

PRODUCT DESCRIPTION DOCUMENT

National Digital Forecast Database (NDFD) Climate Outlook Probability Elements

APPROVED (signed)

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National Digital Forecast Database (NDFD) Climate Outlook Probability Elements NWS Product Description Document (PDD)

Part 1 - Mission Connection

- a. Product Description: The [National Digital Forecast Database \(NDFD\)](#) contains a seamless mosaic of digital weather forecasts from National Weather Service (NWS) field offices and the National Centers for Environmental Prediction (NCEP). The Climate Prediction Center (CPC) is the NWS' center of expertise for climate outlooks covering valid periods of one week, one month, and three-months, with lead times (i.e. advance issuance before the beginning of the valid period) from a "zero" lead to 12.5 months of lead time.

The following Climate Outlooks by the CPC are available in the NDFD in operational status. The outlooks are probabilistic (expressed in percent).

- Probability of 8- to 14-Day Average Temperature Above Normal
- Probability of 8- to 14-Day Average Temperature Below Normal
- Probability of 8- to 14-Day Total Precipitation Above Median
- Probability of 8- to 14-Day Total Precipitation Below Median
- Probability of One-month Average Temperature Above Normal
- Probability of One-month Average Temperature Below Normal
- Probability of One-month Total Precipitation Above Median
- Probability of One-month Total Precipitation Below Median
- Probability of Three-month Average Temperature Above Normal
- Probability of Three-month Average Temperature Below Normal
- Probability of Three-month Total Precipitation Above Median
- Probability of Three-month Total Precipitation Below Median

All of these elements are available for the contiguous U.S. (CONUS), the 16 pre-defined NDFD CONUS subsectors (see <http://www.weather.gov/ndfd/coverage.htm>), and Alaska.

These probabilistic outlooks pertain to the average temperature and total precipitation for the entire valid period and **not** to the variability within it; these outlooks will **not** help people planning events for specific dates or sub-periods.

- b. Purpose: In support of the mission described in the *National Weather Service Strategic Plan for FY2003 - FY 2008*, the NDFD is a "...national information database and infrastructure which can be used by other governmental agencies, the private sector, the public, and the global community." The NDFD is the primary means by which digital information will be made available to customers and partners. As part of this digital database, Climate Outlook Probability elements are available in

response to growing user needs for planning purposes and critical safety decisions. Future digital datasets will continue to be developed in accordance with growing user needs.

- c. Audience: The audience for the Climate Outlook elements includes large volume users of forecast and/or climate information, the media, utility companies, government agencies (including NWS field offices), academia, agricultural interests, and other economic and business planners. They are also for anyone who wishes to decode and explore various applications of the NWS Climate Outlook Probability data; or simply view, post, or distribute the data or graphic images. See the [CPC web page](#) for graphics of these outlooks.
- d. Presentation Format: The Climate Outlook elements are available at 5 kilometer spatial resolution for the Contiguous (CONUS), the 16 pre-defined NDFD CONUS subsectors (see <http://www.weather.gov/ndfd/coverage.htm>), and Alaska.

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>

These elements are available in Gridded Binary Data Edition 2 (GRIB2); eXtensible Markup Language (XML) via the Internet; and Geographic Markup Language (GML) via Web Feature Service, as described below. The Climate Outlook Probability elements are *not* available from NDFD as graphics.

1. GRIB2 Gridded Binary, Edition 2) format: via hypertext transfer protocol (http) or file transfer protocol (ftp): 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 http or ftp server via the Internet. High-volume users can also choose to subscribe to the Server Access Service of the Family of Services (ftp via dedicated line; cost-recovery fee)

- ftp server: http://www.weather.gov/ndfd/access_http.htm
- http server: http://www.weather.gov/ndfd/anonymous_ftp.htm
- Server Access Svc: <http://www.weather.gov/datamgmt/fos/fospage.html#A5>

A user-defined GRIB2 access method is also available. That service allows the user to input latitude/longitude points for two corners 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. 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. GML: Users can request NDFD elements over the Internet using the NDFD Web Feature Service (WFS). The response to the user request is returned in GML format. For more information, please refer to the WFS Service Description Document online at:

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

and the NDFD WFS web page at:

http://www.weather.gov/forecasts/xml/OGC_services/

To access these 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: User feedback is important in our effort to improve the quality and usefulness of products and services. Please provide feedback on these, or any, NDFD elements by completing one of the brief product surveys shown below.

GRIB2 NDFD users:

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

Users of NDFD XML SOAP service:

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

Users of the NDFD GML via Web Feature Service:

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

Technical questions regarding the Climate Outlook Probability elements may be addressed to:

<http://www.cpc.ncep.noaa.gov/comment-form.html>

For general questions regarding the NDFD, please e-mail:

nws.ndfd@noaa.gov

Part II - Technical Description

- a. Science and Format: Predictable phenomena which contribute to the skill of the 8-14-day Outlooks include atmospheric blocking; the predictability of patterns, such as the Pacific North American and the North Atlantic Oscillation; and the anticipated impacts of surface conditions, including sea surface temperatures (SST) and soil moisture, on the atmosphere. Dynamical models are the main tools used by CPC to generate the outlooks. The average skill of these outlooks is about 30 percent better than climatology, for temperature, and about 15 percent, for precipitation. One-Month Outlooks derive most of their skill from trends, impacts of SST and soil moisture, and El Nino/Southern Oscillation (ENSO). Other sub-seasonal phenomena, such as the tropical intra-seasonal oscillation, may also contribute. Skill of 1-Month temperature and precipitation Outlooks averages about 20 and 10 percent better than climatology, respectively. The 3-month Outlooks derive much of their skill from trends, ENSO, and the effects on the atmosphere of SST and soil moisture. The skill of the 3-month temperature and precipitation outlooks is about 25 and 10 percent better than climatology. A combination of dynamical and statistical models are equally used in making the 1- and 3-Month Outlooks.

CPC expresses the outlooks in a three category probabilistic format as the chance the average temperature or total precipitation for the period will fall into each of three classes: above, below, or near normal. The near normal probabilities (which are not provided as separate elements in NDFD) can be computed for any grid point by subtracting the sum of the above normal and below normal probabilities from 100 percent.

CPC defines the classes as climatologically equally likely: Under ideal conditions, the top 10 cases of a thirty year record define the above category (A); the middle 10 cases define the normal category (N), and the bottom 10 cases defining the below category (B). CPC uses the 30-year mean temperature and 30-year mean total precipitation for the climatology and class limits. The NDFD products allow users to reconstitute the 3-class maps of 3-month mean temperature and total precipitation which CPC issues each month.

For information on CPC's climatology and class limits for the various valid periods, go to:

http://www.cpc.ncep.noaa.gov/products/predictions/new_climates/

- b. Product Availability:

The Climate Outlook Probability elements are issued as follows:

- 8- to 14-Day Outlooks at 3:00 p.m. Eastern Local time each day with one week lead time.
- One-Month Outlook twice a month; at around 8:30 a.m. Eastern local time on the third Thursday of the month (about 0.5 month lead time) and 3:00 p.m. Eastern local time on the last day of the month (“zero lead” time).
- Three-Month Outlook: CPC issues these 13 outlooks simultaneously once a month on the third Thursday of the month at around 8:30 a.m. Eastern Local time. CPC will issue the 13 outlooks with lead times from 0.5 months to 12.5 months. For example, in mid-January, CPC will issue Three-Month Outlooks for February through April, March through May, April through June, and so on to February through April of the following year.

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.

c. Additional Information:

Detailed descriptions of these products are available on the CPC web site. See:

8- to 14-Day Outlook:

<http://www.cpc.ncep.noaa.gov/products/predictions/814day/index.php>

One-month Outlook: <http://www.cpc.ncep.noaa.gov/products/predictions/30day/>

Three-month Outlooks: <http://www.cpc.ncep.noaa.gov/products/predictions/90day/>

For more information on the NDFD, please refer to the NDFD web site at:

<http://www.nws.noaa.gov/ndfd/>