



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

Software for NWS hydrology!

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1. HIGHLIGHTS FOR DECEMBER 2004 AND JANUARY 2005

The NEXRAD RPG Build 8 development efforts continued on schedule during the months of December and January. The NEXRAD SREC met on January 19 to consider content for Build 8, and to form a recommendation for the NEXRAD PMC. Most WFOs are now at RPG Build 6, although there are still some sites at Build 5. A program-wide meeting to discuss Dual Polarization was held on 1/27/05.

The RFC-only software for AWIPS OB5 (Release 26) was pre-released to the RFCs in January. Several interim releases to address urgent problems found after the OB5 deadline were also made available. We are midway through the development of OB6 (Release 27) which will consist mainly of converting the applications to PostGreSQL. We have a number of AHPS projects which we will either develop ourselves or we will manage contracts for external contractors. All AHPS projects will be worked through the OHD HOSIP (Hydrologic Operations & Services Improvement Process) and we will be starting to work on the HOSIP Gate 1 documents this month. Please see below the description of the HOSIP process and the list of documents required for each HOSIP gate.

For the AWIPS WHFS/IHFS and RFC-WFO shared software, most of the activities reported in the Decemeber newsletter are still ongoing. As reported in an excellent summary status page

available via: http://www.ops1.nws.noaa.gov/awips_software.htm, essentially all offices are upgraded to at least OB4.1, and 9 of the slated 48 offices already having 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 a new Dam Catalog application (DamCREST), which supports the Simplified DamBreak Model operations. During the 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 beta installs are beginning this week. OB5.1 will include some important RiverPro changes; its schedule is still being finalized. OB6 development activities consist primarily of the PostgreSQL implementation; its delivery to AWIPS for integration is February 7. Design work has also proceeded on OB7, primarily for the upgrades to the Multi-Sensor Precipitation Estimator (MPE) suite of applications to integrate functionality in the Tulsa RFC P3 and the Western Region Mountain Mapper applications.

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 continued efforts to remove superfluous source code from the PPS, and modernize one of its components by converting the rate and accumulation task from Fortran to C. These improvements will impact the text portions of several Level III precip products by removing adaptable parameter data associated with the "Time Continuity Test". Revised product descriptions will be posted to our documentation web site in March; watch for details in April's 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")

The NEXRAD Software Recommendation & Evaluation Committee (SREC) met on January 19 in Norman, Oklahoma to discuss content for RPG Build 8. OHD's proposed changes (above) were accepted. The committee is now in the process of formulating a final recommendation for the NEXRAD PMC.

2.1.2 RPG BUILDS 5 & 6

Approximately 5 to 10 sites are still running RPG Build 5. EPRE, developed by the ROC and implemented by HSEB, was introduced in Build 5. However, most WFOs are now at RPG Build 6; HSEB did not provide any new software in Build 6. The ROC provides both operational and software maintenance support for all RPG Builds.

2.1.3 OTHER NEXRAD DEVELOPMENT NEWS

The effort to bring Canadian Weather Radar data into NWS forecast operations continues to be managed via the NWS Operations & Services Improvement Process (OSIP). An Integrated Work Team (IWT) has now been formed, with HSMB (Dave Kitzmiller) providing team leadership and HSEB (Jon Roe, Chris Dietz) participating as reviewers. The first meeting, originally scheduled for this month, has been postponed due to resource contention.

A design review for the RPG Refresh project, led by the ROC, was held on January 18 2005. The proposed hardware upgrade from Sun CPUs running Solaris to PC-based processors running Linux is currently targeted to coincide with RPG software Build 9 (deployment date still to be determined). In March 2005 HSEB's NEXRAD group will begin work to migrate the PPS to Linux.

There is still significant planning and coordination work to be accomplished for Dual Polarization. NPI leadership in OS&T PPD has begun conducting monthly status meetings, in which HSEB and HSMB participate. Two tri-agency meetings were held during this period: December 13 2004, and January 27 2005. HSEB and HSMB will work closely with OS&T, NCAR, and NSSL to develop a strategy for introducing this new science into hydrologic forecast operations. The next step is to evaluate NSSL's prototype software, which we plan to begin at the end of summer 2005. NCAR has offered to provide us with archived data from their experimental radar.

2.2 AWIPS RELEASE OB4.X

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

Development for the RFS OB4 delivery is complete and this build is now in the maintenance phase. Please see the HSD support page for the status of bug reports.

http://www.nws.noaa.gov/om/water/RFC_support/hseb_buglist.shtml

Please contact the HSD support team if you have questions about RFS OB4.

[Contact HSD Support Team](#)

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, large and small, made for OB4 and OB3. OB3.3 introduced the new headline section in RiverPro, which replaces the previous summary header section - this headline section will play a larger role as the VTEC and 10-922 (WFO Hydrologic products) product changes are implemented.

Primarily due to some issues with Warngen's ability to do "extended-in-time" products and the NWS Corporate Board decision to replace the Watch, Warning, Advisory (WWA) application with the Graphical Hazards Generator (GHG) application, VTEC will not be used for any hydrologic products for the previously planned start date of February 8, 2005. As currently scheduled, all remaining "warning" products will implement VTEC by Fall 2005. AWIPS Release OB5.1 is scheduled to address remaining items for VTEC and 10-922 implementation.

As mentioned previously, the web-based Dam Catalog application which ran on the AS machines will be replaced at offices receiving new DX hardware. All other offices will receive the new Dam Catalog Reviewer and Estimator Tool (DamCREST) with Release OB5. In summary, the existing browser-based Dam Catalog application is being replaced/upgraded 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.

A new catalog database is not provided with DamCREST; it will use a slightly changed version of the existing database. Field sites will not have their dam catalog data disturbed. There is a recognized problem with the accuracy of the data and break scenarios already provided in the catalog due to the limited data which led to assumptions made in the Simplified DamBreak model runs used to populate the catalog. The OHD/HL/HSMB is investigating methods to improve the input data. The method by which the catalog data and model output data were assembled is

detailed in a document available from OCWWS/HSD or HSEB.

2.2.3 PRECIPITATION PROCESSING SOFTWARE

Release OB4 changes include 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 five interim releases for the OB5-R26 software:

a)Corrected a problem with the behavior of 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_nwsrfs

[Notes from last month's newsletter about the OB5-R26 release:](#)

The highlights are:

- a. Integration of the new UHGCDATE mod which has a start and end date

- b. Inclusion of an initial NDFD-to-NWSRFS pre-processor
- c. Upgrade of the NWSRFS fs5file locking process to allow ESP to run with batchpst and the pre-processors
- d. Addition of new features to the RES-J operation
- e. Enhancement of FLDWAV to create flood mapping files needed by the FLDVIEW application
- f. Porting of ts2oh and gs2oh to Linux
- g. Completion of the esp hindcast generating GUI (formerly espvs)
- h. Completion of 49 HSD Bug List bug fixes

2.3.2 WHFS/IHFS DATABASE

WHFS/IHFS OB5 software was delivered to AWIPS in August 2004, with beta testing beginning February 1, 2005, and full deployment begins April 12, 2005.

The following is part of OB5:

- a) Sites which were not included as OB4.AS sites will receive the DamCREST application for the first time. The application is accessible geographically (i.e., dams plotted on the map) via the HydroView/MPE application.
- b) Numerous Assorted enhancements were performed for the Site-Specific application.
- c) Enhancements to the TimeSeries application, including some requests from the Western Region.
- d) 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.
- e) Some new SHEF physical elements for snow data were added, and new data processing is provided for handling areal observed and forecast data.

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'sfastetc 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.

c) Improvements are being considered 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.

2.4 AWIPS RELEASE OB6

2.4.1 RFS

The primary purpose of this build is to port our applications to PostGreSQL and to the new RedHat Enterprise 3 operating system. AWIPS had considered moving to a new compiler, but recently decided to push that move off to OB7.

This upcoming release will include a new technique to allow users to select from a set of parameters for the default diurnal disaggregation parameters for the MAT pre-processor. These are the coefficients used to convert the Max/Min temperatures into six hour time steps. The default parameters are used when there are no hourly or three hourly stations available from which the disaggregation can be inferred. This situation most commonly occurs in the future. We had hoped to integrate additional sets of parameters than the 4 new sets we have added, however, we were not given the resources to complete either the science or the software to expand the original scope of this project. Hopefully, the next step we take to improve MAT calculations will be to rewrite the MAT pre-processor so we have one that takes advantage of new data sources, new algorithms, new data storage methods and new software tools.

[Notes from last month's newsletter about the r27 release:](#)

We are cleaning up the ProbVS which had been developed by RTi and tested at the CBRFC. We have many RFCs issuing probability forecasts and no way to verify them and the ensemble science group needs verification support for their research. Once we get the program running, we will be using it in house and will be able to support the RFC use of this application.

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

No new precipitation processing functionality is planned for OB6. However, 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 for all offices to perform QPE operations.

2.5 DEVELOPMENT SUPPORT ACTIVITIES

2.5.1 New OHD Software Architecture

Our contractors (RTi and Apex Digital Systems) have made considerable progress in the past two months to develop and test the infrastructure we need for a Data Service. We have seen demonstrations of code running, and while the results are very exciting for us and make us optimistic about the possibility of moving the RFS to a new database, describing the new code here makes the results seem very un-dramatic. We have successfully inserted code between the RRS pre-processor and the fs5files so the data access now passes through a set of routines which should allow us to switch data sources to a PostGreSQL data base without having to rebuild the RRS pre-processor. We will see the RRS accessing data from a local PostGreSQL database later this month, and then early in March we will see it access data from a PostGreSQL data base not in our offices. That is, we will be using a data service to pull data from a PostGreSQL database instead of the hard code memory reads which RFS currently uses. This is a big deal because it validates the incremental migration strategy we have proposed for moving from the fs5files to PostGreSQL (or any other RDBMS). For those of you who have asked for a long time to move fs5file data structures to the IHFS_DB, this is the first big technical hurdle that we are clearing.

2.5.2 Beta Testing

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

The VTEC (Valid Time Event Coding) and 10-922 features of RiverPro will be tested in the Spring 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 are initially provided in OB3, and are undergoing refinements through OB5.

2.5.3 AWIPS System Changes

Because of their importance, these previously announced items are repeated again.

On the AWIPS systems front, the PostgreSQL DBMS has been selected as the next Relational

Database Engine for AWIPS, and 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. Field offices who have local database software must be ready when AWIPS OB6 arrives. OHD can automatically convert a field office IHFS database to PostGreSQL, and can provide guidance information to offices for conversion of local applications. Offices that have their own Informix databases or tables should begin to plan for the eventual transition to PostGreSQL for OB6, which will begin deployment in late September 2005.

Lastly, the Red Hat Enterprise Linux Workstation Basic Version 3 (update 4) has been selected as the operating system for AWIPS Release OB6 and beyond. This may have some impact on local scripts or methods that are possibly changed during the OB6 installation. 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.

2.5.4 AHPS projects

The AHPS software development requests from the RFCs this year are very ambitious. We will be working on new architecture Control Services for the Ensemble Software, on migrating the MAT pre-processor data to the IHFS-DB, implementing Streamflow Regulation Accounting tools, determining the architecture for a distributed model, continuing our work with XML, and enhancing the verification programs available at the RFCs. These projects will start to show up with AWIPS OB7 and beyond.

2.5.5 HOSIP

HOSIP is the "Hydrologic Operations & Services Improvement Process" which was derived from the NWS Operations & Services Improvement Process (OSIP). For those not familiar with this acronym, this is the process OHD is using to manage science infusion and software development. There are 4 stages in HOSIP, each of which ends with a "Gate Meeting". At the Gate Meetings the HL management team determines if the project has completed the previous stage's activities and is ready to go on to the next stage. Here is a quick summary of the key deliverables that come out of each HOSIP stage. Soon after this newsletter is published OHD will put up a complete HOSIP web site that explains the process in much more detail, has document templates, and has the actual documents from our various projects for you to review.

HOSIP Stage 1 (**INPUT**) deliverables: Need Identification Document (NID), Statement Of Need (SON).

HOSIP Stage 2 (**VALIDATION**) deliverables: Concept Of Operations (CONOPS) including high level functional requirements, initial Business Case Analysis (BCA), Stage 3 plan.

HOSIP Stage 3 (**RESEARCH & ANALYSIS**) deliverables: updated CONOPS with lower level functional requirements, scientific algorithm documentation (if applicable), updated BCA, Stage 4 plan.

HOSIP Stage 4 (**OPERATIONAL DEVELOPMENT**) deliverables: updated CONOPS with technical requirements, Design Specification, Test Plan, Test Procedures, Test Results, software code, release notes, installation instructions, training materials, user manual materials, and system manual materials.
