

Office of Hydrologic Development Hydrologic Software Engineering Branch Quarterly Activity Newsletter July 2010

Software for NWS Hydrology!

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1. HIGHLIGHTS OF April, May, June 2010

AWIPS baseline software development efforts were minimal again for this quarter.

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. Software releases are now focused less on new features and more on correcting existing capabilities and tuning the performance. Meanwhile the CAT-II RFCs (remaining 9) are well on their way to migrating their configurations from NWSRFS to CHPS; in June they also received CHPS System Manager's training at the CNRFC in Sacramento, CA.

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

Finally, Joe Gofus, with OHD since 1999, retired from Federal Service on July 3, 2010. Joe made many significant contributions to successes with the NWS Hydrology Program over the years. Most recently, he managed the beginning of the migration of NWSRFS software models to CHPS and then moved over to manage OHD's participation in AWIPS II as well as the MPE/Daily QC modifications necessary for the RFCs to move to CHPS. HSEB will greatly miss Joe's steady hand and insightful analyses. We will start to look for a replacement HSEB PAL in the third quarter of FY 2010.

2. NEXRAD SOFTWARE DEVELOPMENT

NEXRAD Build 12.1 beta testing starts in early July 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. In addition, a new scanning strategy called the Automated Volume Scan Evaluation and Termination (AVSET) will be available for field testing at ten pre-selected operational WSR-88D sites. AVSET 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 rarely occurring 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 we delivered to the ROC. The RPG dual pol build (12.1) is now in System Test. 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 have also started a quantitative evaluation of the dual pol QPE algorithm at KOUN.

For the dual pol enhancement, the 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

During this period several catastrophic releases (OB9.2.x) of the AWIPS software were deployed. While some of the fixes affected hydro software, HSEB acted as a consultant rather than directly contributing to the software changes.

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

The changes made to the MPE/Daily QC application 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 four CAT RFCs continue to prepare for operational implementation of CHPS at their offices, with most of their staff using CHPS on a daily basis in “shadow” mode (no operational products are issued by CHPS). Although the original schedule called for these RFCs to “Go Live” with CHPS in approximately April 2010, some technical issues over the past winter, such as missing or incomplete functionality and sluggish system performance, have prevented them from switching to CHPS as the primary system in operations. With the completion of an Advanced Configuration Training class in June at NWRFC in Portland, OR the CATs have now received all formal training from Deltares under the CHPS Implementation contract. Any further training needs for the CAT will be assessed and handled via other mechanisms.

After the March Software Acceptance Testing (SAT) in Silver Spring, the CAT representatives concluded there was no need to personally attend the SAT scheduled for June. Instead Deltares adjusted the plan to conduct some of the testing in Silver Spring with HSEB staff, followed by field (beta) testing at the CAT RFCs and subsequent distribution to the CAT-II offices. Accordingly, the June release is (as of June 30) being tested by the 4 CAT RFCs, with distribution to the CAT-II expected soon.

During the week of May 10 the CAT held a 3-day workshop at CNRFC in Sacramento, CA. The primary focus has now shifted away from CHPS software functional requirements to operational support. The threat of inadequate support coverage is now a show-stopper for the CAT RFCs. In response to their concerns HSEB has directed all 12 CHPS software developers to participate in operational support activities. Developers have begun their training via a combination of attendance at available classes, weekly mentoring from Deltares, and experience with real questions and problems posted by the RFCs. Two of HSEB’s developers (Ai Vo and Xuning Tan) attended the Advanced Configuration Training at NWRFC in April. Developers will form support team pairs containing one more knowledgeable individual and one individual with less CHPS experience. Ultimately each developer will be available to provide individual support.

On a related topic, HSD and HSEB are investigating use of an operational help desk/issue tracking tool called FogBugz. (Visit <http://www.fogcreek.com/fogbugz/> for more information.) OHD has acquired a trial version for evaluation; a purchase is expected in July. This tool, with access provided to each RFC, will significantly enhance issue tracking on the CHPS project; the current practice of using a spreadsheet in conjunction with a list server is not sustainable in the long term.

CHPS Acceleration Team-II (CAT-II)

In May Deltares delivered to the CAT-II RFCs a System Manager's Training class, which was the second of their full suite of CHPS classes. It was held at CNRFC in Sacramento, CA during the week of May 24. Originally scheduled for April, the class was postponed until May due to ash clouds from the eruption of an Icelandic volcano, grounding flights from the Netherlands. The CAT "buddy" RFCs also attended the training to provide additional support for the CAT-II.

Seasonal flooding in some areas has delayed CHPS migration activities, but in general the CAT-II RFCs continue to migrate their NWSRFS systems to CHPS. Unlike the CAT RFCs, the CAT-IIs are not working with as rapidly evolving a software suite and are able to migrate at a faster pace. Some CAT-II RFCs report being ready to go operational before next winter but - as planned - the CHPS software does not yet contain the full set of BOC-II capabilities.

A national RFC CHPS workshop was held during the week of June 21 at the UCAR facility in Boulder, CO. This provided an opportunity for the CATs to give a detailed view of their CHPS activities along with some planning advice for the CAT-II RFCs; the CATs laid out a tentative timeline to get all CAT-IIs to CHPS operations by April 2011. Going operational with CHPS will, however, be a local decision made by each RFC. Securing adequately experienced HSD and HSEB resources to support all 13 RFCs using CHPS operationally is now on the critical path for completion of the project.

CHPS Community

The subject of community is beginning to play an important role as the NWS gets closer to implementing CHPS. HSEB has begun discussions with the Bonneville Power Administration (BPA) in Portland, OR, which has plans to implement CHPS over the next several years. With common interests and a shared desire to leverage capabilities developed by or for either federal entity, HSEB and BPA are discussing ways to share CHPS-based tools and information and pilot some mechanisms. We have begun monthly conference calls.

CHPS Software Development

HSEB developers continue to work on non-model related BOC features.

1. 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 products for FFH and FFG and the GRIB formatted grid product for FFG.
2. Porting the parts of the Site Specific Hydrologic Predictor (SSHP) that are

responsible for extracting data from the RFS data base for transmission to the WFOs and eventual use by SSHP. Note: the program used today extracts data from NWSRFS FS5FILES, but the future program will extract the data from the FEWS DB.

3. Improve the performance of ESP runs (by using multi-threaded FEWS option).

A beta version of FFH was packaged with the June CHPS release. This version did not have a way to automatically migrate an FFH configuration in NWSRFS to CHPS. This functionality along with same capabilities for area based flash flood guidance is scheduled to be a part of the September CHPS release. With the September release the following FFG related capabilities will be available:

- The ability to use the existing FFH algorithms along with functionality for creating the FFH SHEF-encoded text product
- The ability to use the existing gridded FFG (i.e., the legacy version of FFG available in NWSRFS; gridded in that the result is a grid of FFG values) along with the functionality for creating the FFG SHEF-encoded text and grib* products
- An automated way of going from NWSRFS FFG configurations (FFH and GriddedFFG) to FEWS configurations

* This grib file is currently produced using PRODGEN and is the underlying source of data for viewing FFG in D2D and producing area averaged FFG by the WFO GAFF application.

The SSHP data extraction utility is targeted for the winter 2010/2011 release and the ability to use multi-threaded ESP runs will be released as soon as possible.

Finally, HSEB developers have started fielding CHPS support issues. Our developers are delving into all areas of CHPS for the purpose of training and improving CHPS support. We've set up an internal buddy system where a pair of developers works on issues originally posted to the chps_ops infolist and then passed on to HSEB from HSD.

CHPS Forcings

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

HSEB continued to work on the list of "show-stopper" issues which need to be addressed before the CAT-II RFCs can effectively use MPE/DailyQC to generate gridded input for CHPS operations. During this period, developers made changes to deal with roughly half of the show-stopper issues and these changes will be released to all the RFCs in early July. Work continues on several of the remaining issues.

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 need to be re-implemented in the AWIPS II environment (since Raytheon has rewritten MPE/DailyQC for AWIPS II) 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), Hydrologic Model Output Statistics (HMOS) tool, and the Graphics Generator. Each of these components is now available to RFCs with CHPS for field testing. Over the next several weeks, we'll be making changes which make XEFS installation and configuration easier. 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 forecaster GUI, the IFD. A few months ago, we started modifying the Graphics Generator to incorporate feedback from the RFCs, and we are making changes to make the Graphics Generator easier to use. Over the next few months, we will work with Forecast Decision Training Branch to develop Graphics Generator training. 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 Field Operational Test and Evaluation (OT&E). Under the latest plans, the hydro software is not expected to be completely delivered for testing until late in 2010. However, OHD has been working with OST to advance the completion of some of this software (especially MPE/DailyQC) to allow us to have more time with it prior to the beginning of the Field OT&E, which is currently slated to begin in February, 2011.

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

No changes have been implemented to HADS realtime data processing software. However, during the past several months, HADS computing platforms have been upgraded to the Red Hat Enterprise v 5.5 operating system and PostgreSQL version 8.1.2. One of the two systems that perform raw data acquisition via the DOMSAT satellite feed underwent a Red Hat OS upgrade, in addition to an upgrade to the Local Readout Ground Station (LRGS) application software. One system still requires these upgrades and it will be accomplished by the end of July.

The HADS web environment was expanded to include presentations of data point locations via Google Maps. The Google application was also implemented to display the locations of ‘New DCPS’ – these are locations of GOES transmitters ‘recently’ activated by a GOES operator.

Regarding ‘New DCPS’ –

<http://www.weather.gov/ohd/hads/newdcp.html> /
http://amazon.nws.noaa.gov/hads/gmap/NewDCPS_gmap.html

- on a daily basis, during the past several months, an average of 490 sites have been on this list. We need the assistance of our field office users to advise if these data locations should be added to HADS processing or be removed from this list since their location(s) or data sensors are not required for NWS operations.

5.2 HADS Data Network

As of July 1, there were 14,275 data locations defined for HADS processing, an increase of 108 reporting locations since April 1.

Due to system issues at the NESDIS Data Collection System (DCS), most updates of platform metadata details are not becoming available in a timely manner. While evaluating the details for a number of existing locations it was discovered that the latitude/longitude values in the DCS were different than those on the agency’s web pages and therefore incorrect in HADS. So, during that past several weeks, the HADS team has been checking the validity of latitude/longitude values for all defined USGS GOES locations. Many differences were discovered between USGS NWIS and HADS – as a result the HADS data were changed to match those of the USGS.

The number of locations that uplink data on an hourly cycle continues to grow as the GOES DCS steadily moves toward the operational environment in which all data platforms must employ

High Data Rate (HDR) transmitters. The vast majority of the HDR sites now uplink their messages on a 60-minute cycle while a small subset of HDR units are reporting every 30 minutes. There are now 12,041 platforms processed by HADS that transmit on the hourly cycle and 17 sites that are providing new observations every 30 minutes.