Office of Hydrologic Development
Hydrologic Software Engineering Branch
Bi-Monthly Activity Newsletter
June 1, 2004

Software for NWS hydrology!

1. HIGHLIGHTS FOR APRIL & MAY 2004

The NEXRAD Software Development Group gained two new people this period, and began a field evaluation for the WSR-88D Range Correction Algorithm (RCA)/Convective Stratiform Separation Algorithm (CSSA). The two new people are Mr. Kelley Miles, a new full time contractor, and Mr. Jeremy Su, a full time summer student (see below).

The AWIPS RFS software (NWSRFS R25) was pre-released to the RFCs in March and also delivered to AWIPS for their OB4 build. Since then we have worked to define requirements for the NDFD to NWSRFS pre-processor, the Unit-Hydrograph Change mod and on an updated fs5file locking mechanism.

The AWIPS WHFS/IHFS and RFC-only software has been involved in multiple builds. Planning is near final for OB6 activities, OB5 development has started, OB4 is being finalized, OB3.1 and 3.3 patch releases are ongoing, while OB3 deployment and support continues. For OB3, the most noteworthy changes are numerous enhancements to the Multi-Sensor Precipitation Estimator (MPE) component of HydroView, the addition of a pre-defined request for the Point Display Control function in HydroView, and RiverPro enhancements in support of requested CN RFC enhancements.

On the AWIPS systems front, the Red Hat Enterprise Linux Workstation Basic version 3 has been selected as the operating system for AWIPS release OB6. Also, evaluation of the future Linux-hosted relational database is continuing with study focused on a PostGreSQL implementation, which is being considered for AWIPS release OB6/7.

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 5

*Enhanced Pre-Processor (**EPRE**)*
OHD team members: Dennis Miller, Jihong Liu, Scott Vandemark

In May we assisted OOS/ROC/Programs Branch with a Build 5 problem concerning failure of the Precipitation Processing System (PPS) to process the Gage Bias Table sent from AWIPS; a software problem was identified and fixed by ROC/Engineering.

We also assisted with analysis of an operational issue involving high radar precip estimates; no science or software bugs were identified.

2.1.2 RPG BUILD 8

*Range Correction Algorithm (**RCA**)/Convective Stratiform Separation Algorithm (**CSSA**)*

OHD team members: Chris Dietz, Dave Kitzmiller, Dennis Miller, Feng Ding, Dave Riley, Cham Pham

A field evaluation of the RCA/CSSA began on March 29 and is expected to run until June 11. WFOs participating in the evaluation of this new science include Charleston, WV, Minneapolis, MN, Norman, OK, Pittsburgh, PA, Pleasant Hill, MO, and Portland, OR. ABRFC and MBRFC have also been invited to participate. Forecasters from these sites are asked to submit feedback on the RCA's performance during precipitation events. So far, RCA/CSSA has been performing largely as expected - feedback will enable the team to make necessary adjustments. A teleconference call to discuss overall performance of the RCA/CSSA will be held in June.

Kevin Lynott of OCWWS/HSD has been helping the team define a Concept of Operations (Conops) for the introduction of RCA/CSSA into forecast operations at WFOs and RFCs. The Conops document should be completed by mid-end June.

OOS/ROC/Applications Branch in Norman, OK are assisting us with an Independent Validation & Verification (IV&V) of the CSSA science. They are due to deliver their report by the end of June. (The Applications Branch conducted IV&V on the RCA science in 2003.)

We spent the rest of the time improving the cpu efficiency of the prototype software and correcting bugs. OOS/ROC has agreed to evaluate the high cpu usage to see if it can be further streamlined; their recommendations are expected by the end of June. This software will ultimately be integrated into the Precipitation Processing System (PPS) of the WSR-88D Radar Products Generator (RPG). We are currently targeting RPG Build 8 (operational deployment Fall 2005).

2.1.3 SREC

The Spring 04 SREC was held in Norman, OK on April 20 and 21 to discuss RPG Build 7 content and consider candidates for future RPG Builds. Chris Dietz and Dennis Miller attended via video-teleconference (VTC). Chris presented a status briefing for the RCA/CSSA project.

2.1.4 OTHER NEXRAD DEVELOPMENT NEWS

We added a new person to the team on April 1 - Kelley Miles, who is an RSIS contractor. Kelley has a bachelor's and master's degree in meteorology, and over 15 years of software engineering experience. He will be focusing on software process improvement for the NEXRAD group, including introducing a software configuration management (CM) tool, documenting current software procedures, and developing a GUI-based test case archive.

On April 26 we welcomed back our summer student, Jeremy Su, who is studying Computer Science at the University of Pittsburgh. He's currently working on the RadClim system of scripts/software, generating software documentation and porting the package to Linux. The goal is to incorporate RadClim into the AWIPS baseline.

Jihong Liu returned from maternity leave on May 12. Jihong's husband Yukuan Song works in OS&T, also on WSR-88D software development. Their son Robert was born on March 4. Jihong has focused on EPRE testing since her return.

2.2 AWIPS RELEASE OB3.x

2.2.1 RFS

OB3 has been superseded by OB4, although AWIPS is now delivering OB3.

2.2.2 WHFS/IHFS DATABASE

Visit the OCWWS/HSD web page for the WHFS software at: http://www.nws.noaa.gov/om/whfs/ This web page contains the OB3 Release Notes, which detail the numerous changes, large and small, made for OB3. AWIPS Patch Release OB3.1 was also completed to support Initial Operational Test and Evaluation (IOT&E) of the VTEC functions in RiverPro. Included in the 3.1 release is the ability to specify probability attributes when retrieving forecast data for inclusion in a generated product. AWIPS Patch Release OB3.3 includes significant new features to support RiverPro VTEC features, and will be used to support VTEC OT&E to be conducted this summer. Any changes resulting from this OT&E will be incorporated in the OB4.1 release, with VTEC scheduled for formal "turn on" in February 2005. The RiverPro OB3.3 version will also include some changes in support of NWS Instruction 10-922 policy changes, with the remaining changes to be incorporated into RiverPro OB4.1.

2.2.3 PRECIPITATION PROCESSING SOFTWARE

A major collection of enhancements, and some bug fixes, have been incorporated into the MPE component of HydroView. In addition, a new quality control feature was added that makes use of lightning data and which performs spatial consistency checks on gage data. All these changes are detailed in the WHFS web page.

2.3 AWIPS RELEASE OB4.X

2.3.1 RFS

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

We have made two interim releases for the OB4-R25 software.
1) Corrected the ingest pairs portion of the new verify software suite, so the TS code in existing pair files is interpreted correctly. Bug R25-11.
2) Corrected the dates on the espadp CARD file display . Bug R25-8.

Please contact the HSD support team if you have questions about these two interim releases.
Contact HSD Support Team

2.3.2 WHFS/IHFS DATABASE

The final submission of the WHFS/IHFS OB4 software to the AWIPS Contractor was recently completed. Because of issues external to the OHD software, the full deployment of OB4 has been delayed, and is scheduled to commence in September 2004. The OB4 release notes document will be available soon and posted on the WHFS web page. The highlights of the Release OB4 changes include:

-- Added the Sacramento rainfall-runoff model into Site-Specific, with supporting RFC-WFO communications functions, and an improved user interface.
-- Removed the old DamCatalog tables in lieu of the newer database used by the browser based application; this frees up database space.
-- Established consistent service backup controls in the WHFS software that are based on the HSA definitions, instead of county based assignments.
-- Completed many minor enhancements and bug fixes.

As part of the OB4.1 Patch release, the RiverPro application will contain numerous enhancements to support the WFO product formatting policy changes as specified in NWS Instruction 10-922.

2.3.3 PRECIPITATION PROCESSING SOFTWARE

The highlights of the Release OB4 changes include:

-- Updated the DPA product decoder to handle new data and associated format changes in RPG Build 5 (EPRE) products while also handling Build 4 products properly.
-- Added 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.
-- Removal of Stage 2/3 database tables and software.

2.4 AWIPS RELEASE OB5

2.4.1 RFS

For this build the major development tasks are integrating the new UHGCDATE mod, developing an initial NDFD-to-NWSRFS pre-processor, upgrading the NWSRFS fs5file locking process and adding new features to the RES-J operation.

With the help of HSD we distributed the UHGCDATE requirements. Those requirements have been approved by all RFCs and we are now developing the code.

We have written the requirements for a first phase of development for the NDFD-to-NWSRFS pre-processor and we are now working with the OHRFC to validate those requirements.

We are returning to our work on rewriting the locking process used by the RFS so we can lock less of the database and thereby allow more than one RFS process to run concurrently. The devil is really in the details on this one, but we believe we have a solution which will permit batchpst and the pre-processors to run at the same time as ESP. This is a first step, and if we succeed here, we will look for additional opportunities to break the database locking into smaller pieces.

We are collaborating with RTi and SERFC to update the RES-J with additional functions. We are prototyping a process which will allow us to work more closely with RFCs who want to integrate new functions into the AWIPS baseline code. RTi has developed code, which normally we would have to test. Testing contractor delivered code is a key step in the development process and we find the cost for us to test and integrate is generally one third of the total time the contractor has spent developing the code. Testing is very expensive. SERFC is testing the updates they requested RTi make to the code permitting them to get the changes into the upcoming build. We look forward to more collaborative projects of this nature with other RFCs in the future.

2.4.2 WHFS/IHFS DATABASE

Initial delivery of OB5 software is scheduled for August 9, 2004, with AWIPS Systems Integration Testing (SIT) commencing December 20, 2004, and full deployment beginning May 3, 2005.

Some insight into our development environment follows...From a development perspective, this delay between initial delivery of software and final deployment, and the staggered overlapping builds, greatly complicates development management and planning. For example, currently OB2 is still fielded at many sites and is supported by OCWWS/HSD and OHD, OB3 is fielded at most sites, with OB3.1 and OB3.3 heading out soon. Also, OB4 development activity is just now wrapped up, but is not planned for deployment until September 8, 2004. Currently OB4.1 and OB5 is where our active development is taking place. Lastly, final tasking is wrapping up for OB6, with infrastructure planning already beginning for OB7. Additionally, for planning purposes, we always try and reserve time for the inevitable unpleasant discoveries and to-be-realized must-dos.

The following is scheduled for OB5:

-- The existing browser-based Dam Catalog application will be replaced/upgraded with the DamCREST (Dambreak Catalog Reviewer and EStimation Tool) application. The DamCREST implementation provides a much 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.
-- Enhancements to the TimeSeries application, including some requests from the Western Region.
-- The 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 is being performed by OST/MDL with significant assistance from OHD/HL/HSEB.

2.4.3 PRECIPITATION PROCESSING

-- An overhaul in the way that point precipitation estimates are handled in the WHFS will ensure that all software has consistent algorithms for deriving precipitation accumulations and will improve the speed of the precipitation data processing. This will affect the RiverPro, HydroView/MPE, PrecipPreProcessor (siipp), and OFS Data Entry (ofsde) applications.
-- Improvements are planned for the MPE component in HydroView to improve the management of user polygon edits in gridded precipitation fields.

2.5 DEVELOPMENT SUPPORT ACTIVITIES

2.5.1 New OHD Software Architecture

Here is an interesting page which you should check out.
http://www.nws.noaa.gov/oh/hrl/hseb/hseb_pdf_links.htm

We have been working for 7 or 8 years now to develop a new architecture for our software: to move ourselves out of the NWSRFS flat file database restrictions and the RFS FORTRAN implementation restrictions. We have tried several approaches and none have proven successful. We are making a new assault on this problem and are in the middle of designing a new data access procedure for the RFS called a Data Service. We will begin implementing a proof of concept here in OHD for testing purposes this summer. This Data Service is one element of an overall architecture called a Service Oriented Architecture. The link above will take you to a set of documents which should explain a Services Oriented Architecture and how we envision using one. The early phases of this work are progressing quickly; we will keep you posted.

2.5.2 OHD starting to use XML

XML is cool and using it makes us cool, but that is not the only reason we are now trying to move all RFS I/O to XML. There are too many uniquely formatted binary and ascii files in and around the River Forecast System and they make system maintenance a real headache. We need to standardize these bits and pieces of data and we need a better standard for communicating with the outside world. OHD is working to organize the hydrologic community (Corps, Bureau, USGS, Universities ....) to come up with consistent tags and structure so we can share our data more easily. We are aiming to have a meeting of interested parties in the next year. In the meantime, any new RFS I/O uses XML. Also, a key aspect of the Service Oriented Architecture mentioned above is the use of XML to communicate data between the services.

Note that the SiteSpecific enhancement delivered in OB4 transfers data from RFCs to WFOs and makes use of XML formatted data in these transferred data sets.

2.5.3 Development Infrastructure Development

Testing, testing, testing and more testing is one of the keys to reliable software. We have just implemented two new regression tests one for FLDWAV and one for our ensemble programs. (We already have ofs, and calb regression tests). The regression tests runs the suite of programs and them compare the new output to the output from the prior build.

2.5.4 Really Great Reservoir Workshop

Kuang Hsu and Mary Mullusky are working very hard to create an informative reservoir workshop for June. They have developed new slides and several examples. Should be a good workshop.

2.5.5 Beta Testing

The OB4 Site Specific application, with the Sacramento rainfall-runoff model is in ongoing beta testing at MBRFC and SERFC/SJU.

The VTEC (Valid Time Event Coding) features of RiverPro will be tested as part of a formal Operational Test and Evaluation (OT&E) at selected sites from August 30 - October 8. VTEC will be implemented in February 2005 and represents a major change in the way hazard products are issued by the NWS.

The OB5 DamCREST application is planned for beta testing at a to-be-determined WFO and RFC. It is undergoing pre-beta testing on the HQ NHO-R system now.

Testing of modifications of RiverPro made to support CN RFC-WFO operations is ongoing. These features are provided in OB3.
