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

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1 HIGHLIGHTS FOR JANUARY, FEBRUARY, AND MARCH, 2006

Besides support activities for OB5 and OB6.0 sites, recent efforts are focused on delivery of OB7.1 software, development of OB7.2 software, and planning for OB8.x releases. As per AWIPS direction, Release OB7 was split into two distinct releases: OB7.1 and OB7.2. with the OB7.1 release focused on the upgrade to the Redhat operating system, the gcc compiler, and a partial decommissioning of the AWIPS data servers. For RFC-software, no new functionality was introduced in OB7.1. For the OHD Common Software, which includes the Data Ingest, WHFS, and Precipitation Processing components, modest enhancements were introduced. Most application changes originally scheduled for "OB7" will be delivered in OB7.2.

As reported in a page available via: https://www.ops1.nws.noaa.gov/Secure/awips_softwre.htm the OB6 installations are well underway. The OB7.1 installations are scheduled to begin in July 2006, with OB7.2 scheduled for December 2006. OB7.2 development includes the following major tasks: implementation of the Distributed Hydrologic Modeling capability, conversion of the RFC Archive database from Informix to PostgreSQL, upgrades to the Multi-Sensor Precipitation Estimator (MPE) suite of applications, and an enhancement of the HydroView station data display capabilities.

One OB6 interim release for NWSRFS was issued in January. Meanwhile the NWSRFS developers focused on design and development of our OB7 projects within the context of a new AWIPS software development process. Some CHPS-related tasks made progress this quarter.

The new AWIPS contract is introducing significant change to the AWIPS development, deliverable, and installation strategies. The new AWIPS planning paradigm schedules three releases a year, four months apart, beginning with OB8.1, OB8.2, OB8.3 Each of these releases are considered "equal" in stature. The delivery of functionality among the three releases will depend on resource allocations, not on any plan to make OB8.1 the major release, and make OB8.2 or OB8.3 be secondary maintenance releases, for example.

The NEXRAD RPG Build 9 work (RPG refresh - migrating the RPG hardware and software from a Sun Solaris platform to a PC Linux environment) was completed and delivered to the

Radar Operations Center (ROC) in Norman, Oklahoma at the end of January. Build 9 is scheduled for operational deployment in early 2007. Meanwhile, efforts in support of Terminal Doppler Weather Radar (TDWR)-based precipitation products (target SPG Build to be determined), and Dual Polarization (target Build 11, deployment expected late 2008) continued this quarter.

On the HSEB Government personnel front we made some progress this quarter on filling our vacancies. We are pleased to announce that Mark Fresch of the NWS Radar Operations Center in Norman, Oklahoma has joined the HSEB as a GS-14 Project Area Leader, in the position vacated by Edwin Welles. Also, we are currently working on filling the GS-13 vacancy left by the retirement of Scott VanDemark and the GS-13 vacancy created by the April 1 retirement of David Street. We wish Dave well and thank him for his 35 years of government service. During the first quarter of 2006 we also added a new OHD Web Master, Ms. Ruiming Chen, an RSIS, Inc. contract employee.

2. NEXRAD SOFTWARE DEVELOPMENT

Visit our web page: http://www.nws.noaa.gov/oh/hrl/hseb/nexrad.htm.

Level III radar precipitation product specifications for the RPG are available on OHD's website: http://hsp.nws.noaa.gov/oh/hrl/wsr88d_prods/index.htm.

2.1 RPG BUILD 9

The NEXRAD team completed all work for Build 9 and conducted a successful Integration Readiness Review (IRR) on Jan 25. We also successfully passed HOSIP Gate 4 and delivered the source code to the ROC on time at the end of January. Build 9 software will be deployed with new RPG hardware beginning late spring 2007.

Also included in our delivery were several minor bug fixes:

NA05-28503 Byte-packing problem with DSP
NA05-14301 Remove diagnostic messages
NA05-20605 Precip Product unit labeling errors
NA06-01803 Rate table array in Rate/Accumulation algorithm too small

2.2 OTHER NEXRAD DEVELOPMENT NEWS

2.2.1 TDWR PPS

As our RPG Build 9 work came to a close, the team began an approximately 6-month task to develop some sample precipitation radar products based on TDWR data. The current Precipitation Processing System (PPS) of the RPG will be adapted to process TDWR data on the

Supplemental Products Generator (SPG), and generate two Hybrid Scan products for further evaluation. The products will not be viewable on AWIPS until OHD, OCWWS, and field staff can assess these sample products to determine potential operational benefits. This task is currently managed within HOSIP and is funded from the NEXRAD Product Improvement (NPI) budget. The requirement for TDWR-based products was ranked as being very high last summer by regional representatives to the OS&T-led Radar Capability Enhancement Priorities working group.

This HOSIP managed project is awaiting Gate 1 processing. OS&T is managing the overall TDWR effort as OSIP project 05-066.

2.2.2 Dual Polarization

The Dual Polarization project is tracked via the NWS OSIP as project 05-023 (https://osip.nws.noaa.gov/osip/index.php).

The HSEB NEXRAD project team continued to support the Dual Polarization project through regular meetings organized by the OSIP Integrated Work Team (IWT) Leader (Roger Hall, OS&T/PPD). The project is now in Stage 3 with an expected Gate 3 in June or July.

This project is the NEXRAD team's highest priority, but it still has a way to go before being ready for final implementation. We expect to increase our levels of activity as the spring and summer progress.

A Dual Polarization Software Design Working Group formed by HSEB at the end of December has been meeting via Video Teleconference (VTC) on a monthly basis. The primary goal of the group is to share knowledge among all collaborators (OHD, OOS/ROC, NSSL, OS&T, and the FAA) and define schedules that will assure transition of NSSL's Dual Polarization software algorithms into the operational baseline in time for Build 11.

In coordination with the ROC, NSSL has begun a Product Development project, whose objective is to make recommendations on the operational polarimetric product suite and formats to implement and use, based on input from operational users and trainers. The project is expected to run through the summer of 2006.

3. AWIPS RELEASE OB6

AWIPS software development in HSEB is currently divided into two general categories: NWS River Forecast System (RFS) software, and the OHD Common software, which includes the WFO Hydrologic Forecast System (WHFS), the Precipitation Processing software, and the Data Ingest Software. Web pages are available that provide support information for both these categories, each site relates to multiple AWIPS builds for the software category.

Refer to the OCWWS/HSD web pages for release notes and other relevant documentation:
-- for RFS Support: http://www.nws.noaa.gov/os/water/RFC_support/index.shtml.

-- for OHD Common Support: http://www.nws.noaa.gov/om/whfs/

The primary purpose of the OB6 build was to port our applications to the PostgreSQL database and to the new RHEL 3 operating system. OB6.0 is currently deployed at approximately 75 locations..

The Red Hat Enterprise Linux Workstation Basic Version 3 Update 4 (RHEL3u4) is the operating system for AWIPS Release OB6 for all systems except the RAX, which stays at Red Hat 7.2. The OB6 install is performed in three phases. The first phase is the PowerVault relocation, the second phase is the upgrade to RHEL 3u4, and the third phase is the conventional installation of OB6.

3.1 NWSRFS

We issued one interim release (for ESPADP) for the OB6-R27 software during this period due to the discovery of a problem during AWIPS beta testing of OB6 at NWRFC. The problem caused connections to the PostgreSQL database to be left open while ESPADP was running which eventually created a situation in which no other applications could access the database until ESPADP completed. We will continue to provide support to the RFC Support team as additional RFCs install this version of software.

3.2 WHFS/IHFS DATABASE

The bulk of the OB6 work consisted of the transition of the OHD HSEB software from using an Informix DBMS on HP-UX servers to using a PostgreSQL DBMS on Linux workstations. This change affected both the IHFS database and the DamCREST database.

Besides the PostgreSQL conversion, a few features are new to OB6 and include the ability to view locally-generated MPE hourly grids in D2D; to include flow-based impacts in RiverPro; to assign proper durations to AWOS METAR precipitation data that have unique sensor reset times; to better control duplicate data SHEFdecoder posting; and to display Contingency data in TimeSeries.

The HydroGen (Hydrograph Generator) function, which replaces the RivDat local application, is being provided as part of the national AWIPS baseline in OB6. At WFOs, this software extracts the pertinent data from the IHFS Database and transfers it to the regional web server, where complementary software creates the time-series and other web-ready files for display via the Rivers tab in the www.weather.gov web page.

An Operational Test and Evaluation of the RiverPro VTEC features is currently scheduled for May 2006., using the OB6 software. Release OB6 of RiverPro includes additional changes to match the latest NWS 10-1703 and NWS 10-922 directives. One change affects WFOs negatively if VTEC is not enabled. The OB6 version of RiverPro assumed that VTEC would be mandated and uses a new method to determine which forecast points to include and which

product category to generate. This new method is based on the assumption that VTEC events are being issued. Without previous products with VTEC event issuances, the new method cannot determine when an FLS product should be recommended, so it recommends an FLW if flooding is occurring or forecast, and an RVS otherwise.

OB6 also includes additional RiverPro changes to ensure compatibility with the workstation test mode operations to be introduced in OB6. With this feature, an AWIPS workstation is designated to be in Operational, Test, or Practice mode, and the formatter applications respond accordingly.

Lastly, the WHFS "oper" user cron which, prior to OB6, was implemented on the DS systems, will be re-distributed so that data ingest operations are scheduled on the DX system and data processing operations on the PX. The OB6 Modification Note (Installation Procedure) and System Managers Manual discuss this further.

3.3 PRECIPITATION PROCESSING

A major change in OB6 involved adding the ability to display locally generated MPE output in D2D. To support this, the GRIB product generation code was moved in OB6. Its directory location is controlled via updated national application token values. RFCs should review a new script which supports transmission of the GRIB products, in order to add locally selected destinations such as the NPVU NCEP destination.

An overall summary of the HSEB QPE activities was given as a supplement at the end of the January 1, 2006 newsletter.

A special release, compatible with OB5 and OB6, is available for the PostAnalysis application, which is used for integrating 24-hour precipitation reports with gridded hourly products. After being rendered unusable by core OB5 changes, HSEB completed a rapid-delivery project to update the application to allow its operational use at RFCs. Please contact the RFC Support Team if your RFC is interested in this application.

4. AWIPS RELEASE OB7.1

Release OB7.1 was delivered to the AWIPS contractor in February 2006. It is currently undergoing testing. During the week of April 3, WFO forecasters will be visiting the contractor test facility to evaluate the OB7.1 applications. It is scheduled to begin national deployment in early July 2006.

4.1 NWSRFS

Due to the limited time available after the OB7.1 schedule was announced, no functionality changes or bug fixes were made for the OB7.1 release. NWSRFS in OB7.1 will simply provide

the same functionality as in OB6 in the OB7.1 operating system environment. Note that OB7.1 does include all of the fixes issued as interim releases to the OB6 release.

4.2 OHD COMMON SOFTWARE

In addition to adjusting the software to operate in the operating system environment, some modest enhancements and fixes were introduced in the OB7.1 common software. The noteworthy enhancements include:

- the ability to store and manage low water (i.e. drought) impact statements in the HydroBase application
- the ability to perform alert/alarm against lower limit thresholds, to complement the existing upper limit exceedance thresholds
- the improved ability to specify and manage the display of flow-based flood impact statements in RiverPro, beyond the existing traditional stage-based impacts
- the separation of HydroView /MPE into separate applications – one for HydroView and another for MPE (more MPE discussion is given in the precipitation processing section below)
- assorted minor bug fixes including the restored ability to properly restart the SHEF decoder from the HydroBase application

4.3 PRECIPITATION PROCESSING

In OB7.1, a collection of changes are introduced as part of the general mission to provide an integrated set of QPE tools within the Multi-Sensor Precipitation Estimator (MPE) application. Although the Western Region's Daily QC (DQC) functionality will not be introduced until OB7.2, some enhancements from the Tulsa RFC P3 QPE application are introduced in OB7.1.

The changes include the introduction of three new grid types: a) Triangulated Local Bias Corrected Multi-Sensor Mosaic; b) Radar Average mosaic; c) Radar Maximum Mosaic. A token is used to control which grids are actually generated at a given office. A separate token is used to control which of the radar mosaics is used for the subsequent grids that use a radar mosaic as an input. Either the existing climatologically-based mosaic is used or one of the new average or maximum grids is used. The existing MPE polygon editing tools were extended in OB7.1 to allow the user to apply, save, or delete polygon-based edits. Lastly, the MPE application, which is now separate from the HydroView application, has a split-screen feature to allow side-by-side comparison of grids.

5. AWIPS RELEASE OB7.2

Release OB7.2 is being delivered to the AWIPS contractor in early June 2006. It is scheduled to begin national deployment in December 2006.

5.1 NWSRFS

We are still in the development phase for AWIPS OB7.2. Aside from general bug fixes, items targeted for OB7 include:

5.1.1 VERIFICATION

New functionality will include new graphical displays. The calculation of confidence intervals has been postponed to a later release to allow additional research on the calculations. Testing of the new software is expected to begin shortly.

5.1.2 CONVERSION OF RFC ARCHIVE TO RHEL/POSTGRESQL

The RAX will be converted to RHEL 4 in OB7.2 and the database engine will be converted to PostgreSQL version 7.4.8.

OHD's software (raw shefdecoder, processed shefdecoder, and Verification) has been modified to work with PostgreSQL and is awaiting code review and final testing. The RAXUM-maintained software is in the process of being converted and tested by various members of the RAXUM team (lead: Julie Meyer, MBRFC).

After several discussions with OS&T SEC and Raytheon, it was determined that OHD will be responsible for writing the installation scripts (i.e., the conversion script). We are currently developing a script that will run at all RFCs, based on an early version developed for our local system..

5.1.3 DISTRIBUTED HYDROLOGIC MODELING (DHM)

New distributed hydrologic modeling techniques will be introduced into RFC operations. DHM is being tracked via OSIP as project 04-007 "Operational Implementation of Distributed Hydrologic Modeling". Visit the OSIP website for more information (https://osip.nws.noaa.gov/osip/index.php).

We are on schedule for delivery of the first release of DHM to the AWIPS contractor in early June. Several Services Oriented Architecture (SOA)-like concepts are being built into the software, making this an early CHPS project.

The project leader, Lee Cajina, gave a presentation to the DOH Science Steering Team (DSST) on March 10. There appears to be field concern that DHM is too immature for operational implementation, and that GFE may not be the right solution for a user interface. We expect to present more information regarding operational implementation to the DSST in May.

We are targeting display (but no editing capability) of distributed modeling grids via D-2D in OB7.2. Over the next few months we will be working closely with the field to define the next set of requirements in OB8. At this point it is unclear which organization (GSD or Raytheon) will implement the GFE enhancements for OB8.

5.1.4 HISTORICAL DATA BROWSER (HDB)

In January we conducted a design review for this project. We are on schedule for delivery to the AWIPS contractor in early June.

5.1.5 RIVERS, RESERVOIRS AND SNOW (RRS) PRE-PROCESSOR

Based on a re-assessment of how to get CHPS into operations, HSEB determined in January that the decision to use the RRS Pre-Processor as an example of a functioning CHPS Data Service would provide too little benefit to operations. Rather, our approach now is to focus on building CHPS concepts into high priority projects such as DHM.

This effort remains on hold until HSEB can develop a better road map for building CHPS into real projects, instead of building CHPS components for their own sakes. In April HSEB intends to initiate a project to carefully define the evolution of projects needed to effectively roll out various CHPS capabilities.

5.2 WHFS/IHFS DATABASE

Changes for OB7.2 include the implementation of the “Mapper” station data display function into WHFS, which currently operates as a local application used primarily in the Western Region. It provides a robust method for displaying hydrometeorological data, in many ways similar to the existing WHFS TimeSeries and HydroView station data display control functions. Its benefits are in its more direct methods for displaying desired data sets (i.e., less mouse clicking), its time-stepping features, and its speed of display.

Work is continuing on improved river and event monitoring tools. This includes an automated application for monitoring differences between river forecast and observations to better identify unreliable forecasts such as when QPF forecasts are inaccurate. This monitoring tool would fit within the existing WHFS Alert/Alarm functionality. A complementary interactive monitoring application is also being developed which would monitor not just observed-forecast differences, but observed and forecast values compared against thresholds, the receipt of observed and forecast data, the active state of any ongoing VTEC events, etc. This application is intended to run continuously, with an automated refresh of color coded tabular information to identify alert/alarm conditions.

5.3 PRECIPITATION PROCESSING

Please refer to the January 1, 2006 newsletter supplement for a detailed discussion of the HSEB QPE tasks which are ongoing. Some of this information related to OB7.2 is also mentioned below.

Major design and development work is ongoing for incorporating the Daily QC functions used in the Western Region into MPE operations. The goal is to provide a nationally-supported and baselined application used by all offices to perform QPE operations. A significant set of changes will be provided in the OB7.2 release, with remaining functionality delivered in OB8 releases.

HSEB is also working to coordinate the delivery of RFC-generated QPE products to the SBN for subsequent receipt and use at WFOs. Changes are being coordinated to make these RFC QPE products displayable in D2D at WFOs, to complement the locally generated QPE products which can be displayed in D2D as of OB6.

6. DEVELOPMENT SUPPORT ACTIVITIES

6.1 NEW SOFTWARE ARCHITECTURE

The project to design and develop a Mean Areal Temperature (MAT) CHPS Architecture Shell was submitted to, but failed, HOSIP Gate 2 in January. The purpose of this effort was to develop an architecture shell for a new NWSRFS MAT data pre-processor. However, field representatives at Gate 2 objected to there being no operational value in the project, preferring to see a new algorithm in operations. OHD management agreed, and the project was stopped. The revised approach is to re-direct efforts to the advancement of new MAT science into operations. This will require a re-write of the contract task statement.

The Ensemble Streamflow Prediction (ESP) component of the NWSRFS, originally selected as a pilot project to develop the first CHPS Control Service, is still on hold due to a lack of Government personnel oversight resources and partially because there are technical problems with designing the overall CHPS Control Service too early compared to other services work needed. Efforts here will be re-directed toward creating the comprehensive CHPS projects road map mentioned above.

Phase 2 of the contract task to refine and extend The Hydrology XML Consortium (HydroXC) is right now being completed. Two workshops were held, one in February and one in March. The first workshop presented a real world example of using HydroXC-compliant XML to serve flood inundation data from the FLDWAV model to any application that might map those data. The second workshop consisted of presentations by NWRFC and NCRFC on their uses of XML and their needs as we move toward a third phase of this project. The third phase of work is being defined right now and will concentrate on crafting tools to manipulate HydroXC-compliant files, tools to convert into and out of HydroXC, and creation of commonly agreed upon object templates. The goal of Phase 3 will be to provide tools that can be used by Consortium members

in their operational software as desired. A slightly revised Version 2 of the HydroXC-compliant XML schema definition will be published in early April as a result of the work performed in Phase 2.

The external project to provide RFCs access to the USACE Reservoir Simulation (ResSim) model from NWSRFS continued progress this period. Rob Hartman, HIC at CNRFC, is leading the way in engaging OHD and USACE's Hydrologic Engineering Center (HEC) in a joint project to provide this linkage, funded entirely by the Yuba County California Water Agency (YCWA). All agreements have now been signed, and HSEB is waiting for funding details in order to engage a contractor and begin work. We expect work to begin in early April and USACE-HEC has already begun their tasks.

6.2 UNSCHEDULED AWIPS RELEASE ACTIVITES

In this section we try to capture activities that are occurring that do not necessarily have an AWIPS release identified as yet.

a) Work continues on the design and development of the first iteration of Streamflow Regulation Accounting (SRA) tool enhancements to the RES-J operation that will enable the RFCs to model basins with complex reservoir operations and water diversions which they cannot model at this time. Implementation and testing of these enhancements is underway. These enhancements have been submitted to the AWIPS SREC for inclusion in AWIPS Release OB8.1.

b) Re-implementation of the Interactive Calibration Program (ICP) is underway. Re-implementing the ICP into a better design with better documentation and more structured code will enhance the ability of the NWS OHD to support and extend this calibration tool. The HOSIP Gate 2 was passed in January and the contractor, RTi, is completing its research and analysis in preparation for HOSIP Gate 3. This project has also been proposed to the AWIPS SREC for inclusion in AWIPS Release OB8.1 or OB8.2.

c) A new simplified TimeSeries feature is planned for WHFS applications. This feature, dubbed "TimeSeriesLite" would be accessible from most WHFS applications, including RiverPro, the new River Monitor tool, and assorted HydroView windows such as the Point Data Display feature, the Alert/Alarm Data Viewer, the Questionable/Bad Data Viewer, etc. This TimeSeriesLite feature would be a much scaled-down version of the current WHFS Time Series feature. It would not allow editing, nor would it support predefined time-series group definitions, and it would have limited scaling options, etc.

6.3 AWIPS BETA TESTING

The VTEC (Valid Time Event Coding) and NWSI 10-922 features of RiverPro will be tested at field sites in mid-2006.

A new tool for generating hourly precipitation accumulations from sub-hourly data will be tested soon at select Eastern Region WFOs. This application would aggregate sub-hourly data, typically of 15 minute durations, into hourly values for use in MPE operations.

The ABRFC is evaluating an updated MPE application with P3 functionality. Because this version requires the OB6 PostgreSQL database server, it is limited to a non-baseline AWIPS system at ABRFC. Upon formal delivery of OB6, the capability to evaluate the integrated application under full operational scenarios will be available.

Testing the MPE application with Daily QC features and the HydroView application with a time-step mode is expected in the summer of 2006. This testing will be conducted at one or more RFCs and WFOs, respectively, in the Western Region.

6.4 AWIPS SYSTEM CHANGES

For OB7.1, the AWIPS Software Engineering Group (SwEG) has adopted numerous changes to the AWIPS COTS software. These include changing to the RHEL4u2 operating system version, the gcc 3.4.3 compiler, and the PostgreSQL 7.4.8 database server.

Recent prioritization activities by the AWIPS SREC resulted in a number of recommendations related to AWIPS system configurations. In addition to plans for updating the Redhat Operating System and the COTS application packages, the SREC accepted two high-priority items related to the database. One involves improvements to the performance of the PostgreSQL database in terms of the speed of input and output transactions, and the other provides a redundant feature for the storage of the PostgreSQL database.

7. HYDROMETEOROLOGICAL AUTOMATED DATA SYSTEM (HADS)

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

7.1 HADS SOFTWARE

HADS software modules that drive data acquisition, data translation and product distribution have not undergone any recent changes. However, there have been several enhancements to software that provides the tools required for our analysis of raw data messages received from GOES Data Collection Platforms.

7.2 HADS DATA NETWORK

The number of defined sites in the HADS network has now surpassed 12,000 reporting locations (12,082) and we are nearing 1.9 million data values processed per day.

The GOES DCS network continues to expand as new co-operators, make use of this efficient communications system. HADS' newest partner, NOAA's National Estuarine Research Reserve System (NERRS) will soon be expanding its network of real-time reporting stations in Florida and possibly in Texas. NERRS data platforms provide an array of meteorological observations as well as a suite of Water Quality measurements.

7.3 HADS, the RFCs and OB6

The implementation of a new method and delivery path for the back-up feed of HADS products to the RFCs continues. In the OB6 environment, these files are delivered via Secure Copy (scp). To date, nine RFCs have been transitioned from ftp processes to the secure copy process. For the remaining RFCs, if and when the need arises, please contact Brian Jackson in order to set-up a redundant data delivery path via scp.