National Digital Forecast Database (NDFD)
Real-Time Mesoscale Analysis (RTMA)
Product Description Document
November 8, 2006

Part I - Mission Connection

a. Description of Product. The National Weather Service (NWS) Digital Forecast Database (NDFD) is a significant part of this organization's Digital Services. NWS forecast offices across the entire nation produce numerous digital forecasts daily for the NDFD, which are used by various users. The NWS developed a requirement for an NDFD-matching analysis. One requirement for this analysis is a minimum grid spacing of 5-km and temporal frequency of one hour to satisfy digital forecast verification requirements and digital forecast preparation. In addition, the analysis must include both CONUS and OCONUS regions for the NDFD. The Analysis of Record (AOR) project's first phase, the Real-Time Mesoscale Analysis (RTMA), will provide an NDFD-matching analysis to help meet these requirements.

The RTMA is an hourly high-resolution, objective analysis of gridded, surface meteorological parameters. The first experimental RTMA parameter set for the CONUS includes temperature, dew point, wind direction, wind speed, a one-hour precipitation estimate, and the equivalent cloud amount (ECA) product. All RTMA products in the initial set, except the ECA, are produced by the National Centers for Environmental Prediction (NCEP). The National Environmental Satellite, Data, and Information Service (NESDIS) generates the ECA, which is a GOES-based product. Analysis uncertainty estimates are available for all RTMA products in the initial set except the precipitation product and ECA. RTMA products will be provided for OCONUS regions in the future.

b. Purpose. The RTMA has several useful applications including an objective analysis to assess digital forecasts (i.e., first-look verification) and a starting point for producing digital forecasts. Operational meteorologists could apply RTMA information for maintaining situational awareness and for the production of short-term forecasts.

c. Intended Audience. NWS field office and special center personnel are the intended internal users of RTMA products. External users of these products include private meteorologists, academic scientists, and other customers utilizing meteorological gridded analyses for operational and research applications.

d. Presentation Method. The RTMA products are available each hour for the CONUS in a digital and graphical form. OCONUS products will be available in later editions of RTMA product sets. RTMA GRIB Edition 2 files are available for users, for decoding and displaying products, in the NDGD (National Digital Guidance Database) on the following ftp server:

ftp://tgftp.nws.noaa.gov/SL.us008001/ST.expr/DF.gr2/DC.ndgd/GT.rtma/AR.conus.

RTMA examples of temperature, dew point, and wind are available at the URL below.

http://www.emc.ncep.noaa.gov/mmb/rtma/

Information on the RTMA precipitation estimate product is available at the following web site:

http://www.emc.ncep.noaa.gov/mmb/ylin/pcpanl/precip_rtma_aor.html

The NESDIS ECA product is available for a domain larger than CONUS and is available at the following web site:

http://www.orbit.nesdis.noaa.gov/smcd/opdb/goes/sdpi/html/xdpieca24.html.

e. Feedback Mechanism. The NWS appreciates feedback from users to enhance products and services. Please provide comments on the RTMA experimental products by completing the brief survey and comment form at the following web site:

http://www.weather.gov/survey/nws-survey.php?code=rtma.

Graphic Element	Comment Open Date	Comment Close Date
RTMA Products	11/15/06	5/15/07

Table 1. RTMA Comment Period

Technical questions regarding the RTMA products may be addressed to:

National Centers for Environmental Prediction
ATTN: Geoffrey Manikin, W/NP22
5200 Auth Road, WWBG
Camp Springs, MD 20746-4304

Part II - Technical Description

a. Format and Scientific Basis. The RTMA products, except the precipitation analyses and the ECA product, are produced from the 2D-VAR (Two-Dimensional Variational Analysis) version of NCEP's GSI (Gridpoint Statistical Interpolation). The background field used for the analysis is the downscaled one-hour RUC (Rapid Update Cycle)-13 numerical model forecast. The first set of RTMA products includes temperature, dew point, wind direction and speed, a one-hour precipitation estimate and the ECA product.

An analysis uncertainty product is generated each hour for the temperature, dew point, wind direction and wind speed products. These uncertainty products are expressed in the same units as the displayed product (e.g., degrees for temperature analysis uncertainty). The analysis uncertainty values depend on observation density and quality, background field quality, and other factors.

NCEP produces the one-hour precipitation estimate product from the hourly Stage II analysis and NESDIS generates the ECA. The precipitation estimate is obtained from the Stage II analysis that includes data from numerous real-time rain gauges and precipitation estimates from Doppler radar reflectivity data. The ECA is a function of cloud coverage and cloud opacity within a satellite field of view. This product is derived from infrared radiances with different absorptions of carbon dioxide. In addition, the product is not based on the visible part of the electromagnetic spectrum.

The RTMA provides a near-real time, high-resolution objective analysis to aid in digital forecast generation and situational awareness by operational meteorologists. The products provide a proof-of-concept of the main AOR system planned for development in the future. The AOR system will provide a delayed analysis used as a daily final verification of digital forecasts and for other possible applications such as climate studies. Products from the main AOR system will be archived at the National Climatic Data Center (NCDC).

b. Product Availability. The RTMA products are available in GRIB Edition 2 for downloading by accessing the NDGD, an ftp directory listed in a previous section. Products from this analysis will be displayed on additional web sites. Additional NDFD information is available at the following URL: http://www.nws.noaa.gov/ndfd/index.htm.