-agency distribution of combined severe weather watch and warning bulletins and other information is shown in Figure 4-3 (**NEEDS UPDATING**). This represents the end-to-end process from the producers, represented by shaded boxes, to the users (public, emergency management, commercial, marine, aviation and military) which are represented by circles. The backup of the producers, described in paragraph 3.5 and in Appendix C, can be achieved because of their inter-connectivity as shown in Figure 4-3. Available Internet web sites are indicated by a double box around the producers (shaded) and connectivity and communications systems (clear).

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 (WSR-88D). Within DOT, 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) generates graphic products that are distributed to users for detection and evaluation of weather features, generally associated with precipitation and storms. Additionally, the WSR-88D automatically generates a product called the radar coded message (RCM). The RCM is centrally collected and quality controlled by the NWS at the Silver Spring, MD facility. NWS produces and edits a national grid of composite RCMs and derived Radar Observations (ROB), that include storm detection (SD) and manually digitized radar (MDR) sections, for WSR-88D sites. The NWS uses a sophisticated multi-step computer program to produce the "derived ROBs." Once the ROBs are generated with the "AUTO" appended, the derived radar observations (ROBs) are then made available to all users.

The FAA's long-range radars show reflectivity on displays in the ARTCC for enroute controllers. An interface was developed that allows these radars to be integrated into AWIPS. It is currently used in South Dakota for snow events. 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 that are common through most of aviation. The second type of radar equipment is the ASR 9 and 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 which depict microbursts, wind shear, current weather, and forecasts out to one hour. The third radar type is the TDWR which will be at 45 locations. It provides information similar to ITWS but not in the level of detail necessary for detecting microbursts and forecasts. It is FAA's intention to eventually make all the data and products available to users, probably through a combination of direct connections and Internet sites. Controllers are encouraged to give pilots information they have on the weather displayed on their scopes. The FAA radar product development team (research) is looking into how to integrate these radars with WSR-88D so all the data will 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 US states and Alaska, provides hourly vertical wind profile data. The data produced by this network is distributed to the National Weather Service (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/>.

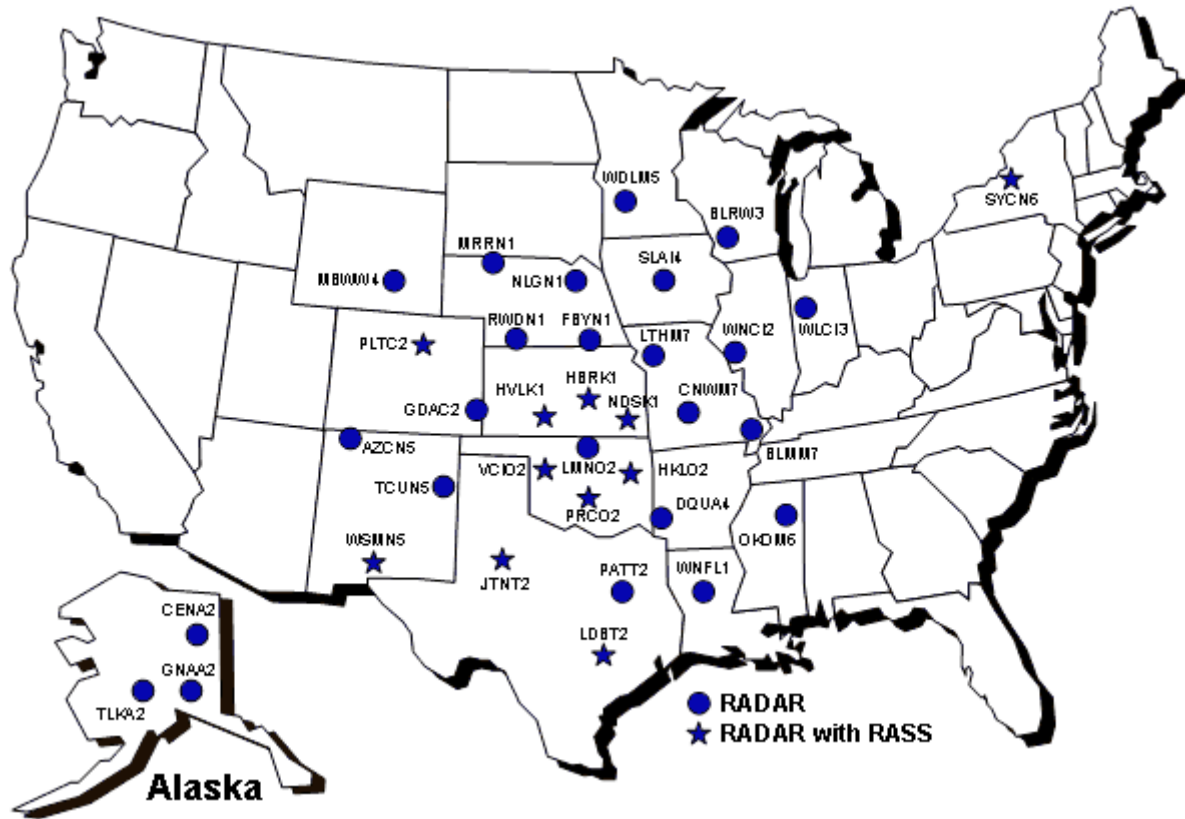


Figure 5-1 Location of National Profiler Network Sites

5.2 Rawinsonde-Observing Stations

5.2.1 NWS Network Stations

Rawinsonde observations 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, 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 is 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.

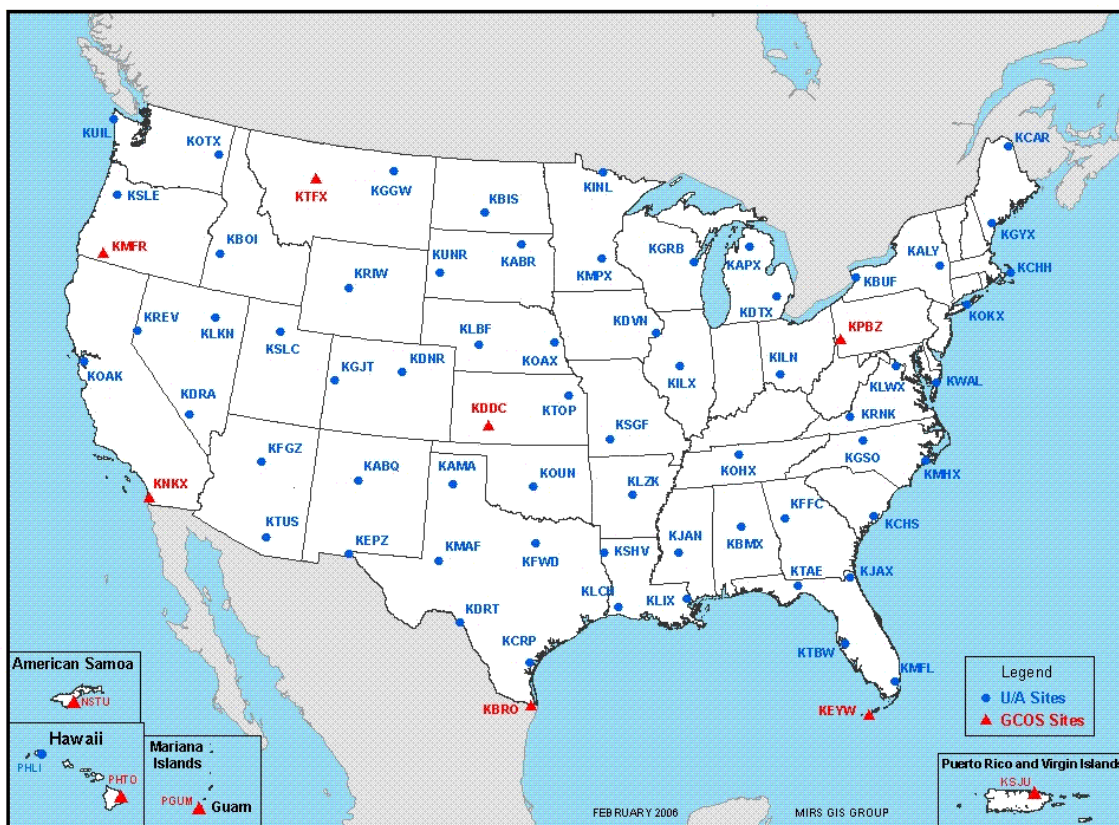


Figure 5-2 Location of RAOB Sites

5.2.2 Other Network Stations

There are approximately 5 rawinsonde network stations operated by 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 Labs 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. Non-network upper-air stations, which might be sources of operational data, are provided in Table 5-1.

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 at 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, 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 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 National Weather Service (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) incorporates this 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 their 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.

Table 5-1. Non-Network Upper Air Stations That Might be Sources of Data

<u>STATION</u>	<u>OPERATED BY</u>	<u>TIME OF OBSERVATIONS</u>	<u>DISTRIBUTION</u>	<u>AGENCY CONTACT</u>	<u>WILL TAKE REQUESTED SPECIALS?</u>
Aberdeen Proving Ground	USA	Mon-Fri 1100Z and as required	AMIS MIST	Charles Clough STECs-PO-OM DSN 298-7908 COM 410-278-7908	Yes
Cold Regions Test Center	USA	Unscheduled	AMIS MIST	Craig England DSN 317-873-4326 COM 907-873-4326	Yes
Dugway Proving Ground, UT	USA	Unscheduled	AMIS MIST	Chris Biltoft STEDP-MT-M DSN 789-5101 COM 801-831-5101	Yes
Edwards AFB, CA	USAF	Unscheduled	AMIS	Commander 412, OSS/OSW DSN 527-4318 COM 661-277-4318	No
Eglin AFB, FL	USAF	Unscheduled	AMIS	46 WS/CC DSN 872-5324 COM 850-882-5324	No
Fort Bragg, NC	USAF	Unscheduled	AMIS MIST	Commander 18 WS/CC DSN 239-3150 COM 910-432-3150	No
Fort Huachuca, AZ	USA	Mon-Fri 1200Z	AMIS MIST	Art Trapp AMSTE-TC-AM DSN 879-3906 COM 602-538-3906	Yes
Fort Lewis, WA	USAF	Unscheduled	AMIS	Commander Det 6, 1 WXG DSN 357-5967 COM 206-967-5967	No

Table 5-1 (continued) Non-Network Upper Air Stations That Might be Sources of Data

<u>STATION</u>	<u>OPERATED BY</u>	<u>TIME OF OBSERVATIONS</u>	<u>DISTRIBUTION</u>	<u>AGENCY CONTACT</u>	<u>WILL TAKE REQUESTED SPECIALS</u>
Fort Riley, KS	USAF	Unscheduled	AMIS MIST	Commander Det 8, 1 WXG DSN 856-3327 COM 913-239-3327	No
Fort Sill, OK	USAF	Mon-Fri 1100Z-1500Z	AMIS	Commander Det 11, 1 WXG DSN 639-3200 COM 405-351-3200	No
Marshall Space Flight Center, Huntsville, AL	NASA	Unscheduled	Local loop to WSO Huntsville, AL, then to RAWARC	Bob Turner COM 205-961-4614	Yes
Naval Air Weapons Station China Lake, CA	USN	Monday-Friday 1230Z and as required	MIDDS AMIS	Lloyd Corbett DSN 437-5058 COM 619-939-6058	Yes
Navy Pacific Missile Test Center Point Mugu, CA	USN	Monday-Friday 1300Z, 1800Z, and 2200Z	MIDDS AMIS	Darwin Tolzin DSN 351-8508 COM 805-982-8508	Yes
Navy Pacific Missile Test Center San Nicolas Is., CA	USN	Monday-Friday 1400Z and 2000Z	MIDDS AMIS	Darwin Tolzin DSN 351-8508 COM 805-982-8508	Yes
Redstone Arsenal	USA	Unscheduled	AMIS MIST	James Young DSN 746-2449 COM 205-876-2441	Yes
White Sands Missile Range, NM	USA	Unscheduled	AMIS MIST	Chief, Forecast Section White Sands Met Team DSN 258-2605/1032 COM 505-678-2605/1932	Yes
Yuma Proving Ground, AZ	USA	Mon-Fri 1200Z and as required	AMIS MIST	Dean Weingarten STEYP-RS-TS-W DSN 899-6070 COM 602-328-6070	Yes

Research continues in the use of space-based lightning mappers and other technology and in the development of the ability 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. The following stations provide data:

- 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/Federal Aviation Administration and 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) and the Automated Weather Observing System (AWOS) and their replacements
- DOI weather and hydrological reporting stations (RAWS and SNOTEL)
- State DOT Environmental Sensor Station observations used in Road Weather Information Systems are available through surface weather observing systems, e.g., 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 Levels. See 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 ASOS are also required to provide other specified data in a daily Supplementary Climatological Data product.

<p style="text-align: center;"><u>“D” Service Level:</u> No augmentation required - stand alone ASOS</p> <p style="text-align: center;"><u>“C” Service Level:</u> Thunderstorm occurrence Funnel clouds Hail Virga Volcanic Ash Tower visibility</p> <p style="text-align: center;"><u>“B” Service Level:</u> 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</p> <p style="text-align: center;"><u>“A” Service Level:</u> 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</p>

Figure 5-3 Civilian Airports With ASOS. Civilian airports with ASOSs are assigned a specific FAA Aviation Service Levels (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.

5.4.2 Marine Surface Observations

Marine surface observations are taken by observers at land stations and on ship 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>.

Personnel on USN, USCG, and NOAA ships, along with civilian Volunteer Observing Ships (VOS) at sea, take and transmit marine observations back to the U.S. About 1,600 ships participate in the VOS program, which is managed by NWS, by taking and transmitting the marine observations every six 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 those forecast. Pilots should report any weather conditions they encounter which 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 ceiling of 5,000FT, visibility less than 5 miles and/or when thunderstorms, turbulence or icing are occurring or forecast. Additionally, AFSS/FSS end all pilot weather briefings with a request for PIREPs.

5.6 Reports by Non-meteorological Agencies and Individuals

The National Weather Service 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 National Weather Service 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 involving unlisted numbers, the National Warning System (NAWAS), State Highway Patrols, teletypewriter circuits. Local Storm Reports are disseminated to mass news disseminators, to other NWS WFOs, SPC, and to safety agencies by 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-12 (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-11 replaced GOES-10 in late 2006 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 will provide 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. This new satellite is stored on orbit at 105 degrees West until required to replace either of the older operational satellites. 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 visible. GOES-12 also carries a 5 band imager but substitutes an 8 km 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 on board GOES-11 is used in combination with the 10.9 micron band to highlight the emissivity of airborne volcanic ash, 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 provide hourly soundings in clear air.

GOES Scan Operations

The spacecraft routinely scan the United States every 15 minutes, except every three hours a full disk image is scanned, taking nearly 30 minutes. Forecasters now view GOES data more frequently and with greater spatial resolution. The GOES-8 and GOES-10 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 one 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 web site.

Requests for Special Satellite Sectors

The 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). The DOD and research requests are taken directly by SAB, which coordinates the request with the NCO SDM.

The details of these procedures are described in the NESDIS/NWS Satellite Schedule Coordination and Dissemination Procedures plan 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). See “Satellite Schedule Coordination and Dissemination Procedures” on this web site.

Special Products

Requirements for GOES dissemination schedules are coordinated and provided through NESDIS, Satellite Services Division, and described in the NESDIS/NWS Satellite Schedule Coordination and Dissemination Procedures, and described by the Satellite Services Division, (see <http://www.ssd.noaa.gov/PS/SATS/satops/> or call 301-763-8051).

GOES Imagers

GOES-11 and GOES-12 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, .55 to .75 microns) - one kilometer resolution
- Channel 2 (Infrared, 3.8 to 4.0 microns) - four kilometer resolution
- Channel 3 (Water Vapor, 6.5 to 7.0 microns) - four kilometer resolution
- Channel 4 (Infrared, 10.2 to 11.2 microns) - four kilometer resolution.
- Channel 5 (Infrared, 11.5 to 12.5 microns) - four kilometer resolution. (GOES-11 only)
- Channel 6 (Infrared, 13.3 microns) – eight kilometer resolution (GOES-12 only)

GOES Products

The principal GOES-11 and GOES-12 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, one, two, four, and eight kilometer resolution visible fixed standard sectors are produced for AWIPS/NOAAPort distribution, as well as equivalent infrared sectors (4 kilometer), including both the cloud and water vapor channels (the latter remapped to 4 kilometers) 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 (RAMSDIS) users within the NWS and NESDIS community (see <http://www.cira.colostate.edu/cira/RAMM//rmsdsol/main.html> for more information). 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 each cross the U.S. twice per day at twelve hour 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 EUMETSAT's MetOp-A and NOAA-18, 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 will be adopted on subsequent NOAA polar orbiters following NOAA-18. The NOAA-11, -12, and -14 platforms were formally decommissioned in June 2004, August 2007, and May 2007, respectively. NOAA-15 and NOAA-16 have been designated as the secondary morning and afternoon satellites, respectively, with NOAA-17 as the morning backup. However, NOAA-17 has an inoperable AMSU instrument which significantly degrades its capabilities for severe weather monitoring. 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 consisting 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), rainrate, ice water path and snow water equivalent are also possible due to 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 NOAA/NCEP for assimilation into the global forecast models, with plans for inclusion of MetOp / IASI in the near future. A summary of environmental satellite products generated from NOAA and EUMETSAT polar orbiters are listed in Table 5-2a.

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” [F17], and the other with an equatorial crossing time in the mid-morning, near 0830/2030 local time [F16]). The constellation also presently 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-13, F-14, F15, F16 and F17 spacecraft are provided to users, although United States Strategic Command (USSTRATCOM) directed activation of a radar calibration beacon on F15 in 2006 has severely degraded the performance of the 22V GHz channel, which in turn has impacted the generation of several environmental products derived either directly or indirectly using this channel. The Naval Research Laboratory (NRL) has since developed software corrections to mitigate this contamination. Starting with the launch of the first Block 5D3 DMSP spacecraft (F16) 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 the Air Force Weather Agency’s (AFWA) 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 Defense and Department of Commerce program whereby the National Oceanic and Atmospheric Administration (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 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 5-2a GOES and NOAA Satellite and Satellite Data Availability for the Severe Local Storms Season

SATELLITE	TYPE OF DATA	LOCAL TIME	PRODUCTS
<p>GOES-12 at 75W</p> <p>GOES-13 at 105W (on orbit storage)</p> <p>GOES-11 at 135W</p>	<p>Multispectral Imager and Sounder</p> <p>5 Channels for Imager</p> <p>19 Channels for Sounder</p>	<p>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).</p>	<ol style="list-style-type: none"> 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-18	AVHRR GAC and LAC (recorded), HRPT & APT, HIRS, AMSU-A, MHS, SBUV-2	0136D/1336A (primary afternoon sat)	
NOAA-17	Same as NOAA-18 except AMSU-B in place of MHS(AMSU-A inoperable)	1003D/2203A (morning backup)	
NOAA-16	Same as NOAA-17	0422D/1622A(secondary afternoon sat)	
NOAA-15	Same as NOAA-16 except no SBUV-2	0510D/1710A (secondary morning sat)	

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
 A Ascending orbit

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-13	OLS Imagery (recorded and direct), SSM/I, SSM/T-1	0630D/1830A	1. 0.3 nm (regional) and 1.5 nm (global) resolution (visible and infrared) imagery available via stored data recovery through AFWA. 2. Regional coverage at 0.3 nm and 1.5 nm resolution (visible and infrared) imagery available from numerous DOD tactical terminals. 3. SSM/T-1, SSM/I, SSMIS data transmitted to NESDIS from FNMOC (no remaining SSM/T-2 sensors)
DMSP F-14	OLS Imagery (recorded and direct), SSM/I, SSM/T-1, and SSM/T-2 all inop	0505D/1705A	
DMSP F-15	OLS Imagery (recorded and direct), SSM/I (22Ghz degraded by radar calibration beacon), SSM/T-1, (SSM/T-2 inop)	0714D/1914A	
DMSP F-16	OLS Imagery (recorded and direct), SSM/IS imagery	0757D/1957A	
DMSP F-17	OLS Imagery (recorded and direct), SSMIS imagery (derived products currently in cal/val)	0530D/1730A	

Under Local Time heading:

- D descending orbit
- A ascending orbit
- 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

6 PUBLICITY

The weather warnings of the AFWA are designed for specialized military users and shall not be released to the public unless provided as backup to SPC and AWC. News media releases that concern the cooperative efforts in severe local storms activities of the Departments of Defense, Commerce, Transportation, Energy, FEMA, Interior, and other agencies should reflect the joint nature of these efforts by giving due credit to participating agencies. Copies of these releases should be forwarded to:

The Joint Chiefs of Staff (J3/JRC)
Pentagon
Washington, D.C. 20318-3000

HQ USAF/A3O-W
1490 Air Force Pentagon
Washington, D. C. 20330-1490
PH: (702) 696-4021, DSN: 426-4021

HQ AFWA/PA
106 Peace Keeper Suite. 2N3
Offutt AFB, NE 68113-4039
PH: (402) 232-8166, DSN: 272-8166

Office of the Deputy Chief of Staff for Intelligence
ATTN: DAMI- POB
2511 Jefferson Davis Highway Suite 9300
Arlington, VA 22202-3910
PH: (703) 601-2499, DSN: 329-2499

Commander, Naval Meteorology and Oceanography Command
1100 Balch Blvd
Stennis Space Center, Mississippi 39529-5005
PH: (228) 688-4203, DSN: 485-4203

Commandant, United States Marine Corps
Headquarters, United States Marine Corps
Code ASL-37
Washington, D. C. 20380-3001

NOAA Public Affairs Office
Herbert C. Hoover Building
14th & Constitution Avenue, N.W.
Washington, D.C. 20230
PH: (202) 482-5647

Public Affairs Officer
NOAA/NESDIS
E/PA, FB-4, Room 3313A
4700 Silver Hill Road
Suitland, MD 20233-0001

Federal Aviation Administration (APA-310)
800 Independence Avenue, S.W.
Washington, DC 20591

Federal Coordinator for Meteorology
Suite 1500
8455 Colesville Road
Silver Spring, MD 20910
PH: (301) 427-2002, DSN: 851-1460

APPENDIX A TEXT PRODUCT EXAMPLES

Convective Outlook (AC)

SPC AC 230100

DAY 1 CONVECTIVE OUTLOOK
NWS STORM PREDICTION CENTER NORMAN OK
0800 PM CDT THU MAY 22 2008

VALID 230100Z - 231200Z

...THERE IS A HIGH RISK OF SVR TSTMS PORTIONS WRN KS...

...THERE IS A MDT RISK OF SVR TSTMS ELSEWHERE OVER PORTIONS
S-CENTRAL/SWRN NEB...WRN/CENTRAL KS AND WRN/NRN OK...

...THERE IS A SLGT RISK OF SVR TSTMS ELSEWHERE FROM CENTRAL HIGH
PLAINS TO NW TX...

...SYNOPSIS...

PRIMARY UPPER AIR FEATURE FOR THIS FCST WILL REMAIN LARGE CYCLONIC
GYRE...MEAN CENTER OF WHICH IS RETROGRADING WWD/SWWD ACROSS GREAT
BASIN ATTM AS 130-150 KT SPEED MAX DIGS AROUND ITS SWRN RIM.
SEVERAL WEAK/LOW-AMPLITUDE SHORTWAVES WILL CONTINUE TO ORBIT BROADER
CYCLONE. THIS INCLUDES TROUGH NOW EVIDENT IN PROFILER DATA AND
MOISTURE CHANNEL IMAGERY...LIFTING NWD ACROSS SERN/E-CENTRAL CO.
FARTHER SE...MID/UPPER LEVEL TROUGH -- NOW EVIDENT OVER SWRN LA AND
E-CENTRAL TX -- IS FCST TO CONTINUE LIFTING NEWD ACROSS AR AND
WEAKENING THROUGH REMAINDER PERIOD.

AT SFC...WARM FRONT EXTENDS ESEWD FROM LOW OVER NERN CO...GENERALLY
ALONG I-70 IN NRN KS AS FAR E AS VICINITY MHK...THEN SEWD ACROSS
E-CENTRAL KS. THIS FRONT SHOULD DRIFT NWD TOWARD KS/NEB BORDER
THROUGH REMAINDER PERIOD. DRYLINE IS ANALYZED OVER W-CENTRAL KS
BETWEEN GLD-GCK...SWD ACROSS ERN TX PANHANDLE AND W-CENTRAL TX.
DRYLINE MAY RETREAT WWD SLIGHTLY OVERNIGHT.

...CENTRAL/SRN PLAINS...

OUTBREAK OF SUPERCELLS AND TORNADOES CONTINUES AHEAD OF DRYLINE AND
INVOF FRONTAL ZONE...REFOCUSING HIGHEST PROBABILITIES TOWARD
CORRIDOR FROM SWRN NEB SWD ACROSS W-CENTRAL KS. REF TORNADO WWS
334..335...336...337 AND SEVERE WW 338...ALONG WITH ACCOMPANYING
MESOSCALE DISCUSSIONS...FOR LATEST NOWCAST GUIDANCE.

SCATTERED-NUMEROUS SUPERCELLS ARE FCST TO CONTINUE FOR SEVERAL MORE
HOURS ACROSS THIS REGION. ALTHOUGH LOW-LEVEL AND DEEP-LAYER SHEAR
PROFILES WILL REMAIN FAVORABLE FOR TORNADIC STORMS THROUGHOUT THIS
CORRIDOR...MOST DANGEROUS AREA BEFORE DARK SHOULD BE INVOF WARM
FRONTAL ZONE IN NRN KS. SUPERCELLS IN THAT AREA WILL ENCOUNTER
RELATIVELY MAXIMIZED LOW LEVEL SRH...VORTICITY AND STORM-RELATIVE
INFLOW...MAXIMIZING POTENTIAL FOR INTENSE/SUSTAINED LOW LEVEL
MESOCYCLONES AND SIGNIFICANT TORNADO FORMATION...AS HAS BEEN
EVIDENT DURING PAST 1-2 HOURS IN WARM FRONTAL ZONE. DURING EVENING
HOURS...MOISTURE TRANSPORT AND RICH THETA_E AT SFC WILL HELP TO

MAINTAIN SFC-BASED EFFECTIVE INFLOW PARCELS ALONG AND S OF WARM FRONT...WHILE LCL LOWERS S OF FRONT AND 35-50 KT LLJ MAINTAINS LARGE HODOGRAPHS. THEREFORE CATEGORICAL HIGH RISK IS MAINTAINED PRIMARILY FOR STRONG-VIOLENT TORNADO POTENTIAL INTO LATE EVENING HOURS. LARGE HAIL AND SEVERE GUSTS ALSO WILL ACCOMPANY TSTMS OVER THIS REGION.

STRONGER CAPPING SHOULD CONTINUE TO KEEP OVERALL CONVECTIVE COVERAGE SOMEWHAT LESS FARTHER S OVER WRN/NRN OK. HOWEVER...A FEW POTENTIALLY TORNADIC SUPERCELLS WITH LARGE HAIL AND GUSTS ALSO REMAIN POSSIBLE WITH EVOLVING SEVERE TSTM CLUSTER OVER W-CENTRAL/NWRN OK. THIS ACTIVITY HAS GROWN UPSCALE CONSIDERABLY AND SHOULD PERSIST FOR SEVERAL MORE HOURS...AS IT ENCOUNTERS RICH MOISTURE AND FAVORABLE STORM-RELATIVE INFLOW INVOF LLJ. ADDITIONAL DEVELOPMENT REMAINS POSSIBLE ALONG DRYLINE OVER ERN TX PANHANDLE AND SW KS AS WELL.

FARTHER NW ACROSS NERN CO AND SERN WY...SVR POTENTIAL IS EXPECTED TO CONTINUE GENERAL DIMINISHING TREND WITH TIME...WITH INSTABILITY RESTRICTED BY OUTFLOW-STABILIZED AIR MASS FROM LARGE AMOUNT OF PRIOR CONVECTION ALONG AND N OF FRONT. ISOLATED SVR GUSTS AND HAIL REMAIN POSSIBLE WITH MOST INTENSE TSTMS.

...SRN/CENTRAL AR...
BAND OF SCATTERED-NUMEROUS MULTICELLULAR TSTMS...THAT DEVELOPED WITH STG AFTERNOON HEATING OF MOIST AIR MASS AHEAD OF SRN STREAM UPPER TROUGH...WILL LIFT NNEWD ACROSS SRN/CENTRAL AR AND ADJACENT FRINGES OF ERN OK THROUGH REMAINDER EVENING. ISOLATED...MARGINALLY SVR HAIL STILL MAY OCCUR FROM MOST INTENSE CELLS...AS WELL AS DAMAGING GUSTS NEAR SVR CRITERIA. OVERALL THREAT IS EXPECTED TO DIMINISH DURING NEXT FEW HOURS AS DIABATIC COOLING TAKES PLACE IN PROSPECTIVE INFLOW AIR MASS N OF THIS ACTIVITY.

..EDWARDS.. 05/23/2008

CLICK TO GET [WUUS01 PTSDY1](#) PRODUCT

NOTE: THE NEXT DAY 1 OUTLOOK IS SCHEDULED BY 0600Z

Mesoscale Discussion (MD)

MESOSCALE DISCUSSION 1028
NWS STORM PREDICTION CENTER NORMAN OK
0350 PM CDT SUN MAY 25 2008

AREAS AFFECTED...SERN/ECNTRL MN...NERN/NCNTRL IA AND WRN WI

CONCERNING...TORNADO WATCH [359](#)...

VALID 252050Z - 252215Z

THE SEVERE WEATHER THREAT FOR TORNADO WATCH 359 CONTINUES.

SUPERCELLS HAVE EVOLVED RAPIDLY ACROSS CNTRL MN JUST S OF KSTC AND NE OF KRWF AS THE CAP HAS ERODED AMIDST RAPIDLY WARMING SFC TEMPERATURES. THESE CELLS WILL LIKELY TRACK EWD NEAR/JUST N OF AN OUTFLOW BOUNDARY DRAPED SEWD INTO THE CNTRL AND NRN PORTIONS OF THE MINNEAPOLIS METROPOLITAN AREA. N OF THE BOUNDARY...ESELY LOW-LEVEL

FLOW WAS SOMEWHAT WEAK...BUT DIRECTIONAL SHEAR WAS GOOD WITH 0-1KM SRH OF 200+ M2/S2. SOUTH OF THE BOUNDARY...WINDS HAVE VEERED...LESSENING LOW-LEVEL SHEAR.

HIGHEST TORNADO POTENTIAL WILL EXIST NEAR AND N OF THE MINNEAPOLIS METRO AREA INTO ADJACENT PORTIONS OF WCNTRL WI THROUGH 00Z. OTHERWISE...STORMS DEVELOPING THROUGHOUT CNTRL/SERN MN...NRN IA AND SWRN WI WILL BE CAPABLE OF VERY LARGE HAIL AND DMGG WIND GUSTS. TORNADOES WILL BE A THREAT WATCH WIDE.

..RACY.. 05/25/2008

ATTN...WFO...LUB...MAF...ABQ...

31680427 32880375 34050353 34100288 33170274 32440279
31780270 30900295 30140314 29100290 29040331 29600456
30590474

Severe Thunderstorm Watch

URGENT - IMMEDIATE BROADCAST REQUESTED
SEVERE THUNDERSTORM WATCH NUMBER 418
NWS STORM PREDICTION CENTER NORMAN OK
130 AM CDT MON JUN 2 2008

THE NWS STORM PREDICTION CENTER HAS ISSUED A SEVERE THUNDERSTORM WATCH FOR PORTIONS OF

WESTERN AND CENTRAL NEBRASKA

EFFECTIVE THIS MONDAY MORNING FROM 130 AM UNTIL 900 AM CDT.

HAIL TO 2.5 INCHES IN DIAMETER...THUNDERSTORM WIND GUSTS TO 70 MPH...AND DANGEROUS LIGHTNING ARE POSSIBLE IN THESE AREAS.

THE SEVERE THUNDERSTORM WATCH AREA IS APPROXIMATELY ALONG AND 90 STATUTE MILES EAST AND WEST OF A LINE FROM 30 MILES WEST NORTHWEST OF VALENTINE NEBRASKA TO 40 MILES SOUTHEAST OF NORTH PLATTE NEBRASKA. FOR A COMPLETE DEPICTION OF THE WATCH SEE THE ASSOCIATED WATCH OUTLINE UPDATE (WOUS64 KWNS WOU8).

REMEMBER...A SEVERE THUNDERSTORM WATCH MEANS CONDITIONS ARE FAVORABLE FOR SEVERE THUNDERSTORMS IN AND CLOSE TO THE WATCH AREA. PERSONS IN THESE AREAS SHOULD BE ON THE LOOKOUT FOR THREATENING WEATHER CONDITIONS AND LISTEN FOR LATER STATEMENTS AND POSSIBLE WARNINGS. SEVERE THUNDERSTORMS CAN AND OCCASIONALLY DO PRODUCE TORNADOES.

DISCUSSION...SLIGHTLY ELEVATED SUPERCELLS THAT HAVE DEVELOPED ESE INTO NW NEB OVER THE LAST TWO HOURS LIKELY WILL PERSIST AND SLOWLY INTENSIFY AS THEY MOVE/DEVELOP FARTHER ESE ALONG 850-700 MB WARM FRONT. THE STORMS MAY INCREASE MORE MARKEDLY IN COVERAGE AND STRENGTH TOWARD SUNRISE AND THEREAFTER OVER CNTRL OR S CNTRL NEB AS THE ACTIVITY ENCOUNTERS RICHER PLUME OF 925-850 MB MOISTURE SURGING NWD INTO THE REGION ALONG LLJ.

AVIATION...A FEW SEVERE THUNDERSTORMS WITH HAIL SURFACE AND ALOFT TO 2.5 INCHES. EXTREME TURBULENCE AND SURFACE WIND GUSTS TO 60 KNOTS. A FEW CUMULONIMBI WITH MAXIMUM TOPS TO 500. MEAN STORM MOTION VECTOR 29030.

...CORFIDI

Watch Outline Update (WOU - Initial for watch number 418 above)

BULLETIN - IMMEDIATE BROADCAST REQUESTED
SEVERE THUNDERSTORM WATCH OUTLINE UPDATE FOR WS 418
NWS STORM PREDICTION CENTER NORMAN OK
130 AM CDT MON JUN 2 2008

SEVERE THUNDERSTORM WATCH 418 IS IN EFFECT UNTIL 900 AM CDT FOR THE FOLLOWING LOCATIONS

NEC005-009-017-019-031-041-047-049-069-071-075-091-101-103-111-113-115-117-149-161-163-171-175-021400-
/O.NEW.KWNS.SV.A.0418.080602T0630Z-080602T1400Z/

NE

. NEBRASKA COUNTIES INCLUDED ARE

ARTHUR	BLAINE	BROWN
BUFFALO	CHERRY	CUSTER
DAWSON	DEUEL	GARDEN
GARFIELD	GRANT	HOOVER
KEITH	KEYA PAHA	LINCOLN
LOGAN	LOUP	MCPHERSON
ROCK	SHERIDAN	SHERMAN
THOMAS	VALLEY	

\$\$

ATTN...WFO...LBF...GID...

Watch Status Message (For Watch 418 above)

STATUS REPORT ON WW 418

SEVERE WEATHER THREAT CONTINUES RIGHT OF A LINE FROM 25 ENE IML TO 30 SW MHN TO 30 SSW VTN TO 20 W ONL.

FOR ADDITIONAL INFORMATION SEE SPC MESOSCALE DISCUSSION 1151.

..EDWARDS..06/02/08

ATTN...WFO...LBF...GID...

&&

STATUS REPORT FOR WS 418

SEVERE WEATHER THREAT CONTINUES FOR THE FOLLOWING AREAS

NEC009-017-019-031-041-047-071-091-111-113-115-117-149-163-171-175-021140-

NE

. NEBRASKA COUNTIES INCLUDED ARE

BLAINE	BROWN	BUFFALO
CHERRY	CUSTER	DAWSON
GARFIELD	HOOKER	LINCOLN
LOGAN	LOUP	MCPHERSON
ROCK	SHERMAN	THOMAS
VALLEY		

\$\$

THE WATCH STATUS MESSAGE IS FOR GUIDANCE PURPOSES ONLY. PLEASE REFER TO WATCH COUNTY NOTIFICATION STATEMENTS FOR OFFICIAL INFORMATION ON COUNTIES...INDEPENDENT CITIES AND MARINE ZONES CLEARED FROM SEVERE THUNDERSTORM AND TORNADO WATCHES.

Aviation Watch Notification Message (For Watch #418 above)

WWUS30 KWNS 020627

SAW8

SPC AWW 020627

WW 418 SEVERE TSTM NE 020630Z - 021400Z

AXIS..90 STATUTE MILES EAST AND WEST OF LINE..

30WNW VTN/VALENTINE NE/ - 40SE LBF/NORTH PLATTE NE/

..AVIATION COORDS.. 80NM E/W /56WNW ANW - 36SE LBF/

HAIL SURFACE AND ALOFT..2.5 INCHES. WIND GUSTS..60 KNOTS.

MAX TOPS TO 500. MEAN STORM MOTION VECTOR 29030.

LAT...LON 43009931 40709841 40700186 43000287

THIS IS AN APPROXIMATION TO THE WATCH AREA. FOR A COMPLETE DEPICTION OF THE WATCH SEE WOUS64 KWNS FOR WOU8.

Watch County Notification (from WFO in Watch #418 above)

WATCH COUNTY NOTIFICATION FOR WATCH 418

NATIONAL WEATHER SERVICE NORTH PLATTE NE

403 AM CDT MON JUN 2 2008

NEC005-049-069-075-101-161-021015-

/O.CAN.KLBF.SV.A.0418.000000T0000Z-080602T1400Z/

THE NATIONAL WEATHER SERVICE HAS CANCELLED SEVERE THUNDERSTORM WATCH 418 FOR THE FOLLOWING AREAS

IN NEBRASKA THIS CANCELS 6 COUNTIES

IN SOUTHWEST NEBRASKA

KEITH

IN THE EASTERN PANHANDLE OF NEBRASKA

DEUEL

GARDEN

SHERIDAN

IN WEST CENTRAL NEBRASKA

ARTHUR

GRANT

THIS INCLUDES THE CITIES OF...ARTHUR...BIG SPRINGS...CHAPPELL...
GORDON...HYANNIS...OGALLALA...OSHKOSH AND RUSHVILLE.

Tornado Watch (Particularly Dangerous Situation)

URGENT - IMMEDIATE BROADCAST REQUESTED

TORNADO WATCH NUMBER 363

NWS STORM PREDICTION CENTER NORMAN OK

330 PM CDT SUN MAY 25 2008

THE NWS STORM PREDICTION CENTER HAS ISSUED A
TORNADO WATCH FOR PORTIONS OF

A LARGE PART OF IOWA

EFFECTIVE THIS SUNDAY AFTERNOON AND EVENING FROM 330 PM UNTIL
1000 PM CDT.

...THIS IS A PARTICULARLY DANGEROUS SITUATION...

DESTRUCTIVE TORNADOES...LARGE HAIL TO 3 INCHES IN DIAMETER...
THUNDERSTORM WIND GUSTS TO 80 MPH...AND DANGEROUS LIGHTNING ARE
POSSIBLE IN THESE AREAS.

THE TORNADO WATCH AREA IS APPROXIMATELY ALONG AND 75 STATUTE
MILES NORTH AND SOUTH OF A LINE FROM 60 MILES SOUTHWEST OF FORT
DODGE IOWA TO 50 MILES EAST SOUTHEAST OF CEDAR RAPIDS IOWA. FOR
A COMPLETE DEPICTION OF THE WATCH SEE THE ASSOCIATED WATCH
OUTLINE UPDATE (WOUS64 KWNS WOU3).

REMEMBER...A TORNADO WATCH MEANS CONDITIONS ARE FAVORABLE FOR
TORNADOES AND SEVERE THUNDERSTORMS IN AND CLOSE TO THE WATCH
AREA. PERSONS IN THESE AREAS SHOULD BE ON THE LOOKOUT FOR
THREATENING WEATHER CONDITIONS AND LISTEN FOR LATER STATEMENTS
AND POSSIBLE WARNINGS.

OTHER WATCH INFORMATION...CONTINUE...[WW 357](#)...[WW 358](#)...[WW359](#)
...[WW 360](#)...[WW 361](#)...

DISCUSSION...VERY TO EXTREMELY UNSTABLE AIR MASS ACROSS MUCH OF IA
AHEAD OF COLD FRONT. THUNDERSTORMS WILL DEVELOP RAPIDLY AND WITH
STRONG DEEP LAYER SHEAR QUICKLY BECOME SUPERCELLS. VERY LARGE HAIL
AND TORNADOES ARE LIKELY WITH ANY SUPERCELL. POTENTIAL FOR LONG
LIVED SUPERCELLS WITH STRONG TORNADOES.

AVIATION...TORNADOES AND A FEW SEVERE THUNDERSTORMS WITH HAIL
SURFACE AND ALOFT TO 3 INCHES. EXTREME TURBULENCE AND SURFACE
WIND GUSTS TO 70 KNOTS. A FEW CUMULONIMBI WITH MAXIMUM TOPS TO
550. MEAN STORM MOTION VECTOR 24035.

...HALES

Tornado Warning (TOR)

BULLETIN - EAS ACTIVATION REQUESTED
TORNADO WARNING
NATIONAL WEATHER SERVICE RAPID CITY SD
320 PM MDT MON JUN 2 2008

THE NATIONAL WEATHER SERVICE IN RAPID CITY HAS ISSUED A

- * TORNADO WARNING FOR...
EAST CENTRAL CAMPBELL COUNTY IN NORTHEASTERN WYOMING
- * UNTIL 400 PM MDT
- * AT 315 PM MDT...DOPPLER RADAR INDICATED A SEVERE THUNDERSTORM
CAPABLE OF PRODUCING A TORNADO NEAR DOWNTOWN GILLETTE...MOVING EAST
AT 16 MPH.
- * LOCATIONS IMPACTED INCLUDE...
GILLETTE...
WYODAK...
ROZET...

THIS INCLUDES INTERSTATE 90 BETWEEN WYOMING MILE MARKERS 125 AND
147...

TAKE SHELTER IN A BASEMENT OR SMALL INTERIOR ROOM ON THE GROUND
FLOOR. STAY AWAY FROM WINDOWS AND EXTERIOR WALLS. PROTECT YOURSELF
FROM FLYING DEBRIS WITH BLANKETS...PILLOWS...OR CUSHIONS.

LAT...LON 4443 10509 4415 10508 4425 10553 4437 10551
TIME...MOT...LOC 2120Z 264DEG 14KT 4429 10543

Severe Thunderstorm Warning (SVR)

BULLETIN - EAS ACTIVATION REQUESTED
SEVERE THUNDERSTORM WARNING
NATIONAL WEATHER SERVICE TOPEKA KS
1020 AM CDT MON JUN 2 2008

THE NATIONAL WEATHER SERVICE IN TOPEKA HAS ISSUED A

- * SEVERE THUNDERSTORM WARNING FOR...
NORTHERN COFFEY COUNTY IN EAST CENTRAL KANSAS...
- * UNTIL 1115 AM CDT
- * AT 1018 AM CDT...NATIONAL WEATHER SERVICE DOPPLER RADAR INDICATED A
SEVERE THUNDERSTORM CAPABLE OF PRODUCING BASEBALL SIZE HAIL...AND
DAMAGING WINDS IN EXCESS OF 60 MPH. THIS STORM WAS LOCATED NEAR
LEBO...OR 19 MILES EAST OF EMPORIA...MOVING SOUTHEAST AT 35 MPH.
- * LOCATIONS IMPACTED INCLUDE...
JOHN REDMOND RESERVOIR...
BETO JUNCTION...
NEW STRAWN...
WAVERLY...

THIS INCLUDES INTERSTATE 35 BETWEEN MILE MARKERS 144 AND 156.

LARGE DESTRUCTIVE HAIL WILL OCCUR WITH THIS STORM. FOR YOUR SAFETY MOVE INDOORS NOW...AND STAY AWAY FROM WINDOWS.

STAY TUNED TO WEATHER RADIO OR LOCAL MEDIA OUTLETS FOR THE LATEST SEVERE WEATHER INFORMATION.

LAT...LON 3826 9595 3843 9594 3843 9550 3825 9550
3825 9551 3816 9552
TIME...MOT...LOC 1520Z 297DEG 31KT 3845 9582

Flash Flood Warning (FFW)

BULLETIN - EAS ACTIVATION REQUESTED
FLASH FLOOD WARNING
NATIONAL WEATHER SERVICE KANSAS CITY/PLEASANT HILL MO
1202 PM CDT MON JUN 2 2008

THE NATIONAL WEATHER SERVICE IN PLEASANT HILL HAS ISSUED A

- * FLASH FLOOD WARNING FOR...
BATES COUNTY IN WEST CENTRAL MISSOURI
JOHNSON COUNTY IN EAST CENTRAL KANSAS
LINN COUNTY IN EAST CENTRAL KANSAS
MIAMI COUNTY IN EAST CENTRAL KANSAS
SOUTHERN LEAVENWORTH COUNTY IN NORTHEAST KANSAS
SOUTHWESTERN CASS COUNTY IN WEST CENTRAL MISSOURI
- * UNTIL 600 PM CDT
- * AT 1201 PM CDT...NATIONAL WEATHER SERVICE DOPPLER RADAR INDICATED SLOW MOVING THUNDERSTORMS WITH VERY HEAVY RAINFALL ACROSS THE WARNED AREA. RAINFALL RATES ASSOCIATED WITH THE HEAVIEST DOWNPOURS WILL EXCEED 1 TO 2 INCHES PER HOUR. WHILE HEAVY RAINFALL HAS NOT YET AFFECTED THE ENTIRE WARNED AREA...A COMPLEX OF VERY HEAVY RAINFALL WILL TRACK SOUTHEAST...AFFECTING WESTERN PORTIONS OF THE KANSAS CITY METRO AREA...ALONG WITH PORTIONS OF EAST CENTRAL KANSAS AND WEST CENTRAL MISSOURI. THESE STORMS HAVE HAD A HISTORY OF PRODUCING LOCALIZED RAINFALL AMOUNTS APPROACHING THREE INCHES. LOW WATER CROSSINGS...POOR DRAINAGE...AND OTHER LOW LYING AREAS WILL BE THE MOST LIKELY LOCATIONS TO EXPERIENCE FLOODING.
- * RUNOFF FROM THIS EXCESSIVE RAINFALL WILL CAUSE FLASH FLOODING TO OCCUR. SOME LOCATIONS THAT WILL EXPERIENCE FLOODING INCLUDE...
ADRIAN...BUTLER...DE SOTO...EDGERTON...GARDNER...HARRISONVILLE...LA
CYGNE...LENEXA...LOUISBURG...MOUND CITY...OLATHE...OSAWATOMIE...
PAOLA...PECULIAR AND PLEASANTON.

FLOODING IS OCCURRING OR IS IMMINENT. MOST FLOOD RELATED DEATHS OCCUR IN AUTOMOBILES. DO NOT ATTEMPT TO CROSS WATER COVERED BRIDGES...
DIPS...OR LOW WATER CROSSINGS. NEVER TRY TO CROSS A FLOWING STREAM...
EVEN A SMALL ONE...ON FOOT OR IN A VEHICLE.

LAT...LON 3804 9507 3897 9505 3898 9517 3914 9517
3912 9491 3899 9491 3897 9462 3884 9462
3848 9408 3806 9407 3806 9462 3803 9462

Special Marine Warning (SMW)

BULLETIN - IMMEDIATE BROADCAST REQUESTED
SPECIAL MARINE WARNING
NATIONAL WEATHER SERVICE BALTIMORE MD/WASHINGTON DC
533 PM EDT SUN JUN 1 2008

THE NATIONAL WEATHER SERVICE IN STERLING VIRGINIA HAS ISSUED A

- * SPECIAL MARINE WARNING FOR...
CHESAPEAKE BAY FROM NORTH BEACH TO DRUM POINT MD...
CHESAPEAKE BAY FROM DRUM POINT MD TO SMITH POINT VA...
TIDAL POTOMAC FROM INDIAN HEAD TO COBB ISLAND MD...
TIDAL POTOMAC FROM COBB ISLAND MD TO SMITH POINT VA...
- * UNTIL 730 PM EDT
- * AT 529 PM EDT...NATIONAL WEATHER SERVICE DOPPLER RADAR INDICATED A
LINE OF THUNDERSTORMS...PRODUCING STRONG WINDS 34 KNOTS OR GREATER
FROM 11 NM WEST OF FLAG HARBOR TO 32 NM WEST OF COBB ISLAND...
MOVING SOUTHEAST AT 16 KNOTS.
- * THESE STRONG THUNDERSTORMS WILL BE NEAR...
TIDAL POTOMAC FROM COBB ISLAND MD TO SMITH POINT VA.
CHESAPEAKE BAY FROM DRUM POINT MD TO SMITH POINT VA.
TIDAL POTOMAC FROM INDIAN HEAD TO COBB ISLAND MD.
CHESAPEAKE BAY FROM NORTH BEACH TO DRUM POINT MD.

MARINERS CAN EXPECT GUSTY WINDS...HIGH WAVES...DANGEROUS LIGHTNING...
AND HEAVY RAINS. BOATERS SHOULD SEEK SAFE HARBOR IMMEDIATELY...UNTIL
THIS STORM PASSES.

LAT...LON 3815 7667 3816 7668 3806 7671 3817 7686
3840 7690 3825 7678 3833 7672 3810 7636
3815 7633 3846 7666 3848 7660 3833 7642
3836 7639 3839 7640 3849 7650 3817 7574
3809 7574 3789 7591 3787 7628
TIME...MOT...LOC 2133Z 302DEG 16KT 3846 7669 3817 7748

Convective SIGMETs

WSUS31 KPCI 051555
SIGE
CONVECTIVE SIGMET 21E
VALID UNTIL 1755Z
FL AND SC FL GA CSTL WTRS
FROM 110ESE CHS-180ENE VRB-100ENE PBI-40E RSW-50E CTY-110ESE CHS
AREA SEV EMBD TS MOV FROM 14010KT. TOPS ABV FL450.
WIND GUSTS TO 65KT POSS.
TS ASSOCD WITH T.S. HANNA

OUTLOOK VALID 051755-052155
AREA 1...FROM 120ESE SIE-190ESE ECG-140SSE ILM-170E PBI-90SE
MIA-40SSW MIA-PIE-RDU-120ESE SIE
WST ISSUANCES EXPD. REFER TO MOST RECENT ACUS01 KWNS FROM STORM
PREDICTION CENTER FOR SYNOPSIS AND METEOROLOGICAL DETAILS. REFER
TO MOST RECENT WTNT23 KNHC FROM TROPICAL PREDICTION CENTER FOR

DETAILS ON T.S. HANNA.

AREA 2...FROM ERI-170S CEW-30SSE TTH-30S DXO-ERI
WST ISSUANCES POSS. REFER TO MOST RECENT ACUS01 KWNS FROM STORM
PREDICTION CENTER FOR SYNOPSIS AND METEOROLOGICAL DETAILS.

APPENDIX B

CONUS MILITARY BASES AND CORRESPONDING WEATHER FORECAST OFFICES

This is a list of military bases in CONUS and their servicing National Weather Service Weather Forecast Offices (WFOs).

<u>Military Location</u>	<u>Weather Forecast Office (WFO)</u>
U.S. Air Force Academy	WFO Colorado Springs, CO
MCLB Albany	WFO Albany, NY
Altus AFB	WFO Norman AFB
Andrews AFB	WFO Sterling, VA
Arnold AFB	WFO Nashville, TN
NAS Atlanta	WFO Atlanta, GA
NSB Bangor	WFO Portland, ME
Barksdale AFB	WFO Shreveport, LA
MCLB Barstow	WFO Fresno, CA
Beale AFB	WFO Sacramento, CA
MCAS Beaufort	WFO Charleston, SC
Bergstrom AFB	WFO San Antonio/Austin, TX
Bolling AFB	WFO Sterling, VA
NS Bremerton	WFO Seattle, WA
NAS Brunswick	WFO Portland, ME
Buckley ANGB	WFO Denver, CO
Camp Fretterd	WFO Sterling, VA
Camp Mabry	WFO Houston, TX
Cannon AFB	WFO Amarillo, TX
Cape Canaveral AFS	WFO Melbourne, FL
Carswell AFB	WFO Fort Worth, TX
Channel Islands ANGS	WFO Los Angeles, CA
Charleston AFB	WFO Charleston, SC
NWS Charleston	WFO Charleston, SC
MCAS Cherry Point	WFO Newport/Moorhead City, NC
Cheyenne Mountain AFS	WFO Colorado Springs, CO
NWS China Lake	WFO Hanford, CA
Columbus AFB	WFO Memphis, TN
NAS Corpus Christi	WFO Corpus Christi, TX
NTTC Corry Station	WFO Mobile, MS
Creech AFB	WFO Las Vegas, NV
NSWCDD Dahlgren	WFO Wakefield, VA
FCTCLANT Dam Neck	WFO Wakefield, VA
Davis-Monthan AFB	WFO Tucson, AZ
Dobbins AFRB	WFO Atlanta, GA

Dover AFB	WFO Philadelphia, PA
Dyess AFB	WFO Fort Worth, TX
Edwards AFB	WFO Harford, CA
Ellsworth AFB	WFO Rapid City, SD
NS Everett, WA	WFO Seattle, WA
Fairchild AFB	WFO Spokane, WA
NAS Fallon	WFO Reno, NV
Forbes Field ANGB	WFO Topeka, KS
Francis E. Warren AFB	WFO Cheyenne, WY
Ft. Belvoir	WFO Sterling, VA
Ft. Benning	WFO Atlanta, GA
Ft. Bliss	WFO El Paso, TX
Ft. Bragg	WFO Raleigh, NC
Ft. Campbell	WFO Nashville, TN
Ft. Carson	WFO Colorado Springs, CO
Ft. Drum	WFO Buffalo, NY
Eglin AFB	WFO Tallahassee, FL
Ft. Eustis	WFO Wakefield, VA
Ft. Huachuca	WFO Tucson, AZ
Ft. Hood	WFO Fort Worth, TX
Ft. Indiantown Gap	WFO State College, PA
Ft. Irwin	WFO Las Vegas, NV
Ft. Knox	WFO Louisville, KY
Ft. Leavenworth	WFO Topeka, KS
Ft. Leonard Wood	WFO Springfield, MO
Ft. Lewis	WFO Seattle, WA
Ft. McPherson	WFO Atlanta, GA
Ft. Polk	WFO Lake Charles, LA
Ft. Riley	WFO Topeka, KS
Ft. Rucker	WFO Tallahassee
Ft. Sill	WFO Lawton, OK
Ft. Stewart	WFO Atlanta, GA
NAS JRB Fort Worth	WFO Fort Worth, TX
Goodfellow AFB	WFO San Angelo, TX
Grand Forks AFB	WFO Fargo, ND
NTC Great Lakes	WFO Chicago, IL
Grissom AFRB	WFO Indianapolis, IN
NCBC Gulfport	WFO Mobile, MS
Hanscom AFB	WFO Boston, MA
Henderson Hall	WFO Sterling, VA
Hill AFB	WFO Salt Lake City, UT
Holloman AFB	WFO El Paso, TX
Homestead AFRB	WFO Miami, FL
Hurlburt AFB	WFO Tallahassee, FL
Hunter AAF	WFO Charleston, SC
NS Ingleside	WFO Corpus Christi, TX

NAS Jacksonville	WFO Jacksonville, FL
MCSA Kansas City	WFO Pleasant Hill, MO
Kelly AFB	WFO San Antonio/Austin, TX
Keesler AFB	WFO Mobile, AL
NAS Key West	WFO Miami, FL
NSB Kings Bay	WFO Jacksonville, FL
NAS Kingsville	WFO Corpus Christi, TX
Kirtland AFB	WFO Albuquerque, NM
Lackland AFB	WFO San Antonio, TX
NAES Lakehurst	WFO Philadelphia, PA
Langley AFB	WFO Wakefield, VA
Laughlin AFB	WFO San Antonio/Austin, TX
Los Angeles AFB	WFO Los Angeles, CA
Camp Lejeune	WFO Wilmington, NC
NAB Little Creek	WFO Wakefield, VA
Little Rock AFB	WFO Little Rock, AR
Los Angeles AFB	WFO Los Angeles,
Luke AFB	WFO Phoenix, AZ
MacDill AFB	WFO Tampa, FL
Malmstrom AFB	WFO Great Falls, MT
March ARB, CA	WFO Los Angeles, CA
Maxwell AFB	WFO Birmingham, AL
NS Mayport	WFO Jacksonville, FL
McChord AFB	WFO Seattle, WA
McConnell AFB	WFO Wichita, KS
McGuire AFB	WFO Philadelphia, PA
NSA Mid-South	WFO Memphis, TN
Minot AFB	WFO Bismarck, ND
MCAS Miramar	WFO San Diego, CA
NAS Meridian	WFO Jackson, MS
Moody AFB	WFO Charleston, SC
Mountain Home AFB	WFO Boise, ID
Naval Post Graduate School	WFO San Francisco, CA
US Naval Academy	WFO Sterling, VA
NSB New London	WFO New York/Upton, NY
Nellis AFB	WFO Las Vegas, NV
NS Newport	WFO Boston, MA
MCAS New River	WFO Newport/Moorhead City, NC
NSA New Orleans	WFO New Orleans, LA
Niagra Falls ARS	WFO Buffalo, NY
NS Norfolk	WFO Wakefield, VA
NSGA Northwest	WFO Wakefield, VA
NAS Oceana	WFO Wakefield, VA
Offutt AFB	WFO Omaha, NE
Onizuka AFS	WFO San Francisco, CA
Otis ANGB	WFO Boston, MA

NCSS Panama City	WFO Tallahassee, FL
MCRD Parris Island	WFO Charleston, SC
NS Pascagoula	WFO Mobile, MS
Patrick AFB	WFO Melbourne, FL
NAS Patuxent River	WFO Sterling, VA
Pease ANGB	WFO Portland, ME
Camp Pendleton	WFO Wakefield, VA
NAS Pensacola	WFO Mobile, FL
Pentagon	WFO Sterling, VA
Peterson AFB	WFO Colorado Springs, CO
NAS Point Mugu	WFO Los Angeles, CA
Pope AFB	WFO Raleigh, NC
NCBC Port Heuneme	WFO Los Angeles, Ca
NS Portsmouth	WFO Gray/Portland, ME
MCB Quantico	WFO Sterling, VA
Randolph AFB	WFO San Antonio/Austin, TX
Robbins AFB	WFO Atlanta, GA
NS San Diego	WFO San Diego, CA
Schriever AFB	WFO Colorado Springs, CO
Scott AFB	WFO St. Louis, MO
Selfridge ANGB	WFO Grand Rapids, MI
Seymour Johnson AFB	WFO Raleigh, NC
Shaw AFB	WFO Charleston, SC
Sheppard AFB	WFO Norman, OK
Simmons AAF	WFO Raleigh, NC
Stennis Space Center	WFO Mobile, MS
Tinker AFB	WFO Norman, OK
Travis AFB	WFO Sacramento, CA
MCAGCC 29 Palms	WFO Las Vegas, NV
Tyndall AFB	WFO Tallahassee, FL
Whiteman AFB	WFO Pleasant Hill, MO
Willow Grove ARS	WFO Philadelphia, PA
Vance AFB	WFO Tulsa, OK
Vandenberg AFB	WFO Los Angeles, CA
Volk Field ANGB	WFO Lacrosse, WI
SCSC Wallops Island	WFO Wakefield, VA
Westfield ANGB	WFO
NAS Whidbey Island	WFO Seattle, WA
Whiteman AFB	WFO Pleasant Hill, MO
NAS Whiting Field	WFO Mobile, FL
NAS JRB Willow Grove	WFO Philadelphia/Mt Holly, PA
Wright-Patterson AFB	WFO Wilmington, OH
NWS Yorktown, VA	WFO Wakefield, VA
MCAS Yuma	WFO Phoenix, AZ

APPENDIX C
CONTINGENCY BACKUP OPERATIONS

Memorandum of Agreement

Between

The National Centers for Environmental Prediction

The National Weather Service
The National Oceanic and Atmospheric Administration

And

The Air Force Weather Agency

The United States Air Force

Regarding

The Backup of Operational Services of the Aviation Weather Center and the Storm Prediction Center by the Air Force Weather Agency at Offutt AFB, NE (**Signed May 2004**)

1. Introduction

1.1 This Memorandum of Agreement (MOA) between the National Centers for Environmental Prediction (NCEP) of the National Weather Service (NWS) of the National Oceanic and Atmospheric Administration (NOAA) and the Air Force Weather Agency (AFWA) of the United States Air Force (USAF) provides for the AFWA to backup the operational services of the Aviation Weather Center (AWC) and the Storm Prediction Center (SPC) and provide an interim site for AWC and SPC forecasters in the event of a prolonged outage at the AWC or SPC respectively. AFWA in turn receives an ancillary data source, the National-Automated Weather Information Processing System (N-AWIPS) from NCEP on a dedicated communications circuit. This capability could be used as a backup source by AFWA for limited NCEP model data in the event of a catastrophic failure of the NWS Telecommunications Gateway or an Information Assurance-driven lockdown of the unclassified data networks at AFWA (DATMS-U, NIPRNET, etc.).

1.2 Specifically, this MOA sets forth a framework for mutually beneficial cooperation, and delineates the respective roles of the AWC, the SPC, and the AFWA in administering the operational backup program. For the purposes of this agreement, the backup of services is defined in National Weather Service Policy Directive (NWSPD) 10-22, December 3, 2003, and in Operations and Services Readiness, National Weather Service Instruction (NWSI) 10-2201, February 5, 2004, entitled Backup Operations. Further, the backup responsibility falls under the Office of the Federal Coordinator for Meteorological Services and Supporting Research's Federal Plan for Cooperative Support and Backup Among Operational Processing Centers FCM-P14-2002.

2. Authority

NWS is authorized to enter into this agreement pursuant to 15 USC 313, 49 USC 44720 and 15 USC 1525, the Department of Commerce's joint project authority. AFWA is authorized to enter into this agreement pursuant to DoDI 4000.19 Interservice and Intragovernmental Support. The parties certify that they have a mutual interest in ensuring delivery of the NWS products described herein to the public. The costs associated with this project have been equitably apportioned with each party bearing the costs associated with its participation. This agreement does not involve the transfer of funds between the parties.

3. Agency Responsibilities

3.1 AWC Responsibilities

3.1.1 In the event of any ground system malfunction, security or safety concerns, failure, or degradation to normal AWC operations, the AWC will notify, via Cell phone and Conference Bridge, the AFWA Operations Center (Tel 402-294-2586 option 1) and brief the problem. If deemed necessary by the AWC Lead Forecaster, the AFWA will assume backup operations for the AWC until notified

by the AWC that they are prepared to resume normal operations or AWC forecasters arrive at the AFWA. The AWC Lead Forecaster will also notify the Senior Duty Meteorologist (SDM) at NCEP Central Operations (NCO) of all changes in status. AWC will also issue an Area Forecast amendment message notifying users of the outage. The AWC Lead Forecaster will also call the Honolulu Forecast Office and the Tropical Prediction Center to notify them that backup is required for the Flight Information Regions (FIR) in the Pacific and Atlantic Oceans. The AWC Lead Forecaster will notify all parties when the emergency has ended.

3.1.2 If the emergency continues for more than 8 hours, the AWC will send forecasters to AFWA and they will work in a designated area on workstations previously provided to AFWA by the AWC. While stationed at AFWA, the AWC forecasters will resume the full operational tactical program of Significant Meteorological Forecasts (SIGMETs), Convective SIGMETs, Airman's Meteorological Information (AIRMETs), and Area Forecasts.

3.2 SPC Responsibilities

3.2.1 In the event of any ground system malfunction, security or safety concerns, failure, or degradation to normal SPC operations, the SPC will notify, via telephone, the AFWA Operations Center (Tel 402-294-2586 option 1) and brief the problem. If it is deemed necessary by the SPC Lead Forecaster, the AFWA will assume backup operations for the SPC until notified by the SPC that they are prepared to resume operations or SPC forecasters arrive at the AFWA. The SPC Lead Forecaster will also notify the SDM at NCO of all changes in status.

3.2.2 If the backup is expected to continue for more than 24 hours, the SPC will send forecasters to the AFWA. They will work in a designated area on workstations provided by the AFWA. The SPC Lead Forecaster will also notify the SDM at NCO of all changes in status.

3.3 AFWA Responsibilities

3.3.1 Once notified by the AWC to begin backup operational support, the AFWA will provide, as required, the following products to the appropriate NWS customers until AWC forecasters arrive at the AFWA or the backup is terminated.

3.3.1.1 Convective SIGMETs, Non-Convective SIGMETs, and AIRMETs as defined in NWSI 10-811.

3.3.1.2 AFWA will provide additional space for AWC forecasters to carryout Area Forecast (FA) backup responsibility.

3.3.2 Once notified by the SPC to start operational backup, the AFWA Lead Meteorologist would call the SPC to acknowledge and confirm assumption of operational backup. Upon assumption of operational backup, the AFWA will provide, as required, the following products to the appropriate NWS customers until SPC forecasters arrive at the AFWA or the backup is terminated.

3.3.2.1 Day 1/Day 2/Day 3 Convective Categorical Outlooks (text and graphics).

3.3.2.2 Weather Watches (text and graphics).

3.3.3 The AFWA will provide for necessary maintenance on appropriately designated computer hardware located at the AFWA to properly run all required software for AWC/SPC backup operations. The AFWA Systems and Network Management Branch (SCHS) will also provide access to the NWS equipment for AWC/SPC technical personnel to install and maintain operating software.

3.3.4 The AFWA will ensure there is a fully trained cadre of forecasters to provide AWC/SPC backup operations. This will include travel by AFWA Strategic Center Backup Lead Meteorologist to the AWC/SPC biannually for training. The AFWA shall be solely responsible for all costs associated with such travel to AWC/SPC.

3.3.5 The AFWA will be responsible for providing technology refresh, upgrades, and sustainment to all AFWA owned hardware.

3.4 NWS/NCEP Responsibilities

3.4.1 The NCEP/NCO SDM, upon notification by either SPC or AWC that AFWA has assumed backup operations, will issue a notification message of a change in status that will be transmitted on Automated Weather Information Processing System (AWIPS) and sent to TOC/Gateway for distribution to all other appropriate communication circuits.

3.4.2 The NCEP will provide appropriate data sets (e.g., model output, satellite, observations, pireps, etc.) for use on appropriately designated workstations at the AFWA. In addition, training and training materials will be provided as required on system hardware and software.

3.4.3 The NCEP will provide software support, installation, and maintenance to the AFWA for all backup software requirements, including software upgrades for AWC/SPC unique applications and product generation software.

3.4.4 The NCEP will be responsible for providing technology refresh, upgrades, and sustainment to all NWS hardware located at the AFWA.

3.4.5 The NCEP will be solely responsible for all costs associated with travel to AFWA for AWC/SPC technology exchange visits.

3.5 Joint NWS/AFWA Responsibilities

3.5.1 AFWA/XOG and NCEP (AWC and/or SPC) will maintain a mutually coordinated and agreed upon listing of equipment (computer hardware and software), floor plans, communication circuits, etc. associated with this operational backup support. Listing will also document ownership of the equipment.

3.5.2 AFWA and NCEP will share equally the costs incurred for the communications link between NCEP and AFWA.

3.5.3 NWS and AFWA will conduct scheduled practice backup exercises on a quarterly basis. (Request AWC/SPC personnel present)

4. Additional Terms and Conditions

4.1 NWS and AFWA participation in this agreement is subject to the availability of appropriated resources. Nothing herein is intended to conflict with current NOAA and USAF directives. If any terms of this agreement are inconsistent with directives of either of the agencies entering into the agreement, then those portions of the agreement that are inconsistent shall be held invalid. Remaining terms and conditions not affected by the inconsistency shall continue in full force and effect.

4.2 Should a disagreement arise in interpretation of the provisions contained herein, or of any amendment or revision, the parties shall attempt to reconcile the differences first at the operating level. Each party for consideration shall state the areas of disagreement in writing. If the agreement cannot be reached in thirty days, the disputing parties shall forward the written presentation and documents relating to the disagreements to respective higher officials for appropriate resolution.

5. Effective Date, Period of Performance, and Termination

5.1 The procedures outlined in this MOA are detailed in NWS directives (Operations Manual Chapters and associated Operations Manual Letters). These procedures will be implemented beginning on the effective date of the update(s) to those directives that reflect this MOA. This MOA becomes effective on the date of the final signature and shall remain in effect until terminated.

5.2 This MOA shall remain in effect for 5 years from the latest date appearing below and shall be reviewed at least annually by all parties concerned to ensure completeness and accuracy. At such time, and at any other time agreed to by the parties, this agreement

may be modified as appropriate, and mutually agreed. This MOA may be terminated by either party, but shall require 180 days advance written notification by the terminating party.

APPENDIX D

STATE CONTACTS FOR NAWAS NETWORK

Alabama

Fred Springall
205-834-1375
Alabama Emergency Management Agency
5898 County Road 41
Clanton, AL 35045-5160

Arizona

Harry E. Border, Program Director
602-231-6214
Arizona Division of Emergency Services
5626 East McDowell Road
Phoenix, AZ 85008

Arkansas

Jim Stalnaker
501-329-5601
Arkansas Office of Emergency Services
P.O. Box 758
Conway, AK 72032

California

Lloyd Darrington
916-427-4375; Fax: 916-427-1677
California Warning Center
State Office of Emergency Services
2800 Meadowview Road
Sacramento, CA 95832

Colorado

Dave Holms
303-273-1619
Colorado Disaster Emergency Services
1500 Golden Road
Camp George West
Basement Room D-18
Golden, CO 80401

Connecticut
Tom Walsh
860-566-4737
Office of Emergency Management
360 Broad Street
Hartford, Connecticut 06105

District of Columbia
Bill Curry
202-673-7353
2000 14th St., NW 8th Floor
Washington, D.C.

Delaware
Alan McClements
302-834-4531
State Of Delaware
Department of Public Safety
Emergency Planning and Operations Division
P.O. Box 527
Delaware City, Delaware 19706

Florida
John Fleming
904-448-1900; FAX: 904-448-6250 (to get updated records: 904-448-1320)
Division of Emergency Management
2740 Centerview Drive
Rhyne Building - Room #175
Tallahassee, FL 32399

Georgia
Mike Taylor
404-624-7222
Georgia Emergency Management Agency
P.O. Box 18055
Atlanta, GA 30316-0055

Idaho
Vicki Miller, Communications & Resource Officer
208-334-3460
Idaho Bureau of Disaster Services
650 West State Street
Boise, Idaho 83720

Illinois

John Myers
217-782-4602
Illinois Emergency Management Agency
110 East Adams Street
Springfield, IL 62706

Indiana

Mike Rollins
317-233-6055
Indiana State Police
Indiana State Office Building
100 North Senate Avenue
Indianapolis, IN 46204

Iowa

Dick Clement
515-281-3231
Iowa Office of Disaster Service
Hoover State Office Building, Level A
Des Moines, Iowa 50319

Kansas

Larry Waters, Communications Operator II
913-296-13102/6908
State of Kansas; The Adjutant General
Division of Emergency Preparedness
P.O. Box C-300
Topeka, Kansas 66601-0300

Kentucky

Omar Marshall
502-564-8617
Kentucky Emergency Management Agency
Boone Center
Frankfort, KY 40601-6168

Louisiana

John Buie & Jim Wilkes
504-342-5470
State of Louisiana Military Department
Office of Civil Defense & Emergency Preparedness
P.O. Box 44217
Baton Rouge, LA 70804

Maine

Joe Grimmig
207-626-4503
State Civil Defense Control Center
State House
72 State Office Building
Augusta, Maine 04333

Maryland

Hank Black, Communications Officer
877-636-2872
Maryland Emergency Management Agency
2 Sudbrook Lane East
Pikesville, MD 21208

Massachusetts

Steve Finks
508-820-2020
Massachusetts Emergency Management Agency
400 Worcester Road
Framingham, MA 01701

Michigan

Tom Newell
517-334-5126/5026
Michigan State Police
Emergency Management Division
Knapps Center, Suite 300
300 South Washington Square
Lansing, Michigan 48913

Minnesota

Tom Cherney
612-296-0455
Division of Emergency Management
B-5 State Capital
St. Paul, Minnesota 55155

Mississippi

Alvin Reynold
601-960-9000
Mississippi Emergency Management Agency
P.O. Box 4501
Jackson, Mississippi 39296-4501

Missouri

Cathy Zumwalt

573-526-9146

Missouri Emergency Management Agency Communications Center

1717 Industrial Drive

Jefferson City, MO 65101

Montana

Homer Young, Communications Officer

406-444-6911

Emergency Management Agency

P.O. Box 4789

Helena, Montana 59604

Nebraska

Bob Eastwood

402-471-7414

Communications Manager

Nebraska State Civil Defense Agency

1300 Military Rd.

Lincoln, NE 68508-1070

Nevada

Bob Minter

702-687-4240

Nevada Division of Emergency Management

2525 South Carson Street

Carson City, NV 89710

New Hampshire

Chuck Welch

603-271-2231

Office of Emergency Management

State Office Park South

107 Pleasant Street

Concord, NH 03301

New Jersey

Bob Schroeder

609-530-6019

Division of State Police

Emergency Management Section

P.O. Box 7068

West Trenton, NJ 08628-0068

New Mexico
Larry Austin
505-827-9242
New Mexico State Police Headquarters
4491 Cerillus Road
P.O. Box 1628
Santa Fe, NM 87504

New York
Earl Dressel
518-457-2200
Communications Section
NY State Emergency Management Office
Building 22 - State Campus
Albany, NY 12226-5000

North Dakota
Larry Ruebel
701-328-8108
Division of Emergency Management
P.O. Box 5511
Bismarck, ND 58502-5511

North Carolina
Clay Benton
919-715-4264
North Carolina State EOC
116 West Jones Street
Raleigh, NC 27603

Ohio
Dean Bolton
614-889-7155
Emergency Management Agency
2825 West Granville Road
Columbus, Ohio 43235-2712

Oklahoma
Ron Hill
405-521-2481
Oklahoma Civil Emergency Management Agency
P.O. Box 53365
Oklahoma City, OK 73152

Oregon
Joseph Cunningham
503-378-6377
Oregon Emergency Management
595 Cottage Street N.E.
Salem, OR 97310

Pennsylvania
Steve Vergot
717-651-2001/2039
Pennsylvania State
Council of Civil Defense
Foster and Commonwealth
Harrisburg, PA 17105-3321

Rhode Island
Jim Bell
401-946-9996
Emergency Management Agency
State House
Room 27
Providence, RI 02903-1197

South Dakota
Jim Ward
605-773-6425
Department of Military & Veterans Affairs
500 East Capitol
Pierre, SD 57501

South Carolina
Kenton Towner
803-734-8020
South Carolina EOC
1429 Senate Street
Columbia, SC 29200

Tennessee
Lynn Richland & James Barrett
615-741-0008
Tennessee Emergency Management Agency
Emergency Operations Center
3041 Sidco Drive
P.O. Box 41502
Nashville, TN 37204-1502

Texas

Linda Moore
512-424-2278
Texas Department of Public Safety
5805 North Lamar Blvd.
P.O. Box 4087
Austin, TX 78773-0001

Utah

Jim Brown
801-538-3400
State of Utah
Department of Public Safety
Division of Comprehensive Emergency Management
State Office Building, Room 1110
Salt Lake City, UT 84114

Vermont

Chris Fuhrmeister
802-244-8727
Emergency Management Department
103 South Main Street
Waterbury, VT 05671

Virginia

Ken Crumpler
804-897-6606
Commonwealth of Virginia
Department of Emergency Services
310 Turner Road
Richmond, VA 23225

Washington

Jimmie Hocutt, Communications Officer
206-459-9191
State of Washington
4220 East Martin Way
Olympia, WA 98504

West Virginia

Clay Carney, Communications Officer
304-348-5380
State of West Virginia
Office of Emergency Service
Main Capitol, Room EB-80
Charleston, WV 25305

Wisconsin

Alan Wohlfred, Director, Communications & Warning

608-266-3232

Wisconsin Division of Emergency Government

4802 Sheboygan Ave, Room 99A

P.O. Box 7865

Madison, WI 53707-3232

Wyoming

Bill Morton

307-777-4905

Wyoming Emergency Management Agency

Basement Emergency Operations Center

5500 Bishop Blvd

P.O. Box 1709

Cheyenne, WY 8200

APPENDIX E

ABBREVIATIONS AND ACRONYMS

-A-

ADWS	Automatic Digital Weather Switch
AFB	Air Force Base
AFRB	Air Force Reserve Base
AFRL	Air Force Research Laboratory
AFS	Air Force Station
AFSS	Automated Flight Service Station
AFW	Air Force Weather
AFWA	Air Force Weather Agency
AIRMET	Airmen's Meteorological Information
ALDARS	Automated Lightning Detection and Reporting System
AM	Amplitude Modulation
AMIS	Advance Meteorological Information System
AMOS	Automated Meteorological Observing Stations
AMSU	Advanced Microwave Sounding Unit
ANGB	Air National Guard Base
APT	Automatic Picture Transmission
ARTCC	Air Route Traffic Control Center
ASOS	Automated Surface Observing System
ASR	Airport Surveillance Radar
ATCT	Air Traffic Control Tower
ATM	Asynchronous Transfer Mode
ATOVS	Advanced TIROS-N Operational Vertical Sounder
AUTODIN	Automatic Digital Network
AWC	Aviation Weather Center
AWIPS	Advanced Weather Interactive Processing System
AWOS	Automated Weather Observing System
AVHRR	Advanced Very High Resolution Radiometer

-B-

BLM	Bureau of Land Management
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-C-

C ⁴ I	Command, Control, Communications, Computers, and Intelligence
CDDF	Central Data Distribution Facility
C/ESORN	Committee for Environmental Services, Operations and Research Needs
CIRA	Cooperative Institute for Research in the Atmosphere
C-MAN	Coastal Marine Automated Network
COMET	Cooperative Program for Operational Meteorology, Education and Training
CONUS	Continental United States
CRS	Console Replacement System (NWS)
CWS	Combat Weather Squadron
CWSU	Center Weather Service Unit
CWA	Center Weather Advisory

-D-

DDS	Domestic Data Service
DCO	Data Collection Offices
DET	Detachment
DMSP	Defense Meteorological Satellite Program
DOC	Department of Commerce
DOD	Department of Defense
DOT	Department of Transportation
DSN	Defense Switching Network

-E-

EAS	Emergency Alert System
EMWIN	Emergency Managers Weather Information Network
EOC	Emergency Operations Center

-F-

FAA	Federal Aviation Administration
FCC	Federal Communication Commission
FCMSSR	Federal Committee for Meteorological Services and Supporting Research
FCM	Federal Coordinator for Meteorology
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FM	Frequency Modulation
FNMOC	Fleet Numerical Meteorology and Oceanography Center
FO	Military Weather Advisory Future Outlooks
FOS	Family of Services
FSS	Flight Service Station
FTS	Federal Telecommunications Service

-G-

GAC	Global Area Coverage 4 km Resolution
GMDSS	Global Maritime Distress and Safety System
GOES	Geostationary Operational Environmental Satellite
GPS	Global Positioning System
GTS	Global Telecommunications System
GVAR	GOES Variable

-H-

H+55	55 minutes past the Hour
HAWCNET	High-speed Asynchronous transfer mode Weather Communications NETwork
HAZUS	HAZards U.S.
HNL	Honolulu, HI WFO
HQ	Headquarters
HRPT	High Resolution Picture Transmission
HF	High Frequency

-I-

IAP	International Airport
ICMSSR	Interdepartmental Committee for Meteorological Services and Supporting Research
IMO	International Maritime Organization
IR	Infrared
ITWS	Integrated Terminal Weather System
IWIN	Interactive Weather Information Network

-J-

JAAWIN	Joint Air Force and Army Weather Information Network
JAG/SLSO	Joint Action Group for Severe Local Storms Operations
JET	Joint Environmental Toolkit
JOTS	Joint Operational Tactical System
JPDO	Joint Planning and Development Office

-L-

LAC	Local Area Coverage 1.1 km resolution
LDS	Lightning Detection System
LF	Light Fine Video Data (1/3 nm (0.6 km))
LOA	Letter of Agreement
LS	Light Smooth Video Data (1.5 - 2.0 nm (2.8 - 3.7 km))
LVL	Level

-M-

MDR	Manually Digitized Radar
METAR	aviation routing weather report
METOC	Meteorology and Oceanography (as in commands, centers, or DETs) or Meteorological and Oceanographic (as in data or products)
METSAT	Meteorological Satellite
METWATCH	Meteorological Watch
MF	Medium Frequency
MIC	Maximum Instantaneous Coverage
MIDDS	Meteorological Integrated Data Display System
MSU	Microwave Sounding Unit
MWA	Military Weather Advisory

-N-

NASA	National Aeronautics and Space Administration
NAVMETOCCOM	Naval Meteorology and Oceanography Command
NAVTEX	a primary GMDSS
NAWAS	National Warning System
NCEP	National Centers for Environmental Prediction
NCF	Network Control Facility
NCO	NCEP Central Operations
NCWF	National Convective Weather Forecast
NDBC	National Data Buoy Center
NESDIS	National Environmental Satellite, Data, and Information Service
NEXRAD	Next Generation Radar (WSR-88D)
NGDC	National Geophysical Data Center
NHC	National Hurricane Center
NIMA	National Imagery Mapping Agency
NIPRNET	Non-secure Internet PRotocol NETwork
NMOSS	Navy Mobile METOC Support System
NOAA	National Oceanic and Atmospheric Administration
NOAAPort	NOAA communications system for data and products
NODDS	Navy Oceanographic Data Distribution System
NPHs	Natural Phenomena Hazards
NRC	Nuclear Regulatory Commission
NRP	National Response Plan
NSLSOP	National Severe Local Storms Operations Plan
NSSL	National Severe Storms Laboratory
NWP	Numerical Weather Prediction
NWR	NOAA Weather Radio
NWS	National Weather Service
NWSTG	NWS Telecommunications Gateway
NWWS	NOAA Weather Wire Service

-O-

OBS	observations
OFCM	Office of the Federal Coordinator for Meteorological Services and Supporting Research
OJCS	Organization of the Joint Chiefs of Staff
OLS	Operational Line Scanning
OWS	Operational Weather Squadron

-P-

PATWAS	Pilots Automatic Telephone Weather Advisory Service
PIBAL	Pilot Balloon
PIREP	Pilot Report
POES	Polar Orbiter Environmental Satellite
PPS	Public Product Service
PWW	Point Weather Warnings

-R-

RAWS	Remote Automatic Weather Station
R&D	Research and Development
RAMSDIS	Regional and Mesoscale Meteorology Team Advanced Meteorological Satellite Demonstration and Interpretation System
RAWIN	Rawinsonde
RCM	Radar Coded Message
RFC	River Forecast Center
RMTN	Regional Meteorological Telecommunications Network
RPG	Radar Product Generator
ROB	Automated Radar Observation (WSR-88D)
RTOVS	Revised TIROS-N Operational Vertical Sounder
RSO	Rapid Scan Operations
RVR	Runway Visual Range

-S-

SAB	Satellite Analysis Branch
SafetyNET	a primary GMDSS
SAME	Specific Area Message Encoders
SAWRS	Supplementary Aviation Weather Reporting Station
SD	Storm Detection
SDHS	Satellite Data Handling System
SDM	Senior Duty Meteorologist at NCEP
SIGRAD	Significant Radar Message
SIGMET	Significant Meteorological Information
SLSO	Severe Local Storms Operations

SNOINCR	Snow Increasing Rapidly report
SNOTEL	Snow Telemetry
SOLAS	Safety of Life at Sea
SPC	Storm Prediction Center
SPECI	aviation selected special weather report
SPP	Shared Processing Program
SR	Stored Data
SRC	State Relay Center
SRSO	Super Rapid Scan Operations
SSCs	Structures, Systems, and Components
SSM/I	Special Sensor Microwave Imager
SSM/T-1	Special Sensor Microwave Temperature Sounder
SSM/T-2	Special Sensor Microwave Moisture Sounder
SSU	Stratospheric Sounding Unit

-T-

TAA	Total Area Affected
TDWR	Terminal Doppler Weather Radar
TF	Thermal Fine Data (1/3 nm (0.6 km))
TIROS	Television Infrared Observation Satellite
TOVS	TIROS Operational Vertical Sounder
TPC	Tropical Prediction Center
TRACONS	Terminal Radar Approach Controls
TS	Thermal Smooth Data (1.5 - 2.0 nm (2.8 - 3.7 km))
TWEB	Transcribed Weather Broadcast

-U-

USA	United States Army
USAF	United States Air Force
USCG	United States Coast Guard
USMC	United States Marine Corps
USN	United States Navy
UTC	Universal Coordinated Time
UUA	Urgent pilot reports

-V-

VAS	VISSR Atmospheric Sounder
VHF	Very High Frequency
VHRR	Very High Resolution Radiometer
VIP	Video Integrated Processor
VISSR	Visible Infrared Spin Scan Radiometer
VOR	VHF Omni-Directional Radio Range
VOS	Voluntary Observing Ship

-W-

WFO	Weather Forecast Office
WIBIS	Severe Weather Watch Will Be Issued
WMO	World Meteorological Organization
WMSCR	Weather Message Switching Center Replacement
WSOM	Weather Service Operations Manual