Office of Hydrologic Development
Hydrologic Software Engineering Branch
Quarterly Activity Newsletter
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Software for NWS Hydrology!

Chief, HSEB, Jon Roe
Project Area Leaders: Lee Cajina, Larry Cedrone, Chris Dietz, Mark Fresch, Joe Gofus

1.   HIGHLIGHTS OF January, February and March, 2010

AWIPS baseline software development efforts were minimal again for this quarter. For OB9.2, we supported the testing of significant changes to the MPE/Daily QC which were made available to River Forecast Centers (RFCs) through an AWIPS Test Authorization Note (ATAN) and will be part of the OB9.2 baseline. The changes include enabling ingest from NSSL's experimental system, the National Mosaic and Multi-sensor Quantitative Precipitation Estimation (NMQ), and adding functionality to provide gridded forcings to the Community Hydrologic Prediction System (CHPS).

Almost all of our AWIPS activities continue to be providing considerable support to the AWIPS II (a.k.a. AWIPS migration) evaluation. We have continued to install the latest contractor (Task Order 11) software releases and evaluate each release as it is available.

For Next Generation Radar (NEXRAD), our main task continues to be testing the dual polarization (or dual pol) Quantitative Precipitation Estimation (QPE) algorithm and products operational software. The dual pol enhancement is targeted for Build 12.1 which is due to begin Beta Testing in November 2010 and deployment in March 2011.

The CHPS Acceleration Team (CAT) RFCs continued to practice running their forecasting operations using CHPS. Meanwhile the CAT-II RFCs (remaining 9) received their first formal CHPS training at the NWSTC in Kansas City, MO.

In the CHPS Forcings area, we released a set of enhancements to MPE/DailyQC to RFCs under ATAN 1005. These enhancements had been identified by the CAT RFCs as necessary to support gridded inputs for CHPS.

2.   NEXRAD SOFTWARE DEVELOPMENT

NEXRAD release Build 12 is under System Test with deployment scheduled for August 2010. The major changes with this build include extending the 8-bit super-res velocity and storm relative velocity products to a range of 300 km and providing a new scanning strategy called the Automated Volume Scan Evaluation and Termination (AVSET) which provides faster volume

scan updates for all volume coverage patterns. For more information on AVSET, see http://www.roc.noaa.gov/WSR88D/PublicDocs/NewTechnology/AVSET_FAQs030910.pdf. For this build, HSEB fixed a task fault in the Precipitation Preprocessing Subsystem (PPS).

2.1   Dual Polarization

HSEB continues testing the software for the dual pol QPE algorithm and products which they delivered to the ROC. In addition, HSEB continues helping ROC, WDTB, and OST assess the quality of the data output by the test-bed radar (KOUN) that has been upgraded with dual pol by the contractor, Level III communications. We are also preparing to do quantitative evaluation of the dual pol QPE algorithm which will start after the quality of the dual pol base data is acceptable. At this point, the data quality of the dual pol test-bed radar is getting close to acceptable.

For the dual pol enhancement, the Radar Product Generator (RPG) software, including new algorithms and products, were implemented by the ROC, OST, and OHD. The Radar Data Acquisition (RDA) software and hardware changes for the dual polarization enhancement are being done by a contractor, Level III Communications.

3.   AWIPS RELEASE OB9

The deployment of OB9.2 release, which contained fixes for several bugs and the MPE/Daily QC changes for NMQ and CHPS, was completed.

3.1   WHFS Improvements

Information on the WHFS, data ingest, and precipitation processing (e.g., MPE) applications are accessible on the NWS Office of Climate, Water and Weather Services Hydrologic Services Division (OCWWS/HSD) support web page at: https://ocwws.weather.gov/intranet/whfs/.

No significant work has been done on WHFS in the last quarter.

3.2   Precipitation Processing Improvements

Significant changes made to MPE/DailyQC were included in AWIPS Release OB9.2 which was deployed to all sites during this period.   Additional MPE/Daily QC changes related to CHPS are described in the CHPS Forcings section.

3.3   Field Tests

The following evaluations at certain offices are ongoing:

- CAT and CAT II RFCs are using a post-OB9.2 version of MPE/DailyQC to provide gridded forcings for CHPS.

4. DEVELOPMENT SUPPORT ACTIVITIES

4.1 New RFC Software Architecture: CHPS

Visit the CHPS web site at http://www.nws.noaa.gov/ohd/hrl/chps/index.html to review the history of the project. The "News & Activities" section contains reports from these HSEB quarterly newsletters. The CHPS page can also be accessed from the main OHD page (http://www.nws.noaa.gov/ohd/).

4.1.1 CHPS Implementation

CHPS Acceleration Team (CAT)

The CAT held a workshop in Silver Spring during the week of January 5. With the CAT-II offices just beginning to migrate their operations to CHPS (see below), the primary focus is to ensure Deltares, HSD, and OHD have the necessary resources to support 13 RFCs during the transition.

Forecasters from NWRFC and NERFC conducted further testing of the Interactive Forecast Display (IFD) during Software Acceptance Testing (SAT) in March. This latest version of the CHPS interface provides enhanced performance as well as some greatly anticipated functionality. We did experience some issues concerning consistency of environments between the RFCs, the NHOR, and the test system in Delft; in the coming months we will take steps to configure the NHOR machine in Silver Spring to more accurately reflect one of the CAT RFCs.

During a meeting in March, the CAT agreed to suspend work on the CHPS-based calibration until Deltares has developed enough of an Application Programming Interface (API) that will permit OHD to add user interfaces on top of FEWS without impacting FEWS itself. Deltares took an action to form a small API team, create a plan, and do some development. FEWS already addresses the vast majority of the calibration requirements; OHD is in the process of learning FEWS and identifying the relevant capabilities before defining the remaining requirements.

CHPS Acceleration Team-II (CAT-II)

During January and February 2010 the CAT-II RFCs installed the new CHPS hardware; OCWWS HSD subsequently installed the FEWS infrastructure software.

Then in February Deltares conducted Migration & Configuration Training for CAT-II RFCs at the NWSTC in Kansas City, MO. CAT representatives ("buddies"), OHD, OCWWS HSD, and others also attended the training.

Immediately following Migration training, Deltares and the CAT "buddies" conducted on-site visits for all CAT-II RFCs, during which time Deltares installed the first release of CHPS at those sites.

Despite some seasonal flooding, the CAT-II RFCs are now well on their way to migrating their

NWSRFS systems to CHPS.

A national RFC CHPS workshop is planned for June 2010 in Boulder, CO.

CHPS Software Development

HSEB developers have begun CHPS training with a view to providing operational support when called upon by HSD. Training involves attendance at RFC training classes (as space permits), plus weekly coaching sessions provided by Deltares at OHD.

HSEB developers continue to work on non-model related BOC features. These will be tested and delivered as part of future CHPS builds. They include
1. A utility to automatically convert NWSRFS mods to FEWS xml files through IFP. Currently only the SSARREG, WECHNG and SETQMEAN have been identified as needed for BOC (SSARREG and WECHNG are complete and were tested during the March SAT)
2. Generating headwater flash flood guidance (FFH) and area based flash flood guidance (FFG) in CHPS. This consists of porting the existing NWSRFS algorithms to CHPS and includes generating the SHEF formatted text product for FFH and FFG and the GRIB formatted grid product for FFG.
3. Porting the parts of the Site Specific Hydrologic Predictor (SSHP) that were responsible for extracting data from the NWSRFS data base to extract data from the FEWS database (this project is on hold pending updates to FEWS for accessing data in the FEWS DB by external programs – PI Interface)

CHPS Forcings

Progress towards generating gridded forcings for use in CHPS continued. The list-server has seen increasing use as a medium for discussion between RFCs of the setup and use of MPE/DailyQC.

AWIPS Release OB9.2, which was deployed in this period, contained a number of changes to MPE/DailyQC which were needed to generate grids in netCDF and GRIB1 formats. In March, HSEB distributed some additional enhancements to MPE/DailyQC to all RFCs under ATAN 1005. These enhancements, referred to as 9.c, were changes which the CAT RFCs had identified as critical to allow them to effectively generate gridded input for CHPS operations.

In January, HSEB conducted a second webinar to discuss CHPS Forcings and the use of MPE/DailyQC. Most, if not all, RFCs participated. Subsequently, HSEB worked with the CAT II RFCs and HSD to create and prioritize a list of "showstopper" issues which would need to be addressed before the CAT II RFCs could effectively use MPE/DailyQC to generate gridded input for CHPS operations. HSEB developers are currently addressing those issues. As these showstoppers are addressed, HSEB will work with the RFCs to identify a list of significant enhancements which should be undertaken when the showstoppers have been resolved.

Meanwhile HSEB is also making plans to ensure any enhancements beyond the OB9.2 baseline will be available in the AWIPS II environment as soon as possible after AWIPS II is deployed. The enhancements will be needed to minimize the disruptions to the use of CHPS during the transition from AWIPS to AWIPS II.

4.1.2 Experimental Ensemble Forecast System (XEFS) and Hydrologic Ensemble Forecast Service (HEFS)

The XEFS includes experimental non-baseline versions of new ensemble-related software interfaced to CHPS and FEWS through model adapters. Any new baseline ensemble-related software will become part of the HEFS which is intended to be the operational name to follow XEFS.

XEFS/HEFS components are a new Ensemble Pre-processor (EPP), Ensemble Post-processor (EnsPost), Ensemble Verification System (EVS), and Hydrologic Model Output Statistics (HMOS), and the Graphics Generator. Each of these components are now available to RFCs with CHPS for field testing. In addition, these components will undergo a second phase where the prototype is re-factored into baseline CHPS software.

The Graphics Generator is a Graphical User Interface (GUI) where users can change the look of graphics or displays and an engine to create special graphics not available through the standard CHPS GUI, the IFD. During the past quarter, the Graphics Generator completed Phase 1, which includes the same functionality of the existing Ensemble Streamflow Prediction Analysis and Display Program (ESPADP). Over the next few months, we will modify the Graphics Generator to incorporate feedback from the RFCs. For Phase 2 of the Graphics Generator, the functionality will be extended to deterministic and spatial displays. For Phase 3, our current plan is to make the Graphics Generator functionality available to external users.

To help make XEFS easier to use and move toward operations, OHD will be setting up a web page to provide the XEFS software (models and adapters) and documentation (installation and configuration notes and users guides).

4.2 AWIPS II

During this period, HSEB personnel continued to support the testing of the interim releases of AWIPS II software provided by Raytheon. As most of you are aware, Raytheon is still making changes to the AWIPS II software to address missing functionality and serious problems which must be fixed prior to the start of the System Operational Test and Evaluation, which is currently scheduled to begin no earlier than May 5.

HSEB developers have begun examining the AWIPS II source code in anticipation of beginning to develop enhancements which will be delivered in the AWIPS II environment. The first enhancements of this type are planned to be those needed to support the hydrometeorological forcings for CHPS.

5.   HYDROMETEOROLOGICAL AUTOMATED DATA SYSTEM (HADS)

Visit our web page at: http://www.nws.noaa.gov/ohd/hads/

5.1   HADS Systems and Software

An extremely tranquil period for HADS operational software, no changes / modifications have been made during the past several months.

The HADS web presence was recently expanded to include presentations of data platform locations via Google Map displays. The reporting locations are displayed on a state-by-state basis with Icons depicting the locations and a right-side frame alphabetically listing the locations names and their associated NWSLI. Clicking on the location name will cause an information window to appear on the map above the data point. From the information window, a user will then be linked to the site's metadata records and then to the site's observational data.   The pages are automatically updated on an hourly basis, at H+40.

5.2   HADS Data Network

As of April 1st, there were 14,167 data locations defined for HADS processing, an increase of 57 reporting locations since January 1$^{st.}$ The number of data values delivered to NWS operations is averaging 2.68 million each day, an increase of approximately 70,000 daily values since January 1st. This significant increase is attributed to the fact that many dcps were inoperative during the winter months and recent maintenance to these sites has brought them back on-line.