FURUNO

NAVnet 3D

BBWX3 SIRIUSXM SATELLITE WEATHER REFERENCE MANUAL

The purpose of this manual is to provide operating procedures for Navnet NN3D's SiriusXM Satellite Weather capability. An optional SiriusXM Weather Receiver BBWX3 and SiriusXM subscription are required. This manual is provided in addition to the Navnet NN3D operator's manual, which fully covers operating procedures for the NavNet NN3D system. SiriusXM weather coverage is currently only available in U.S. and Canada.

Disclaimer – The weather information is subject to service interruptions and may contain errors or inaccuracies and consequently should not be relied upon exclusively. The service is provided as is. You are urged to check alternate weather information sources prior to making safety related decisions. You acknowledge and agree that you shall be solely responsible for use of the information and all decisions taken with respect thereto. By using this service, you release and waive any claims against SiriusXM Satellite Radio Inc., WSI, Navcast Incorporated and Furuno with regard to this service. If you do not have the subscription agreement, you will find a copy at: www.sirius.com/marineweather/marineweather_terms_and_conditions.pdf
Or call 1-800-869-5480 to have a copy sent to you.

FURUNO ELECTRIC COMPANY

www.furuno.co.jp

Weather

1.1 Weather Display Overview

When connected to the SiriusXM Weather Receiver BBWX3, this MFD will display current and forecasted weather information for your area. Real time updating ensures that you have up-to-the-minute weather information for your area, as well as any other area in the U.S.

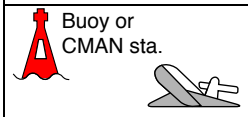
Information provided by the SiriusXM Marine Weather service is advisory nature only. You, the customer, agree to release FURUNO ELECTRIC CO., LTD., Sirius Satellite Radio Inc., Navcast Inc. and WSI Corporation from any and all claims arising from the use of this service, and you acknowledge that you have read the terms of your subscription agreement and agree to all the terms therein. If you do not have the subscription agreement, you will find a copy at: www.sirius.com/marineweatheragreement or call 1-800-869-5480 to have a copy sent to you.

Before using the weather application:

- Obtain an optional SiriusXM Weather Receiver BBWX3.
- Obtain a SiriusXM weather service subscription. Contact Sirius Satellite Radio INC., for further details.
- After connecting and powering up both the BBWX3 and the associated MFD displays, it may take up to 30 minutes for your MFD to receive/accumulate WX data from the BBWX3.
- If, during the installation of the equipment, the Installation Wizard fails to acknowledge the existence of the BBWX3, Sirius-related menus will not appear. Confirm that the equipment acknowledges the SiriusXM receiver.

1.2 Weather Icons

The table below shows the weather icons that appear the SiriusXM Satellite Weather display. These icons can be shown or hidden from the Weather menu.

Icon	Color	Meaning
	Purple	Storm cast
	Dark yellow (recorded in last 0-5 min.) Medium yellow (recorded in last 5-10 min.) Light yellow (recorded in last 10-15 min.)	Lightning
	Buoy: Red CMAN station: Grey Airplane: White	Surface observation stations
	Pink & Blue	Wind
	Dark blue	Waves
	Red-blue	Sea surface temperature
	Green (Rain) Blues (Snow) Pinks (Mixture)	NOWRAD (USA RADAR)
	Grey (Historical) Red (Current) Orange (Forecast)	Storm tracks
  *etc.*	For details, see your MFD Op Manual	Surface pressure

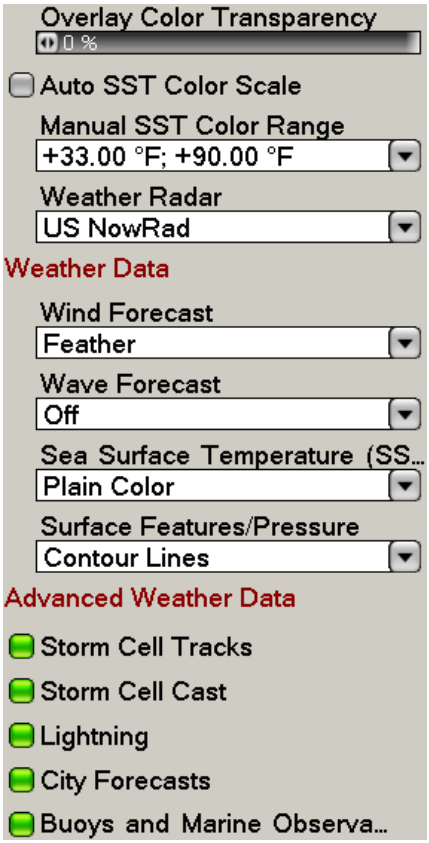
1.3 Weather Menu

The Weather menu lets you adjust the following weather-related items:

- Overlay transparency
- Color scale
- Weather radar (US or Canada)
- Standard weather data
- Advanced weather data

1.3.1 Displaying the Weather Menu

1. Press the **MENU** key to open the menu.
2. Use the RotoKey to open the Weather-Sirius menu.



3. Use the RotoKey to select the weather item that you want to show or hide.
4. Push the RotoKey to alternately turn the item on and off.
5. Press the **MENU** key to close the menu.

1.3.2 Weather Menu Description

Overlay Color Transparency

Adjust the transparency level of the weather overlay. Select this item with the RotoKey and push the RotoKey. Rotate the RotoKey to set and then push it to confirm setting. The higher the value the greater the transparency of the overlay.

Auto SST Color Scale

Enable/disable automatic adjustment of sea surface temperature color scale according to sea surface temperature.

Manual SST Color Range

Set the SST color range when Auto SST Color Scale is disabled. The setting range is +00.00 to 99.99 (degrees Fahrenheit).

Weather Radar

The BBWX3 can display the USA NOWRAD weather radar system. USA NOWRAD shows the type and level of precipitation. The "Level" number shown below denotes a figure of reflectivity from a weather radar. The larger the level number, the stronger the precipitation. CANRAD (Canada) is now included in available USA NOWRAD data.

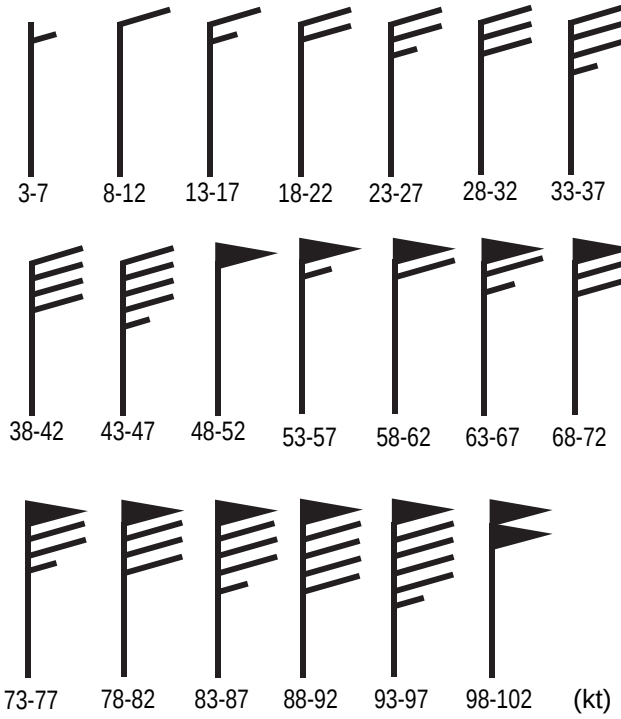
Precipitation indication on NOWRAD.

Weather radar color	Precipitation type	Level
Light green	Rain	15-19 dBz (Mist)
Medium green	Rain	20-29 dBz (Light)
Dark green	Rain	30-39 dBz (Moderate)
Yellow	Rain	40-44 dBz (Mod-Heavy)
Orange	Rain	45-49 dBz (Heavy)
Light red	Rain	50-54 dBz (Very Heavy)
Dark red	Rain	over 55 dBz (Heavy/Hail)
Light blue	Snow	5-19 dBz
Dark blue	Snow	over 20 dBz
Light pink	Mixed	5-19 dBz
Dark pink	Mixed	over 20 dBz

Weather Data

Wind Forecast

Select how to show the wind forecast. There are two types of wind icon styles: Vane feathers and Plain colors. Vane feathers also show you wind speed and direction, but give you more details about the wind speed per the description shown below.



Wind Force	10.0 kt
Wind Direction	306.5 M
Wave Height	+11.0 ft
Wave Direction	141.5 M
Wave Period	0m00s

Place cursor on a wind icon or anywhere on a body of water and hit the **left-click** button to show wind and wave informatior for that area.

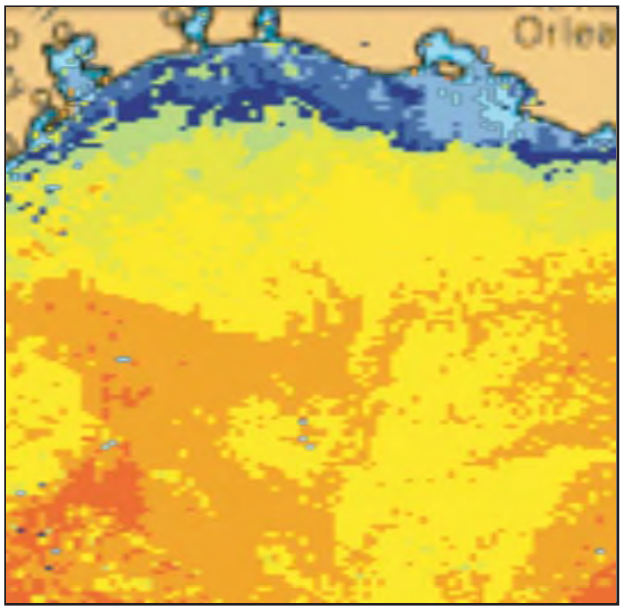
Waves Forecast

The Waves layer depicts wave height, with a dark blue arrow whose length increases with wave height. To find wave information place the cursor on a wave symbol and hit hit the **left-click** button.

Wind Force	30.0 kt
Wind Direction	186.5 M
Wave Height	+12.50 ft
Wave Direction	156.5 M
Wave Period	0m00s

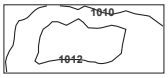
Sea Surface Temperature

This data layer shows the temperature of the sea surface in shades of red and blue, in order of descending temperature.



Surface Features/Pressure

Enable this feature to get surface pressure with meteorological symbols. The cursor may be placed on a surface pressure icon to show the name of the surface pressure.

Seasurface temp icon	Color	Meaning
	Blue	High pressure
	Red	Low pressure
	Red	Warm front (Red)
	Blue	Cold front (Blue)
	Purple	Occluded front (Purple)
	Red-blue	Stationary front (Red-Blue)
	Brown	Trough
	Red	Squall line
	Brown	Dry line
	Grey	Isobars

Advanced Weather Data

Storm Tracks

The storm track icons show significant storms in your area. These include tropical disturbances, depressions, storms and cyclones, hurricanes, typhoons and super typhoons. These symbols are displayed in three different colors: Grey, historical; Red-current, and Orange, forecast.

Storm tracks Icons	Meaning
	Hurricane (Category 1-5)
	Tropical storm
	Tropical disturbance, Tropical depression

To find simple storm tracks information, place the cursor on the icon. For more detailed information, press the **left-click** button.

Simple storm tracks information

Name	OLIVIA
Type	Typhoon
Wind Speed	8.0 kt
True Direction	111.5 °M
Wind Gust Speed	35.0 kt
Max Wind Speed	25.0 kt
Pressure	1008 hPa
Track Position Type	Current
Date of Observation	Oct/12/06
Position	17°36.0000' N; 121°54.0000' W

Detailed storm tracks infomration

Storm Cell Cast

You can find the direction and speed of a storm by placing by placing the cursor on the icon. For more detailed information, press the **left-click** button.

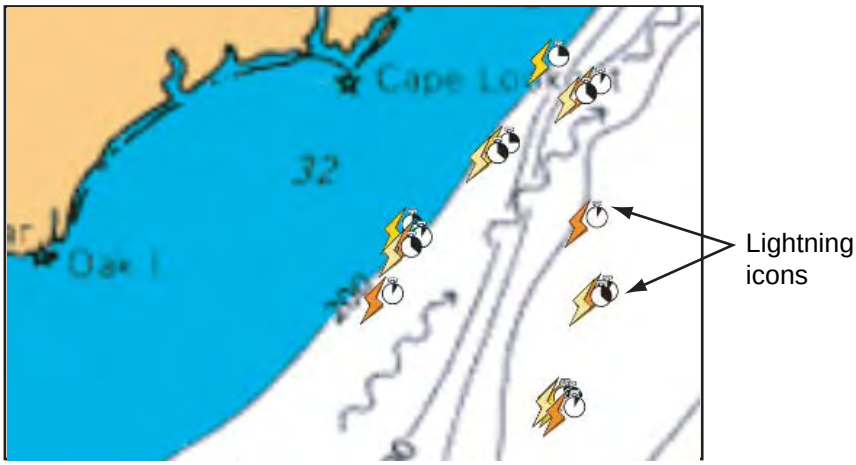
Simple storm cell cast information

Speed	20.0 kt
True Direction	81.0 °T
Date of Observation	Dec/18/07
Echo Top	+25000.00 ft
Type	Unknown
Position	24°32.4000' N; 83°15.5400' W

Detailed storm cell cast information

Lightning

The lightning icons show where lightning has struck, within the last 5, 10 and 15 minutes. The icon's fill color indicates how recent the lightning strike was, as shown in the table below. The number of lightning bolt markers indicates the number of times lightning has struck.

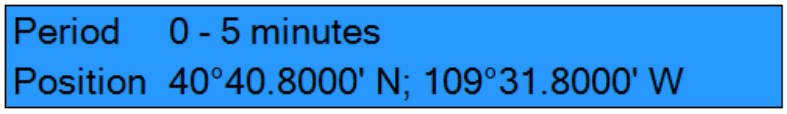


.Description of lightning icons

Lightning icon	Color	Period
	Orange	Last 0-5 min.
	Medium yellow	Last 5-10 min.
	Light yellow	Last 10-15 min.

To find simple lighting information, place the cursor on it. For more detailed information, push the **left-click** button.

Simple lightning information



Detailed lightning information

Buoys

You can check the historical or current weather information at buoys.

For simple information, place the cursor on the buoy icon (), etc. For more detailed information, push the **left-click** button.

Simple buoy information

Name	
Type	Buoy
Date of Observation	Mar/08/07
Ship Speed	0.0 kt
Ship Direction	0.0 °T
Wind Speed	5.8 kt
Wind Direction	80.0 °T
Wind Gust Speed	9** kt
Wind Speed At 10 Meters	5.1 kt
Wind Speed At 20 Meters	5.1 kt
Peak Wind Date	---
Peak Wind Dir	255.0 °T
Peak Wind Speed	9** kt
Variable Wind First Dir	255.0 °T
Variable Wind Second Dir	255.0 °T
Water Tmp	54.23 °F
Air Tmp	48.11 °F
Dewpoint Tmp	5**.* °F
Max Tmp in last 24 hours	5**.* °F
Max Tmp in last 6 hours	5**.* °F

Scroll for more data

Detailed buoy data

1.4 Weather Reports

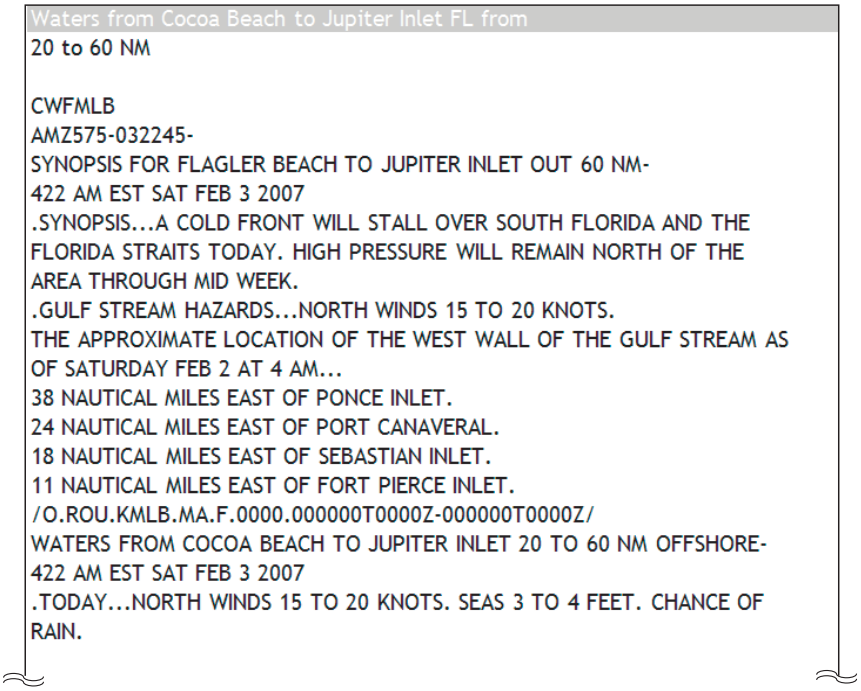
Marine zone forecasts, marine warnings, tropical information and weather alerts are sent to your unit. You can view them on the Weather menu, by opening respective sub menu.

SiriusXM sends warning messages to alert you to bad weather. You can view these messages by opening the Weather-Alert Box menu.

1.4.1 Marine Zone Forecast

These forecasts cover the following areas.

- US coastal weather forecasts
- US offshore forecasts
- High seas forecasts
- Great Lakes forecasts
- Near Shore forecasts
- Canadian coastal weather forecast.


Waters from Cocoa Beach to Jupiter Inlet FL from
20 to 60 NM

CWFMLB
AMZ575-032245-
SYNOPSIS FOR FLAGLER BEACH TO JUPITER INLET OUT 60 NM-
422 AM EST SAT FEB 3 2007
.SYNOPSIS...A COLD FRONT WILL STALL OVER SOUTH FLORIDA AND THE
FLORIDA STRAITS TODAY. HIGH PRESSURE WILL REMAIN NORTH OF THE
AREA THROUGH MID WEEK.
.GULF STREAM HAZARDS...NORTH WINDS 15 TO 20 KNOTS.
THE APPROXIMATE LOCATION OF THE WEST WALL OF THE GULF STREAM AS
OF SATURDAY FEB 2 AT 4 AM...
38 NAUTICAL MILES EAST OF PONCE INLET.
24 NAUTICAL MILES EAST OF PORT CANAVERAL.
18 NAUTICAL MILES EAST OF SEBASTIAN INLET.
11 NAUTICAL MILES EAST OF FORT PIERCE INLET.
/O.ROU.KMLB.MA.F.0000.000000T0000Z-000000T0000Z/
WATERS FROM COCOA BEACH TO JUPITER INLET 20 TO 60 NM OFFSHORE-
422 AM EST SAT FEB 3 2007
.TODAY...NORTH WINDS 15 TO 20 KNOTS. SEAS 3 TO 4 FEET. CHANCE OF
RAIN.

Marine zone forecast

1.4.2 Marine warning

Display the marine warnings (US coastal or near shore).

```
Waters from Cocoa Beach to Jupiter Inlet FL from
20 to 60 NM

NOWMLB
AMZ555-575-031045-
SHORT TERM FORECAST
NATIONAL WEATHER SERVICE MELBOURNE FL
243 AM EST SAT FEB 3 2007
COCOA BEACH TO JUPITER INLET OUT TO 20 NM-INDIAN RIVER-MARTIN-
OKEECHOBEE-OSCEOLA-SOUTHERN BREVARD-ST. LUCIE-
243 AM EST SAT FEB 3 2007
.NOW...
THROUGH 6 AM...LIGHT RAIN OR SPRINKLES WILL EXTEND FROM FAR SOUTHERN
SECTIONS OF BREVARD AND OSCEOLA COUNTIES SOUTH TO AROUND LAKE
OKEECHOBEE. THE AREA WILL CONTINUE TO WORK SOUTH DURING THE EARLY
MORNING HOURS.
$$
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1.4.3 Tropical Statement

Below is an example of a tropical weather statement.

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TWDAT
TROPICAL WEATHER DISCUSSION
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
105 AM EST SAT FEB 03 2007
TROPICAL WEATHER DISCUSSION FOR NORTH AMERICA...
CENTRAL AMERICA...THE GULF OF MEXICO...THE CARIBBEAN SEA...
NORTHEASTERN SECTIONS OF SOUTH AMERICA...AND THE ATLANTIC
OCEAN TO THE AFRICAN COAST FROM THE EQUATOR TO 32N.
THE FOLLOWING INFORMATION IS BASED ON SATELLITE IMAGERY...
METEOROLOGICAL ANALYSIS...WEATHER OBSERVATIONS...AND RADAR.
BASED ON 0000 UTC SURFACE ANALYSIS AND SATELLITE IMAGERY THROUGH
0515 UTC.
...THE ITCZ...
ITCZ AXIS IS CENTERED ALONG 8N13W 3N23W 1N30W CROSSING THE
EQUATOR NEAR 34W CONTINUING ALONG 2S40W INTO NE BRAZIL.
SCATTERED MODERATE CONVECTION IS WITHIN 150 NM S OF THE AXIS
BETWEEN 20W-24W. ISOLATED MODERATE IS WITHIN 180 NM N W OF 32W.
...DISCUSSION...
```
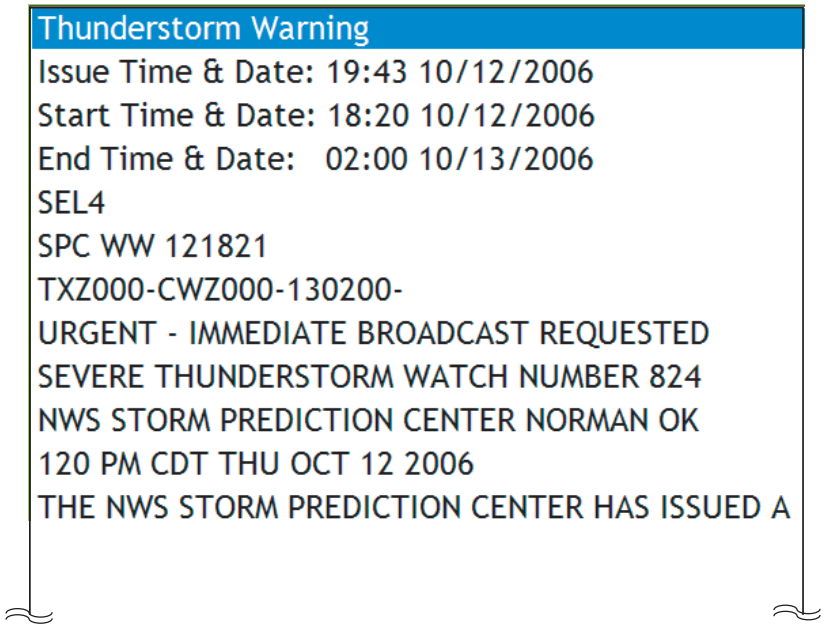

1.4.4 Marine WatchBox

The message "Weather Alarm, Press Menu Button" appears on the status bar when a tornado or thunderstorm warning is received. To view the details of the warning, press the **MENU** key to open the Alert Box in the Weather menu. The message is automatically opened in the Alert Box. A typical warning message is shown below.



You can show or hide the WatchBox warning message with SiriusXM Marine WatchBox in the Alarm-General menu.

Glossary of weather terms

Absolute Humidity- The density of water vapor. It is the mass of the water vapor divided by the volume that it occupies.

Advisory- Advisories are issued for weather situations that cause significant inconveniences but do not meet warning criteria and, if caution is not exercised, could lead to life-threatening situations. Advisories are issued for significant events that are occurring, are imminent, or have a very high probability of occurrence.

Air Pressure- (atmospheric pressure) air pressure is the force exerted on a surface by the weight of the air above it. The internationally recognized unit for measuring this pressure is the kilopascal.

Atmospheric Pressure- (also called air pressure or barometric pressure) The pressure asserted by the mass of the column of air directly above any specific point.

Barometric pressure- The actual pressure value indicated by a pressure sensor.

Cold Front- A narrow transition zone separating advancing colder air from retreating warmer air. The air behind a cold front is cooler and typically drier than the air it is replacing.

Coordinated Universal Time (UTC) - The time in the zero degree meridian time zone.

Cyclone- An area of low pressure around which winds blow counterclockwise in the Northern Hemisphere. Also the term used for a hurricane in the Indian Ocean and in the Western Pacific Ocean.

Depression- a region of low atmospheric pressure that is usually accompanied by low clouds and precipitation.

Doppler Radar- A type of weather radar that determines whether atmospheric motion is toward or away from the radar. It determines the intensity of rainfall and uses the Doppler Effect to measure the velocity of droplets in the atmosphere.

Extended Outlook- a basic forecast of general weather conditions three to five days in the future.

Forecast- A forecast provides a description of the most significant weather conditions expected during the current and following days. The exact content depends upon the intended user, such as the Public or Marine forecast audiences.

Front- The boundary or transition zone between two different air masses. The basic frontal types are cold fronts, warm fronts and occluded fronts.

Fujita Scale- System developed by Dr. Theodore Fujita to classify tornadoes based on wind damage. Scale is from F0 for weakest to F5 for strongest tornadoes.

Gale- Sustained wind speeds from 34 to 47 knots (39 to 54 mph).

High- An area of high pressure, usually accompanied by anticyclonic and outward wind flow. Also known as an anticyclone.

Humidity- The amount of water vapor in the atmosphere.

Hurricane- A severe tropical cyclone with sustained winds over 74 mph (64 knots). Normally applied to such storms in the Atlantic Basin and the Pacific Ocean east of the International Date Line.

Isobar- A line of equal barometric pressure on a weather map.

Knot- A measure of speed. It is one nautical mile per hour (1.15 mph). A nautical mile is one minute of one degree of latitude.

Lightning- Any form of visible electrical discharges produced by thunderstorms.

Low- An area of low pressure, usually accompanied by cyclonic and inward wind flow. Also known as a cyclone.

Millibar- A metric unit of atmospheric pressure. 1 mb = 100 Pa (Pascal). Normal surface pressure is approximately 1013 millibars.

NEXRAD: NEXt Generation RADar. A NWS network of about 140 Doppler radars operating nationwide.

NOAA- National Oceanic and Atmospheric Administration. A branch of the U.S. Department of Commerce, NOAA is the parent organization of the National Weather Service.

Occluded Front- A complex frontal system that occurs when a cold front overtakes a warm front. Also known as an occlusion.

Pressure- The force exerted by the interaction of the atmosphere and gravity. Also known as atmospheric pressure.

Relative Humidity- The amount of water vapor in the air, compared to the amount the air could hold if it was totally saturated. Expressed as a percentage.

Squall- A strong wind characterized by a sudden onset in which the wind speed increases at least 16 knots and is sustained at 22 knots or more for at least one minute.

Squall Line- Any non-frontal line or narrow band of active thunderstorms. The term is usually used to describe solid or broken lines of strong or severe thunderstorms.

Storm Track- the path that a low pressure area follows.

Tornado- A violent rotating column of air, in contact with the ground, pendant from a cumulonimbus cloud. A tornado does not require the visible presence of a funnel cloud. It has a typical width of tens to hundreds of meters and a lifespan of minutes to hours.

Tropical Depression- Tropical mass of thunderstorms with a cyclonic wind circulation and winds near the surface between 23 mph and 39 mph.

Tropical Storm- An organized low pressure system in the tropics with wind speeds between 38 and 74 mph.

Trough- An elongated area of relatively low atmospheric pressure surface or aloft. Usually not associated with a closed circulation, and thus used to distinguish from a closed low. The opposite of ridge.

Typhoon- A hurricane that forms in the Western Pacific Ocean.

UTC- Coordinated Universal Time. The time in the zero degree meridian time zone.

Vicinity- A proximity qualifier used to indicate weather phenomena observed between 5 and 10 statute miles of the usual point of observation but not at the station.

Warning- Forecast issued when a particular weather or flood hazard is "imminent" or already occurring (e.g., tornado warning, flash flood warning). A warning is used for conditions posing a threat to life or property.

Watch- Forecast issued well in advance to alert the public of the possibility of a particular weather related hazard (e.g. tornado watch, flash flood watch). The occurrence, location and timing may still be uncertain.

Wind Advisory- Issued for sustained winds 31 to 39 mph for at least 1 hour or any gusts 46 to 57 mph. However, winds of this magnitude occurring over an area that frequently experiences such winds would not require the issuance a wind advisory.

Zulu time- Same as UTC, Universal Coordinated Time. It is called Zulu because Z is often appended to the time to distinguish it from local time.

For a complete list of weather warnings, advisories, and definitions, please refer to the NOAA website at www.nws.noaa.gov.