The 2012-2013 Hydrometeorology Testbed Numerical Weather Prediction Suite

Ligia Bernardet 1, Steve Albers 2, Linda Wharton 3, Isidora Jankov 4, Kirk Holub 5, David Reynolds 6, and Ellen Sukovich 7

1 Cooperative Institute for Research in Environmental Sciences and NOAA/ESRL/Global Systems Division
2 Cooperative Institute for Research in the Atmosphere and NOAA/ESRL/Global Systems Division
3 NOAA/ESRL/Global Systems Division
4 NOAA/ESRL/Physical Sciences Division
5 Cooperative Institute for Research in Environmental Sciences and NOAA/ESRL/Physical Sciences Division

INTRODUCTION

The Hydrometeorology Testbed (HMT) aims at improving the understanding and forecasting of extreme precipitation events. HMT-West has two NWP components in the winter 2012-3013 (high-resolution deterministic and North American ensemble) using WRF-ARW with RRTM shortwave and Dudhia longwave radiation, and thermal diffusion land surface scheme. These experimental models are used to test new techniques in NWP for future transition to operations.

HIGH-RESOLUTION DETERMINISTIC

MODEL CONFIGURATION

- 3-km grid spacing over west coast
- Forecast length 12 h
- Initialization: NAM + Local Analysis and Prediction System
- Boundary Conditions: NAM
- Microphysics: Thompson scheme

Five-hour forecast of composite radar reflectivity (dBZ) for model run initialized on March 19, 08 UTC

The primary application for this component is providing input for the HMT Flux Tool.

LAPS – LOCAL ANALYSIS AND PREDICTION SYSTEM

- Blends a variety of in-situ and remotely sensed data
- Has hot start capability to add clouds and vertical motion at initial time
- Has 150 users worldwide
- Can be used in traditional (Barnes) or multi-scale variational option

ExREF – Experimental Regional Ensemble System

Surface temperature, dewpoint, and winds analysis and 4-8-h forecasts (mean and members)

The ensemble uses a variety of initial and boundary conditions to represent uncertainty in the large scale fields. Microphysics diversity is also used as QPF is very sensitive to this parameterization.

North American average of T_sfc forecast and RMSE for run initialized 3/21, 18 UTC. Observed T in green.

MODEL CONFIGURATION

- 9-km grid spacing over North America
- Forecast length 84 h
- Initialization: GFS and LAPS
- Boundary Conditions: GEFS
- Microphysics: Thompson, Ferrier, WSM6

The ensemble mean is sent to NOAA WPC where it will be used for the Flash Flood experiment. A subset of the mean is sent using the Local Data Manager (LDM) protocol to the NWS Western Region HQ, and distributed to field offices for use in the Graphic Forecast Editor.

GOING FORWARD

Initial conditions will be enhanced with the use of dynamic downscaling, a technique to combine the uncertainty represented by the difference between members of the GFS ensemble with local data assimilation.

These innovations will be tested by the Developmental Testbed Center for possible transition to the operational Short Range Ensemble Forecasting (SREF) system.

Contact: ligia.bernardet@noaa.gov
http://hmt.noaa.gov or http://laps.noaa.gov/hmt/hmt.html