

PRODUCT DESCRIPTION DOCUMENT

Experimental Hazard Grids in the National Digital Forecast Database

Approved: /Signed/ **Date: 06/04/08**

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Experimental Hazard Grids in the National Digital Forecast Database (NDFD)

Part I - Mission Connection

- a. Product Description - The NWS provides access to operational and experimental gridded forecasts of weather elements (e.g., maximum temperature, sky cover) through the NDFD. The NDFD contains a seamless mosaic of digital forecasts from NWS field offices working in collaboration with the National Centers for Environmental Prediction (NCEP). The hazard grids are prepared by all Weather Forecast Offices (WFO) and are available via the NDFD. Hazard grids are valid for more than two hours.

The hazard grids depict all active long duration watch, warning and advisory hazards issued by NWS WFOs . The hazard grids include long duration coastal, marine, non-precipitation, tropical and winter weather hazards. It also includes convective and some hydrological watches. It does not include the following short duration warnings: Tornado Warning, Severe Thunderstorm Warning, Extreme Wind Warning, Flash Flood Warning, and Special Marine Warning. It does not include the following Long Duration Watches and Warnings issued in RiverPro and WarnGen: Flood Watch for forecast points, Areal Flood Warnings and Flood Warnings for forecast points. In addition, it initially will not include Gale Warnings, Storm Warnings and Hurricane Force Wind Warnings issued in the Offshore and High Seas forecast by OPC and TAFB.

The NDFD Hazard grid definition is defined as, “a weather or hydrologic hazardous event issued for the protection of life and property and the enhancement of the national economy.”

For a detailed listing of the Hazards available via NDFD, refer to Appendix A.

- b. Purpose – These elements are used to convey to users and partners the active NWS long term watches, warnings and advisories and directly support the NWS mission of protecting lives and property and enhancing the national economy.
- c. Audience – A major audience for NDFD gridded data includes large volume users of forecast information, such as utilities, emergency managers, businesses/industry, academia, and any others who wish to decode and explore various potential applications of the NWS digital data.
- d. Presentation Format – There are three methods to acquire the NDFD hazard grids. All three methods, and other technical information about accessing the NDFD, are described at the following URL:

<http://www.weather.gov/ndfd/technical.htm>

As with all NDFD elements, the hazard grids are available in Gridded Binary Data Edition 2 (GRIB2) via hypertext transfer protocol (http) and file transfer protocol (ftp); eXtensible Markup Language (XML); and images via web browser, as described below.

1. GRIB2 format: The GRIB2 files can be decoded and converted to other formats, such as shapefiles, netCDF files, etc. A tutorial to download NDFD elements, decode them and generate images is posted online at:

http://www.weather.gov/ndfd/gis/ndfd_tutorial.pdf

The GRIB2 files are available from the NWS ftp server and/or the http server via the Internet. High volume users can also choose to subscribe to the [Server Access Service \(http://www.weather.gov/datamgmt/fos/fospage.html#A5\)](http://www.weather.gov/datamgmt/fos/fospage.html#A5) of the Family of Services (ftp via dedicated line—cost-recovery fee).

ftp server: http://www.weather.gov/ndfd/anonymous_ftp.htm
http server: http://www.weather.gov/ndfd/access_http.htm
Server Access Svc: <http://www.weather.gov/datamgmt/fos/fospage.html>

A user-defined GRIB2 access method is also available. That service allows the user to input latitude/longitude points for two corners to define an area and select a single weather element. The resulting GRIB2 message is built “on-the-fly” and downloaded by the user. For more information about User Defined GRIB2 access, please refer to the Service Description Document at:

http://products.weather.gov/PDD/User_Defined_Grib2.pdf

2. Extensible Markup Language (XML): Users can request NDFD elements over the Internet using the NDFD XML Simple Object Access Protocol (SOAP) server. The response to the user request is returned in XML format. For more information, please refer to the NDFD XML Service Description Document online at:

http://products.weather.gov/PDD/Extensible_Markup_Language.pdf

and the NDFD SOAP web service web page at:

<http://www.nws.noaa.gov/forecasts/xml/>

3. NDFD graphics via web browser: Hazard images may be accessed from the NWS homepage (www.weather.gov) by clicking on the “Graphical Forecasts” tab, clicking on the large map of the U.S., then clicking on the “Hazardous” tab in the upper right corner, or *directly* at the following URL:

<http://www.weather.gov/forecasts/graphical/sectors/conusHazardDay.php#tabs>

To access the hazard grids and other NDFD elements, or for further technical information (e.g., temporal and spatial resolutions, forecast projections, and geographic coverage), please visit the following URL:

<http://www.weather.gov/ndfd/technical.htm>

- e. Feedback Method - The NWS is requesting your comments and feedback from July 8, 2008 to January 8, 2009, about this experimental hazard grid element. Please feel free to use the links below for submitting comments.

GRIB2 users:

<http://www.weather.gov/survey/nws-survey.php?code=ndfd-grids>

Users of XML SOAP service:

<http://www.weather.gov/survey/nws-survey.php?code=xmlsoap>

NDFD graphics:

<http://www.weather.gov/survey/nws-survey.php?code=gfp>

For general or technical questions or comments regarding the NDFD, please e-mail: nws.ndfd@noaa.gov.

Technical questions regarding the NDFD may be addressed to:

National Weather Service Headquarters
Attn: David Ruth, W/OST21
1325 East West Highway, SSMC2
Silver Spring, MD 20910

Part II - Technical Description

- a. Format & Science Basis - The hazard grids are prepared and revised at the local WFOs on an event-driven basis. These grids are regularly uploaded to the NDFD server where they are combined into mosaics and are available in several formats to customers and partners. The hazard grids contain all the active long duration watch, warning and advisory hazards at the spatial resolution of the NDFD database from zero to 120 hours.

The hazard grids GRIB2 files will be available at one hourly resolution to 72 hours and posted in the Day 1-3 ftp and http subdirectories. For days 4 and 5, a separate set of hazard grids GRIB2 files will be available at six hourly resolution (i.e., 00, 06, 12, and 1800 UTC) and posted in the Day 4-7 ftp and http subdirectories.

Supplemental NDFD-style hazard images will be posted on weather.gov at three

hourly resolution (e.g., 00, 03, 06 UTC, etc.) to 72 hours and six hourly resolution (i.e., 00, 06, 12, 18 UTC) for days 4-5 and continuing until such time that the NWS web farm has sufficient capacity to generate one hourly resolution images.

- b. Product Availability – Products are updated and posted on the NDFD Central Server once per hour between 45 minutes past and the top of the hour. These products are sent to the [where?] and are disseminated from there.

NOTE: Files received at the NDFD Central Server by 45 minutes past the hour will be updated in NDFD near the top of the following hour. Files received after H+45 will be updated in NDFD one hour later.

Appendix A - Hazards in NDFD

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1. Long Duration Watches. Long duration watches are National Weather Service (NWS) products used to provide advance notice of hazardous weather events which have the potential to threaten life or property. The primary goal of this product is to provide enough lead time for users and partners to be advised of hazards in their area of concern.

The following table contains a complete list of NWS watches contained in the NDFD hazard grids and the Valid Time Event Code phenomena (pp) and significance code (s) (NWSI 10-1703):

Watch Name	VTEC		Watch Definition
	pp	s	
Areal Flood Watch	FA	A	Conditions are favorable for meteorological, soil, and/or hydrologic conditions to lead to flooding within 48 hours.
Blizzard Watch	BZ	A	Conditions are favorable for a blizzard event to meet or exceed Blizzard Warning criteria in the next 12 to 48 hours.
Coastal Flood Watch	CF	A	Conditions are favorable for a coastal flood event to meet Coastal Flood Warning criteria in the next 12 to 48 hours.
Excessive Heat Watch	EH	A	Conditions are favorable for an excessive heat event to meet or exceed local Excessive Heat Warning criteria in the next 12 to 48 hours.
Extreme Cold Watch	EC	A	Conditions are favorable for an extreme cold event to meet or exceed local Extreme Cold Warning criteria in the next 12 to 48 hours. Air temperatures exceeding locally defined criteria for a prolonged period of time. Typical criteria: shelter temperatures -50°F or colder and air temperatures remaining below -40°F up to the 700-mb level for at least three days.
Fire Weather Watch	FW	A	Conditions are favorable for a red flag event to meet or exceed Red Flag Warning criteria in the next 12 to 72 hours.
Flash Flood Watch	FF	A	Conditions are favorable for meteorological, soil, and/or hydrologic conditions to lead to flooding within 12 hours or, a dam or levee may fail and threaten lives or property, but the threat is not deemed to be imminent.

Freeze Watch	FZ	A	Conditions are favorable for a freeze event to meet or exceed Freeze Warning criteria in the next 12 to 48 hours during the locally defined growing season.
Gale Watch	GL	A	Conditions are favorable for a gale force wind event to meet the Gale Warning criteria of 34 knots (39 mph) to 47 knots (54 mph), not directly associated with a tropical cyclone, in the next 12 to 48 hours.
Hard Freeze Watch	HZ	A	Conditions are favorable for a hard freeze event to meet or exceed Hard Freeze Warning criteria in the next 12 to 48 hours during the locally defined growing season.
Hazardous Seas Watch	SE	A	Conditions are favorable for a hazardous seas event to meet or exceed Hazardous Seas Warning criteria in the next 12 to 48 hours.
Heavy Freezing Spray Watch	UP	A	Conditions are favorable for a heavy freezing spray event to meet local Heavy Freezing Spray Warning criteria in the next 12 to 48 hours.
High Wind Watch	HW	A	Conditions are favorable for a high wind event to meet or exceed High Wind Warning criteria in the next 12 to 48 hours.
Hurricane Force Wind Watch	HF	A	Conditions are favorable for a hurricane force wind event to meet or exceed Hurricane Force Wind Warning criteria of 64 knots (74 mph) or greater, not associated with a tropical cyclone, in the next 12 to 48 hours.
Hurricane Watch	HU	A	Conditions are favorable for a tropical cyclone to produce hurricane force winds of 64 knots (74 mph) or greater in a specified coastal area within 36 hours except 48 hours for the western north Pacific.
Hurricane Wind Watch	HI	A	Conditions are favorable for a tropical cyclone to spread hurricane force winds of 64 knots (74 mph) or greater inland within 36 hours
Lake Effect Snow Watch	LE	A	Conditions are favorable for a lake effect snow event to meet or exceed local Lake Effect Snow Warning criteria in the next 12 to 48 hours.
Lakeshore Flood Watch	LS	A	Conditions are favorable for a lakeshore flood event to meet Lakeshore Flood Warning criteria in the next 12 to 48 hours.
Severe Thunderstorm Watch	SV	A	Conditions are favorable for severe thunderstorms to develop.
Storm Watch	SR	A	Conditions are favorable for a storm force wind event to meet Storm Warning criteria of 48 knots (55 mph) to 63 knots (73 mph), not directly associated with a tropical cyclone, in the next 12 to 48 hours.
Tornado Watch	TO	A	Conditions are favorable for tornadoes to develop.
Tropical Storm Watch	TR	A	Conditions are favorable for a tropical cyclone to produce tropical storm force winds of 34 to 63 knots (39 to 73 mph) in a specified coastal area within 36 hours except 48 hours for the western north Pacific..

Tropical Storm Wind Watch	TI	A	Conditions are favorable for a tropical cyclone to spread tropical storm force winds of 34 to 63 knots (39 to 73 mph) inland within the next 36 hours.
Tsunami Watch ¹	TS	A	Conditions are favorable for coastal areas to be impacted by destructive tsunami waves. Watches are issued based on seismic information without confirmation that a destructive tsunami is underway. The second highest level of tsunami alert.
Typhoon Watch	TY	A	Conditions are favorable for a tropical cyclone to produce typhoon force winds of 64 knots (74 mph) or greater in specified coastal areas in the western Pacific ocean in the next 24 to 36 hours.
Wind Chill Watch	WC	A	Conditions are favorable for wind chill temperatures to meet or exceed local Wind Chill Warning criteria in the next 12 to 48 hours.
Winter Storm Watch	WS	A	Conditions are favorable for a winter storm event (Heavy Sleet, Heavy Snow, Ice Storm, Heavy Snow and Blowing Snow or a combination of events) to meet or exceed local Winter Storm Warning criteria in the next 12 to 48 hours.

¹ Watch added in late spring 2009

2. Long Duration Warnings. Long duration warnings provide our users and partners advance notice of hazardous weather events that threaten life or property.

The following table contains a complete list of NWS warnings contained in the NDFD hazard grids:

Warning Name	VTEC		Warning Definition
	pp	s	
Blizzard Warning	BZ	W	Sustained wind or frequent gusts greater than or equal to 35 mph accompanied by falling and/or blowing snow, frequently reducing visibility to less than 1/4 mile for three hours or more.
Coastal Flood Warning	CF	W	Inundation of land areas caused by sea waters over and above normal tidal action. Coastal flooding may impact the immediate oceanfront, gulfs, bays, back bays, sounds, and tidal portions of river mouths and inland tidal waterways.
Dust Storm Warning	DS	W	Widespread or localized blowing dust reducing Visibilities to 1/4 mile or less. Sustained winds of 25 mph or greater are usually required.
Excessive Heat Warning	EH	W	Heat Index values forecast to meet or exceed locally defined warning criteria for at least two days (Typical value: 1) Maximum daytime HI $\geq 105^{\circ}\text{F}$ north to 110°F south 2) Minimum nighttime lows $\geq 75^{\circ}\text{F}$).

Extreme Cold Warning	EC	W	Air temperatures exceeding locally defined criteria for a prolonged period of time. Typical criteria: shelter temperatures -50°F or colder and air temperatures remaining below -40°F up to the 700-mb level for at least three days.
Freeze Warning	FZ	W	Minimum shelter temperature is forecast to be 32°F or less during the locally defined growing season.
Gale Warning ¹	GL	W	A warning of sustained surface winds, or frequent gusts, in the range of 34 knots (39 mph) to 47 knots (54 mph) inclusive, either predicted or occurring, and not directly associated with a tropical cyclone.
Hard Freeze Warning	HZ	W	Minimum shelter temperature is forecast to be 26°F or less during the locally defined growing season.
Hazardous Seas Warning ¹	SE	W	Wave heights and/or wave steepness values meeting or exceeding locally defined warning criteria.
Heavy Freezing Spray Warning ¹	UP	W	An accumulation of freezing water droplets on a vessel at a rate of 2 cm per hour or greater caused by some appropriate combination of cold water, wind, cold air temperature, and vessel movement.
Heavy Snow Warning ³	HS	W	Snow accumulation meeting or exceeding locally defined 12 and/or 24 hour warning criteria.
High Surf Warning	SU	W	Warning for breaking wave action resulting in an especially heightened threat to life and property within the surf zone.
High Wind Warning	HW	W	Wind speeds forecast to meet or exceed locally defined warning criteria. (Typical values are sustained wind speeds of 40 mph or greater lasting for 1 hour or longer, or winds of 58 mph or greater for any duration).
Hurricane Force Wind Warning ¹	HF	W	Sustained winds, or frequent gusts, of 64 knots (74 mph) or greater, either predicted or occurring, and not directly associated with a tropical cyclone.
Hurricane Warning	HU	W	Sustained surface winds of 64 knots (74 mph) or higher associated with a hurricane are expected in a specified coastal area within 24 hours.
Hurricane Wind Warning	HI	W	Tropical cyclone to spread hurricane force sustained winds of 64 knots (74 mph) or greater inland within 24 hours.
Ice Storm Warning	IS	W	Ice accumulation meeting or exceeding locally defined warning criteria (typical value is 1/4 inch or more).
Lake Effect Snow Warning	LE	W	Widespread or localized lake induced snow squalls or heavy showers which produce snowfall accumulation meeting or exceeding locally defined warning criteria.

Lakeshore Flood Warning	LS	W	Inundation of land areas adjacent to one of the Great Lakes caused by lake water exceeding normal levels. Lakeshore flooding impacts the immediate lakefront, bays, and the interfaces of lakes and connecting waterways, such as rivers.
Red Flag Warning	FW	W	Warning to alert area firefighting and land management agencies of the onset of critical weather and fuel moisture conditions ideal for rapid or dramatic increases in wildfire activity.
Sleet Warning ³	IP	W	Sleet accumulation meeting or exceeding locally defined warning criteria (typical value is 1/2 inch or more).
Storm Warning	SR	W	A warning of sustained surface winds, or frequent gusts, in the range of 48 knots (55 mph) to 63 knots (73 mph) inclusive, either predicted or occurring, and not directly associated with a tropical cyclone.
Tropical Storm Warning	TR	W	Sustained surface winds, associated with a tropical cyclone of 34 to 63 knots (39 to 73 mph), expected in a specified coastal area within 24 hours.
Tropical Storm Wind Warning	TI	W	Tropical cyclone to spread tropical storm force sustained winds of 34 to 63 knots (39 to 73 mph) inland within 24 hours.
Tsunami Warning ²	TS	W	A warning for the imminent threat of a tsunami from a large undersea earthquake or following confirmation that a potentially destructive tsunami is underway. The highest level of tsunami alert.
Typhoon Warning	TY	W	Sustained surface winds of 64 knots (74 mph) or higher associated with a typhoon are expected in specified coastal areas in the western Pacific ocean within 24 hours or less.
Wind Chill Warning	WC	W	Wind chill temperatures reaching or exceeding locally defined warning criteria (typical value is -18°F or colder).
Winter Storm Warning	WS	W	Winter weather event having more than one predominant hazard (i.e., heavy snow and blowing snow, snow and ice, snow and sleet, sleet and ice, or snow, sleet and ice) meeting or exceeding locally defined 12 and/or 24 hour warning criteria.

¹ Warning not in the NDFD hazard grids issued by Alaska Region WFOs

² Warning added in late spring 2009

³ Warning discontinued in winter 2008

3. Long Duration Advisories. Long duration advisories are for less serious conditions that cause significant inconvenience and, if caution is not exercised, could lead to situations that may threaten life and/or property.

The following table contains a complete list of NWS advisories contained in the NDFD hazard grids:

Advisory Name	VTEC		Advisory Definition
	Pp	s	
Air Stagnation Advisory	AS	Y	Atmospheric conditions stable enough to cause air pollutants to accumulate in a given area. Criteria developed in conjunction with the local or state EPA and the product issued at their request.
Ashfall Advisory	AF	Y	Conditions associated with airborne ash plume resulting in ongoing deposition at the surface. Ashfall may originate directly from a volcanic eruption, or indirectly by wind suspending the ash.
Ashfall Advisory ¹	MH ¹	Y	Conditions associated with airborne ash plume resulting in ongoing deposition over the coastal waters. Ashfall may originate directly from a volcanic eruption, or indirectly by wind suspending the ash.
Blowing Dust Advisory	DU	Y	Widespread or localized blowing dust reducing visibilities to one mile or less, but greater than 1/4 mile. Winds of 25 mph or greater are usually required.
Blowing Snow Advisory ²	BS	Y	Widespread or localized blowing snow reducing visibilities to 1/4 mile or less with winds less than 35 mph.
Brisk Wind Advisory	BW	Y	Small Craft Advisory winds expected for ice-covered waters.
Coastal Flood Advisory	CF	Y	Minor flooding, such as minor tidal overflow, is occurring or is possible within 12 hours.
Dense Fog Advisory	FG	Y	Widespread or localized fog reducing visibilities to regionally or locally defined limitations not to exceed one 1/4 mile over land and one nautical mile over water.
Dense Fog Advisory ¹	MF ¹	Y	Widespread or localized fog reducing visibilities to regionally or locally defined limitations not to exceed one nautical mile over water.
Dense Smoke Advisory	SM	Y	Widespread or localized smoke reducing visibilities to regionally or locally defined limitations not to exceed one 1/4 mile over land and one nautical mile over water.
Dense Smoke Advisory ¹	MS ¹		Widespread or localized smoke reducing visibilities to regionally or locally defined limitations not to exceed one nautical mile over water.
Freezing Fog Advisory	ZF	Y	Very light ice accumulation from freezing fog.
Freezing Rain Advisory	ZR	Y	Light ice accumulation (freezing rain and/or freezing drizzle) meeting or exceeding locally defined advisory criteria, but remaining below warning criteria.

Freezing Spray Advisory	UP ZY ³	Y	An accumulation of freezing water droplets on a vessel at a rate of less than 2 centimeters (cm) per hour caused by some appropriate combination of cold water, wind, cold air temperature, and vessel movement.
Frost Advisory	FR	Y	Minimum shelter temperature forecast to be 33 to 36°F during the locally defined growing season, on nights with good radiational cooling conditions (e.g., light winds and clear skies).
Heat Advisory	HT	Y	Heat Index values forecast to meet or exceed locally defined advisory criteria for one to two days (Typical value: 1) Maximum daytime HI \geq 100°F north to 105°F south 2) Minimum nighttime lows \geq 75°F).
High Surf Advisory	SU	Y	Breaking wave action poses a threat to life and property within the surf zone.
Lake Effect Snow Advisory	LE	Y	Widespread or localized lake effect snowfall accumulation reaching or exceeding locally defined advisory criteria, but remaining below warning criteria.
Lake Effect Snow and Blowing Snow Advisory ²	LB	Y	Sustained wind or frequent gusts of 25 to 34 mph (or locally defined) accompanied by falling and blowing lake effect snow, occasionally reducing visibility to 1/4 mile or less for three hours or more.
Lake Wind Advisory	LW	Y	Sustained wind speeds of 20 to 29 mph (or locally defined) lasting for 1 hour or longer for inland lakes.
Lakeshore Flood Advisory	LS	Y	Minor flooding of land areas adjacent to one of the Great Lakes, such as minor tidal overflow, is occurring or is possible within 12 hours.
Low Water Advisory	LO	Y	Water levels are significantly below average and may cause impact to safe marine navigation.
Sleet Advisory ²	IP	Y	Sleet accumulation reaching or exceeding locally defined advisory criteria, but remaining below warning criteria.
Small Craft Advisory	SC	Y	Sustained wind speeds or frequent gusts of 20 to 33 knots (locally defined) and/or seas or waves 4 feet and greater (locally defined).
Small Craft Advisory for Hazardous Seas	SW	Y	Wind speeds are lower than small craft advisory criteria, yet waves or seas are potentially hazardous due to wave period, steepness, or swell direction.
Small Craft Advisory for Rough Bar	RB	Y	Waves in or near bars are hazardous to mariners due to the interaction of swell, tidal or river currents in relatively shallow water.
Small Craft Advisory for Winds	SI	Y	When wave heights are lower than Small Craft Advisory criteria, yet wind speeds are potentially hazardous.
Snow Advisory ²	SN	Y	Snowfall accumulation meeting or exceeding locally defined advisory criteria, but remaining below warning criteria.

Snow and Blowing Snow Advisory ²	SB	Y	Sustained wind or frequent gusts of 25 to 34 mph (or locally defined) accompanied by falling and blowing snow, occasionally reducing visibility to 1/4 mile or less for three hours or more.
Tsunami Advisory ⁴	TS	Y	Indicates that an area is either outside the current warning and watch regions or that the tsunami poses no danger to that area. The third highest level of tsunami alert.
Wind Advisory	WI	Y	Sustained wind speeds of 30 to 39 mph lasting for 1 hour or longer or locally defined.
Wind Chill Advisory	WC	Y	Wind chill temperatures reaching or exceeding locally defined advisory criteria, but remaining below warning criteria.
Winter Weather Advisory	WW	Y	Winter weather event having more than one predominant hazard (i.e., snow and ice, snow and sleet, or snow, ice and sleet) meeting or exceeding locally defined 12 and/or 24 hour advisory criteria for at least one of the precipitation elements, but remaining below warning criteria.

¹ Marine VTEC phenomena code additions for winter 2008

² Advisory discontinued in winter 2008

³ VTEC phenomena code change for winter 2008

⁴ Advisory added in late spring 2009