J2.3 THE NUMERICAL WEATHER PREDICTION PROFESSIONAL DEVELOPMENT SERIES (NWP PDS)

William R. Bua, UCAR/COMET, Camp Springs, MD 20746. and Stephen D. Jascourt

1. INTRODUCTION

The NWP PDS has been available to meteorologists both inside and outside the National Weather Service (NWS) since December 2000. As implemented, the NWP PDS has three components or Professional Competency Units (PCUs):

1. Understanding NWP Models and Their Processes
2. Understanding Current Characteristics of Operational NWP Models
3. Applications of NWP Concepts

The first PCU covers basic concepts of modeling dynamical and physical processes in NWP, while the second PCU discusses how these concepts are implemented in currently available NWP models used in operational forecasting. The final PCU helps the operational forecaster apply their NWP knowledge through specific case examples.

2. TRAINING DEVELOPMENTS SINCE 2001

2.1 *Web redesign*

Since its initial publishing, the NWP PDS has undergone changes in web design and additions in content. A redesign was completed in 2003 which placed access to all MetEd NWP resources on one webpage by topic (including NWP), community (e.g. Warning Coordination Meteorologists, Science Operations Officers, MeteoForum, and so on), resources, courses, and cases.

From the MetEd home page, we can click on the NWP topic and get to the MetEd web page on NWP/Modeling. A screen capture of the top-most section of the Modeling web page is shown in Figure 1 below.

2.2 *MetEd NWP web page content*

The left-hand frame in the NWP webpage provides links to "Special Interest" items, and is updated as new and relevant training is developed. On 5 July 2005, this

Figure 1. The Web-based interface on the MetEd Website (http://meted.ucar.edu/topics_nwp.php) for access to NWP training, as of 5 July 2005.

included Ensemble Forecasting, the Downscaled GFS Extension (DGEX), material on convection (a warm season concern), the NWP newsgroups, our NWP Distance Learning Course, and COMET Outreach funded by the NWS.

The right-hand frame has clickable links to Modules, Case Studies, and Ready-made Lecture Materials. As NWP content is added to COMET training, the links are updated and a special announcement is made via e-mail to the meteorological community.

2.2.1 Modules

Modules are fairly lengthy training in various media formats, including Webcasts from workshops and other presentations, multiple linked webpages on the same topic, recorded teletraining, and so on. A level of difficulty is assigned to each module, ranging from level 0 (non-meteorologist) to 3 (advanced). Underlined items are linkable via the Internet.

* *Corresponding author address:* William Bua, UCAR/COMET, NCEP/EMC/GMB, 5200 Auth Road, Room 202, Camp Springs, MD 20746; e-mail: Bill.Bua@noaa.gov

On 5 July 2005, module topics range from regional forecast challenges of using NWP models (e.g. Challenges of Forecasting in the West), through use of new NWP forecast tools (e.g. Ensemble Forecasting Explained), to discussion of specific weather phenomena (e.g. Forecasting Dust Storms). Note that the Ensemble Forecast training will be discussed in more detail in another extended abstract in this conference session (See references below.).

One of the most used module links is the Operational Model Matrix: Characteristics of Operational NWP Models. A screen capture of part of the web interface for this module is shown in Figure 2.

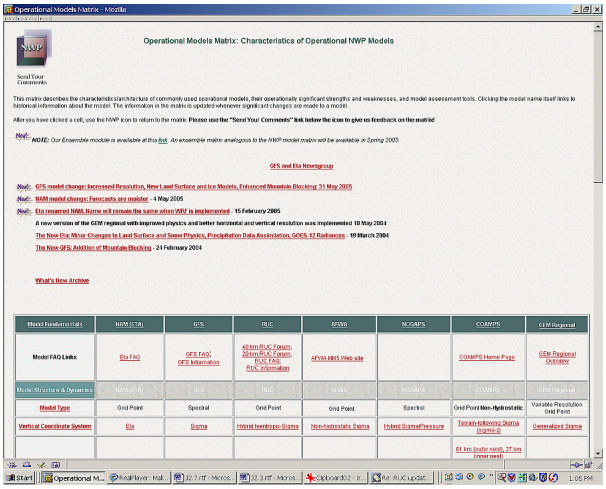

Figure 2. The Operational Model Matrix Module, including links to information for NCEP and other operational models.

Included in the web page are so-called "New Splashes", where announcements of updated matrix (and sometimes other) content related to NWP models are made as they are published. Links as of 5 July 2005 include one to the Ensemble module, the GFS and North American Mesoscale (NAM) Eta Newsgroups, the most recent model implementations of the GFS and the NAM-Eta, and a "What's New Archive" for past "New Splashes".

The matrix itself includes content for the dynamical formulations, physical parameterizations, and post-processed products for the NCEP operational model suite (GFS, NAM/Eta, RUC), the U.S. Navy NOGAPS and COAMPS models, the Air Force AWFA model, and the Meteorological Services of Canada (MSC) regional version of the Global Environmental Model (GEM). If a forecaster needs a refresher on how NWP models are formulated, the left-most column provides links to this material by topic (including Model Fundamentals, Model Structure and Dynamics, Model Physics: Precipitation and Cloud, and Model Physics: Radiative Processing).

2.2.2 *Case Studies*

The next section, "Case Studies", presents two general case category links. One goes to the COMET Web-Based Case Study Library, which is a collection of meteorological data for specific weather events. These include radar, satellite, NWP, text, and upper air/profiler data. The second link is called NWP Case Studies: Applications of NWP Concepts. This second set of cases is prepared by the COMET NWP team. Some of these cases are developed as a result of requests from field meteorologists, while others are at the initiative of the NWP team.

One of the cases developed as a result of questions from the field was on the effect of snow depth errors on forecasts of 2 meter temperatures. The web interface for this case is shown below as Figure 3.

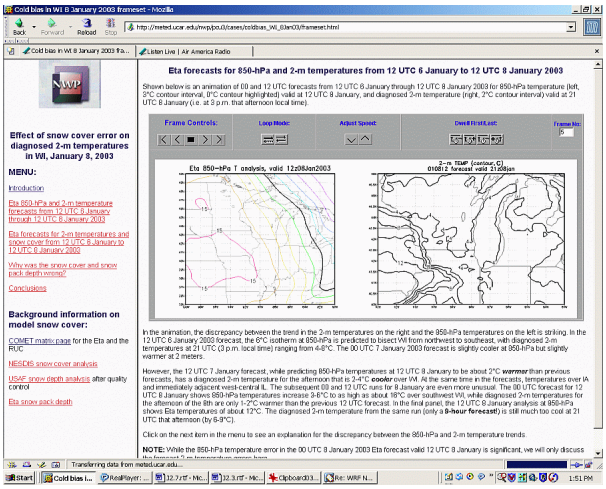

Figure 3. Representative interface for a case study from the NWP PDS.

On the left is a menu by page which allows for easy navigation. The menu usually includes an introduction, presentation of model data, how the data verified, and a discussion and conclusions, including lessons learned about the NWP model discussed in the case. Case content linked through the menu appears in the right hand frame as links on the left are clicked.

2.2.3 *Ready-Made Lecture Materials*

Ready-made lecture materials are found at the bottom of the right-hand frame of MetEd NWP web site. As of 5 July 2005, these included PowerPoint versions of COMET's Winter Weather Refresher, Convective Weather Refresher (plus speaker notes), and the VISITView version of the teletraining on the Downscaled GFS with Eta Extension (DGEX). These materials are updated as needed, as the operational NWP models and their post-processed forecast products are upgraded.

3. FUTURE PLANS FOR THE NWP PDS

By the end of this fiscal year (September 2005), a one-stop web page for links to training and other information on Ensemble Forecasting will be published. Because the NWP effort includes **all** NWP aspects of forecasting, including offshore marine forecasts, an additional one-stop matrix will be published on Marine Wave Models. Announcements will be made as the training materials are published. Some preliminary cases may be developed for the pending implementation of the NAM-WRF, based on how soon a working NAM-WRF starts running in parallel to the NAM-Eta.

During the 2005-2006 fiscal year beginning 1 October, a major focus of the NWP team will be training on the Weather Research and Forecast (WRF) model as it will be implemented by the NWS/National Centers for Environmental Prediction (NCEP) Environmental Modeling Center (EMC) as its North American Mesoscale (NAM) model. This focus will span the full range of the NWP PDS. COMET will expand on existing information on non-hydrostatic models (as part of PCU1), add a column to the (PCU2) Operational Model Matrix for the NCEP version of the WRF model, and develop case studies (PCU3) specifically comparing the NCEP WRF to the NAM-Eta. Teletraining and workshop presentations on the NAM-WRF will greatly augment the web-based training. Additionally, teletraining on the Short- and Medium-Range Ensemble Forecast systems at NCEP (SREF and MREF, respectively) will be prepared and delivered as part of NWP PDS training.

4. CONCLUSIONS

Since its initial publication in 2000, much has been added to COMET material devoted to the NWP PDS. These additions include web pages, webcasts, teletraining, PowerPoint presentations, and other training media on existing and new NWP forecast modeling tools such as Ensemble Prediction Systems. For easy reference, a home page has been developed for all NWP training, which can be found at:

http://meted.ucar.edu

and then clicking on the NWP (Modeling) menu item on the left-hand side of the web page.

5. ACKNOWLEDGEMENTS

This paper is funded by cooperative agreement #NA17WD2383 from the National Oceanic and Atmospheric Administration (NOAA). The views expressed herein are those of the authors and do not necessarily reflect the views of NOAA or any of its sub-agencies.

References

Bua, William, 2005: COMET ensemble prediction training. Preprints, *21st Conference on Weather Analysis and Forecasting/17th Conference on Numerical Weather Prediction.* Washington, DC, Amer. Meteor. Soc., in print.

Jascourt, Stephen D., 2005: Forecaster training on the NCEP North American Mesoscale (NAM) Weather Research and Forecasting (WRF) model. Preprints, *21st Conference on Weather Analysis and Forecasting/17th Conference on Numerical Weather Prediction.* Washington, DC, Amer. Meteor. Soc., in print.

University Corporation for Atmospheric Research/Cooperative Program for Meteorological Education and Training, cited 2005: MetEd Numerical Weather Prediction (Modeling). Available on the internet at: http://meted.ucar.edu/topics_nwp.php