



Office of Hydrologic Development Hydrologic Software Engineering Branch Bi-Monthly Activity Newsletter April 1, 2005

Software for NWS hydrology!

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1. HIGHLIGHTS FOR FEBRUARY AND MARCH 2005

The AWIPS OB6 development focused on porting all the software to the PostgreSQL database. The NWSRFS Release 27 development is in the pre-beta testing phase at this time. With the change to PostgreSQL and the change to RedHat Enterprise Linux 3 (RHEL 3), making a beta release is more difficult than usual as most RFCs will not have either the correct database or operating system to run the software. The design effort for OB7 has begun with our work to select a framework for developing a distributed model, and for designing a prototype Control Service for use with ensemble forecasts. More on these efforts below.

For the AWIPS WHFS/IHFS and RFC-WFO shared software, most of the activities reported in the February 1 newsletter are still ongoing. As reported in the summary status page available via: http://www.ops1.nws.noaa.gov/awips_software.htm, essentially all offices have upgraded to at least OB4.1a, and 16 of the slated 48 installations already have OB4.2. Almost all offices have the text workstation upgrade, and some have received the DX/NAS equipment, including Northwest RFC. The only functional change for OB4.2 is the introduction of the new Dam Catalog application (DamCREST), which supports Simplified DamBreak Model operations.

During early installs of OB4.2, it has been noticed that some offices never installed the Dam Catalog. If an office wishes to obtain their catalog, please contact the WFO/RFC Support Team. An ATAN is being provided to WFOs to address some OB4.0 issues with Site-Specific. On the development front, final work has been completed for OB5, and two field offices have recently received the beta version of OB5. OB5.2 will include some important RiverPro changes. Its schedule is still being finalized. OB6 development activities consisted primarily of the PostgreSQL implementation. Design work is also proceeding on OB7, primarily for the upgrades to the Multi-Sensor Precipitation Estimator (MPE) suite of applications to integrate the functionality of the Tulsa RFC P3 and the Western Region Daily QC applications.

OHD HSEB's NEXRAD RPG Build 8 development efforts were completed and delivered to the ROC in mid-February for integration and testing. Build 8 is expected to begin deployment to WFOs in April 2006. We also began work on Build 9, which will focus on the RPG migration to Linux. Support for the Dual Polarization project continued.

2. DETAILS OF TASKS

2.1 NEXRAD SOFTWARE DEVELOPMENT

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

2.1.1 RPG BUILD 8

The NEXRAD Group completed its efforts to streamline the PPS and fix some software bugs; the final software was delivered to the Radar Operations Center (ROC) in Norman, Oklahoma on February 18. The ROC has now begun the task of RPG software integration. These changes will impact the text portions of several Level III precipitation products by removing adaptable parameter data associated with the "Time Continuity Test". Revised product descriptions have been delayed since we discovered that the originals, on which they are based, contained some inaccuracies. Revised products will be posted to our documentation web site in April; watch for details in the next HSEB bi-monthly newsletter. As a result of these product changes, the AWIPS DPA decoder will also require a minor modification; the upgrade is scheduled for inclusion in AWIPS OB6.

NEXRAD RPG Build 8 will also include fixes for 2 bugs (Configuration Change Requests):

CCR NA04-27811 ("DPA 'TOTAL HYBRID SCAN RAIN AREA' TOO SMALL DURING HURRICANE"); and

CCR NA04-28102 ("SPD PRODUCT DOES NOT DISPLAY VCP 121")

2.1.2 RPG BUILD 9

Work for Build 9 has begun. We are beginning the migration to a new Linux software development system and plan to introduce a new software version control system. Few software changes are expected to the operational Precipitation Processing System (PPS) of the RPG, with the exception of the gauge bias capability which will require some fixes. Much of the activity will be devoted to testing – ensuring that nothing has changed during the migration. One or two minor bugs will also be addressed in Build 9.

Planning for the next NEXRAD Software Recommendation & Evaluation Committee (SREC) meeting is underway with a proposed date of June 2005.

2.1.3 OTHER NEXRAD DEVELOPMENT NEWS

OHD continued to support the Dual Polarization project, which is led by Greg Cate (OS&T) and Mark Fresch (ROC) in Norman, Oklahoma. A monthly meeting was held on Feb 24, with Dave Kitzmiller (HSMB) in attendance. Dave has developed a plan for Independent Validation & Verification (IV&V) of NSSL's new scientific algorithms. HSEB and HSMB are working closely with OS&T, NCAR, and NSSL to develop a strategy for introducing this new science into hydrologic forecast operations. The next meeting is scheduled for April 2005.

The first meeting of a new radar science working group, led by Mike Istok of OS&T SEC, took place in February. The objectives are to share ideas and plans, identify needs for future coordination, and establish priorities. Representatives from the Norman WFO, OCWWS, OS&T, OOS (ROC), and OHD participated. Chris Dietz and Dave Kitzmiller represented OHD. The group plans to meet approximately monthly.

In February Dennis Miller began spending 50% of his time in Dave Kitzmiller's hydromet science group as part of a collaborative agreement between the HSEB and HSMB.

2.2 AWIPS RELEASE OB4.X

2.2.1 RFS (no updates to this section in this newsletter)

RFS OB4/Release 25 has been superseded by RFS OB5/Release 26.

2.2.2 WHFS/IHFS DATABASE

Please visit the OCWWS/HSD web page for the WHFS software at: <http://www.nws.noaa.gov/om/>

[whfs/](#). This web page contains Release Notes for active builds, which detail the numerous changes made for each release.

As mentioned previously, the web-based Dam Catalog application (previously run on the AS machines) will be replaced at offices receiving new DX hardware and installing OB4.2. In summary, the existing browser-based Dam Catalog application is being replaced/updated with the DamCREST application. The DamCREST implementation provides an easier interface, with particular attention paid to getting catalogued results displayed quickly and to facilitating the entry of model input data and subsequent model execution.

Sites can deactivate their AS servers after the install of OB4.2 and after all local applications have been moved off the AS.

2.2.3 PRECIPITATION PROCESSING SOFTWARE

Release OB4 changes included the addition of two new MPE fields generated by the MPE FieldGenerator application and usable in the interactive HydroView/MPE application: local bias adjusted multi-sensor precipitation field and bias adjusted satellite precipitation field.

2.3 AWIPS RELEASE OB5

2.3.1 RFS

We have issued six interim releases for the OB5-R26 software:

- a) Corrected a problem with the behavior of the SACCO mod generation in IFP to ensure the proper SACCO values are included in the mod. Bug R26-2.
Executables -- fcst, ifp_nwsrfs
- b) Corrected a problem in the FLDWAV operation which caused initial conditions to be improperly computed in some tidal situations. Bug R25-54.
Executables -- fcinit
- c) Corrected a problem which resulted in incorrect dates being included in flood mapping files generated by the FLDWAV operation during ESP runs. Bug R25-62
Executables -- fcst
- d) Increased the maximum number of rating curves which can be processed in FCINIT and REORDER. Bugs R25-44 and R25-55.
Executables -- fcinit, reorder
- e) Corrected a problem which caused the Melting Factor Correction (MFC) mod to not be applied for a segment on an hourly timestep. Bug R25-65.

Executables-- fcst, ifp_nwsrf

f) Updated the MAT pre-processor default diurnal disaggregation function to include 4 alternate disaggregation patterns. See the documentation for a description of these patterns and the differences they will make to the disaggregated max/min temperature forecasts.

http://www.nws.noaa.gov/oh/hrl/nwsrfs/users_manual/part6/_pdf/653c_mat_.pdf

http://www.nws.noaa.gov/oh/hrl/nwsrfs/users_manual/part2/_pdf/27ofs_mat.pdf

Executables-- fcst

2.3.2 WHFS/IHFS DATABASE

WHFS/IHFS OB5 software was delivered to AWIPS in August 2004, with beta testing beginning February 1, 2005. Full deployment begins April 12, 2005. See the OB5 release notes on the HSD web page.

The following is a summary of OB5:

- a) Numerous enhancements were made to the Site-Specific application.
- b) Enhancements to the TimeSeries application, including some requests from the Western Region.
- c) The Station Observation Display (a.k.a. Point Data Display) feature currently in HydroView/MPE will be implemented within the D2D application. This will allow overlay of point data from the IHFS database onto D2D. This work was performed by OS&T/MDL with significant assistance from OHD/HL/HSEB.
- d) Some new SHEF physical elements for snow data were added and new data processing is provided for handling areal observed and forecast data.
- e) As currently scheduled, all remaining "warning" products will implement VTEC by Fall 2005. AWIPS Release OB5.2 is scheduled to address remaining items for VTEC 10-1703 and 10-922 implementation. The new method will use VTEC event history to determine which forecast points to include and which product category to generate. Many other RiverPro features will also make their debut in OB5.2. Major changes to the RiverPro recommendation algorithm are also part of OB5.2.

2.3.3 PRECIPITATION PROCESSING

- a) An overhaul in the way that gage precipitation estimates are handled in the WHFS OB5 will ensure that all software has consistent algorithms for deriving precipitation accumulations and

will improve the speed of the precipitation data processing. Gage data was formerly stored in the Precip and CurPrecip tables, with the CurPrecip table containing the same data types as the Precip table, but for a much shorter duration (e.g., the last 3.5 days). This redundant storage method was adopted to provide performance improvements when reading the data (from the CurPrecip table).

The Precip table data will be stored in three new IHFS_DB tables: 1) RawPC 2) RawPP; 3) RawPother (this includes any precipitation data that does not have a physical element of either PC or PP). The smaller CurPrecip data will be stored in two new IHFS_DB tables: 1) CurPC, 2) CurPP. Two other new tables - one for hourly PC and one for hourly PP data - have data stored in 24 hourly slots for each day (similar to methods used in CBRFC's fastetc database). This is expected to improve performance when reading hourly data.

Local applications which use the Precip, CurPrecip, or ProcPrecip **MUST** be converted for OB5. Additional information on the new storage and processing details are provided on the WHFS Support Team web page at: <http://www.nws.noaa.gov/om/whfs>. The document is entitled: "Gage Precipitation Processing (GPP) Operations Guide".

The application conversion is not complicated if accessing only the Precip/CurPrecip tables, because only the table names have changed; i.e., the table structure has not changed. The conversion should be performed as follows: Change all database access of PC or PP data from the CurPrecip table to the CurPC or CurPP tables, respectively. If the Precip table was accessed instead of CurPrecip, then change the access to RawPC, RawPP, or RawPother, as applicable.

If it is not possible to convert the local applications for OB5, the new shef_post_precip token can be set to ON to populate these tables needed by the local application. This should be avoided if at all possible, as significant redundant processing and storage will result.

If applications read data from the ProcPrecip table, the local application will need to be changed to adapt to the new storage method for this data. Please consult the GPP document, and consult OHD/HSEB if necessary for assistance.

b) The MPE operations are being modified to allow individual grids to be turned off, as per the local office wishes. Currently, MPE produces 8 QPE grids, some of which are independent of other grids (e.g., radar-only mosaic), others of which are dependent (e.g., local bias multi-sensor mosaic). By turning off unwanted grids, the MPE FieldGen operation will be completed more quickly. These changes will also facilitate the addition of objective analysis grid generation techniques, such as those employed at Tulsa RFC and within Mountain Mapper.

2.4 AWIPS RELEASE OB6

2.4.1 RFS

The primary purpose of this build is to port our applications to PostgreSQL and to the new RHEL 3 operating system. The current challenge with this build is the Beta test. The help we get from the RFCs during the Beta tests are critical to our ability to deliver software which works when it is installed. Without the beta tests we will have to rely upon our in-house testing, and this is not nearly as comprehensive as the RFC Beta tests. If anyone has RHEL3 and PostgreSQL running on a machine (AWIPS sanctioned or not) and you would be willing to help us test our build, please let us know.

2.4.2 WHFS/IHFS DATABASE

Work is nearing completion on the transition of the OHD HSEB software from using an Informix DBMS on HP-UX servers to using a PostgreSQL DBMS on Linux workstations. We have completed the work required to convert an IHFS_DB from Informix to PostgreSQL and on converting all the application software to access the PostgreSQL database. Testing is continuing. In late December, OHD installed key components (SHEFdecoder, db_purge) at FSL for test and evaluation.

2.4.3 PRECIPITATION PROCESSING

During the OB6 development period, design work is underway for incorporating the ABRFC P3 application into MPE operations. Also, design work is beginning for incorporating the MountainMapper functions used in the Western Region into MPE operations. The goal is to provide a nationally-supported baselined application used by all offices to perform QPE operations.

Improvements are planned for the MPE component in HydroView to improve the management of user polygon edits in gridded precipitation fields. At this point, we believe that this activity will be pushed out of OB6 to OB7.

2.5 DEVELOPMENT SUPPORT ACTIVITIES

2.5.1 New OHD Software Architecture

We have been making slow, but measureable progress testing our ideas for migrating the RFS to use a services based approach to access a PostgreSQL database. On March 16 our two

contractors, Apex and RTi demonstrated for us a successful Proof-of-Concept implementation of such an architecture for the RRS pre-processor. The next step will be to operationalize the code and deliver an RRS pre-processor in OB7 which uses the services oriented approach for all data access, and which reads observations from the PostgreSQL database (parameters will still come from the fs5files and processed time series will be written to the fs5files). A related activity we will be starting on soon, is the data-modeling necessary to move the MAT pre-processor, parameters and all, into the PostgreSQL database. We are also starting to examine designs for a more general Control Service using the ensemble processing as an example. Think of a Control Service as a super HCL that can control all our programs. We will post design documents on the Web as we create them.

2.5.2 AWIPS Beta Testing

The OB5 SiteSpecific application, with the Sacramento rainfall-runoff model is in ongoing beta testing at SERFC/SJU and MBRFC.

The VTEC (Valid Time Event Coding) and 10-922 features of RiverPro will be tested in the Spring and Summer of 2005 as part of a formal AWIPS Operational Test and Evaluation (OT&E).

Testing of modifications of RiverPro made to support CNRFC-WFO operations is ongoing. These features were initially provided in OB3 and are undergoing refinements through OB5.

2.5.3 AWIPS System Changes

On the AWIPS systems front, the PostgreSQL DBMS (Version 7.4.7) has been selected as the next Relational Database Engine for AWIPS. It will replace Informix as the HP-UX DS machines are retired and replaced by the Linux DX machines. Here is the PostgreSQL web site for those who would like to find out more about this DBMS, <http://www.postgresql.org>. There is an interesting FAQ in the Docs section. To support field development activities, a web site has been established by the HSEB which provides helpful information on PostgreSQL development: <http://www.nws.noaa.gov/ohd/hrl/hseb/postgreSQL/index.htm>.

All OHD database software will use PostgreSQL in AWIPS Release OB6 except the software on the RFC Archiver machine which will continue with Informix for OB6 (more on that below). Field offices who have local database software must be ready when AWIPS OB6 arrives. OHD has provided for download scripts to convert a site's current IHFS database to OB6/PostgreSQL. A tar file containing the OB6/PostgreSQL version of shefdecode and db_purge is also available for download for sites that need to test their local applications with a real-time data feed. Offices that have their own Informix databases or tables must begin to plan for the transition

to PostgreSQL. Deployment of OB6 will begin in late September 2005.

The Red Hat Enterprise Linux Workstation Basic Version 3 Update 4 (RHEL 3u4) has been selected as the operating system for AWIPS Release OB6 and beyond for all systems except the RFC Archiver which stays at Red Hat 7.2. Recently, AWIPS announced plans to upgrade to RHEL 3u4 sometime between OB5 and OB6. The specific dates have not been announced. This may have some impact on local scripts or methods. Please coordinate with your office or regional focal point if you have questions on the status of the AWIPS COTS (Commercial-Off-The-Shelf) software.

AWIPS has announced that for OB5, PostgreSQL will be available for download from the NOAA1 ftp site. Details are TBD.

The RFC Archiver machine (RAX), its archive database, and the software that uses that database are in a unique and unfortunate situation. Because OHD had considerable trouble upgrading to the new AWIPS DX/NAS configuration on our NHD-R development system this winter, we could not try the upgrade of the RAX machine from Red Hat 7.2 to RHEL 3u4 until February. AWIPS had planned to upgrade all systems to RHEL 3u4 but no one had tried that OS with Informix 9.3. Sad to say that Informix 9.3 will not run on RHEL 3u4; an upgrade to Informix 9.4 is necessary. However, we have found that the monetary cost of that upgrade for the 18 existing RAX machines is prohibitive. So, the archive databases and all the archive software that uses them on the RFC's RAX machines will have to be ported from Informix to PostgreSQL at the earliest opportunity. This is why the RAX stays at Red Hat 7.2 for OB6. There is strong pressure from AWIPS to get to PostgreSQL for the RAX for OB7 because the obsolete Red Hat 7.2 is not very supportable. OHD is coming up with a plan to get the RAX to PostgreSQL. You will hear more about this at the RFCs soon because the RFCs are key to the support of the RAX software.

2.5.4 QPE Software Activities

On March 8 - 9, Jon Roe, Mark Glaudemans, and Bryon Lawrence visited the California-Nevada River Forecast Center (CNRFC) and the Sacramento Weather Forecast Office (STO) in Sacramento, California. Their purpose was to meet with Hydrologist-In-Charge Robert Hartman and other personnel at the River Forecast Center (RFC) to identify the quantitative precipitation analysis tools needed by the Western Region RFCs and Weather Forecast Offices. The Western Region has the need for unique data visualization and analysis tools due to its topography and widely variable precipitation regimes. These discussions will lead to the incorporation of some new requirements into OHD's nationally supported AWIPS hydrologic software analysis tools. Mr. Hartman also provided considerable background on the upcoming joint project between OHD and the U.S. Army Corps of Engineers Hydrologic Engineering Center (HEC) to provide

CNRFC with the operational capability to run HEC's reservoir simulation numerical model for two key reservoirs on the Feather River in northern California.

On March 10 - 11, Mark Glaudemans participated in a discussion at the Forecast Systems Laboratory (FSL) in Boulder, Colorado regarding the use of FSL AWIPS software at RFCs. The meeting included representatives from four RFCs, Western Region Headquarters, and the Office of Climate, Water and Weather Services. Topics covered were the current capabilities of FSL applications such as Graphical Forecast Editor (GFE), and projects such as the HMT demonstration for the CNRFC and the Advanced Linux Prototype System at FSL. The possible use of GFE for RFC forecast functions was reviewed, in addition to an exploratory discussion of future FSL software enhancements to directly support select RFC operations.
