Office of Hydrologic Development
Hydrologic Software Engineering Branch
Bi-Monthly Activity Newsletter
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Software for NWS hydrology!

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1.HIGHLIGHTS FOR APRIL AND MAY 2005

This month the NEXRAD RPG software development group published the Level III radar precipitation product specifications for Build 8 on OHD's website.The group's efforts are now focused on Build 9, which will feature the RPG PC-Linux re-host and will not include any new science.Build 9 is expected to deploy in the Spring of 2007.The NEXRAD development group is now beginning to scope out the effort for the upcoming Dual Polarization project.More details below.

The OB6 development of NWSRFS has been delivered to AWIPS and we are starting to work on our OB7 tasks.The OB6 software will be delivered only through AWIPS as the operating system will change in OB6.The RFC-only OB7 task list is considerably more ambitious than the OB6 task list.We are intending to deliver a first version of a distributed model (including just the Sacramento model and routing, like the current HL-RMS), an update to the RRS pre-processor so it can read from both an RDBMS and FS5FILES (this represents a first step towards NWSRFS reading an RDBMS), and the archive database and applications converted to PostgreSQL, as well as updates to the verification program and miscellaneous bug fixes.

For the AWIPS WHFS/IHFS and RFC-WFO shared software, installations and development march on.As reported in the summary status page available via: https://www.ops1.nws.noaa.gov/Secure/awips_softwre.htm., the OB4.x installations are continuing, which includes the introduction of the new Dam Catalog application (DamCREST), which supports Simplified Dam Break Model operations.Release OB5 deployments will begin on June 22; it was delayed until

changes were made to address warning-mode performance issues experienced during beta testing. After many planning and strategy sessions, the schedule for the post-OB5 era has been established.Release OB5.1, which includes a minor upgrade to SiteSpecific, is planned for deployment on August 2.Our team is still conducting formal tests and making some changes to OB6 software, which is scheduled for field deployment October 3, and will include the hydro-VTEC software for use in the Operational Test and Evaluation (OTE).Besides some OB6 testing work, our development is focused 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.Much of the information given below for pre-OB6 versions is unchanged, but is repeated until all offices have moved beyond a specific version.

The OHD HSEB has had some recent personnel changes.Scott VanDemark retired on May 15 after more than 30 years of service.Martin Bennertz, RSIS contractor in the AHPS Group, moved on to another job outside of the NWS.Just prior to this reporting period we added two new RSIS contractors to the AWIPS Group, Mr. Ram Varma and Ms. Varalakshmi Rajaram.The new folks are working on improvements to the OHD QPE software applications.We just received late word that RSIS has found a replacement for Martin Bennertz.He is Mr. Andi Voellmy who will be picking up several software architecture issues left by Martin.Andi starts with us on June 6.

Edwin Welles has accepted a new position as the chief of the Development Branch of the NWS Office of Science and Technology Systems Engineering Center (SEC) working for SEC Director Deirdre Jones.This is a great promotion for Edwin but we will miss him greatly in OHD, especially as the AHPS Group Leader.Edwin's last day in OHD is June 11.While we search for a replacement Chris Dietz has agreed to become the acting Group Leader for the AHPS Group in addition to her Group Leader duties for the NEXRAD Group.

We hope you find this newsletter issue to be helpful and informative, as the newsletter enters its second year of existence. Feedback is always appreciated.

2.DETAILS OF TASKS

2.1NEXRAD SOFTWARE DEVELOPMENT

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

2.1.1RPG BUILD 8

The Level III radar precipitation product specifications for RPG Build 5 through Build 8 are now available on OHD's website:http://hsp.nws.noaa.gov/oh/hrl/wsr88d_prods/index.htm.

2.1.2 RPG BUILD 9

Work for the Build 9 RPG refresh project (migration to Linux) continues.The effort primarily involves regression testing to make sure everything will work under Linux the way it currently works under Solaris.We have identified a number of bugs associated with the change in operating system, as well as two minor pre-existing problems.The development hand-off date for Build 9 is the end of January 2006.Build 9 is expected to deploy in the Spring of 2007 after integration and system testing by the ROC.

As members of OHD we are required to use the Hydrologic Operations & Service Improvement Process (HOSIP) for our Build 9 work.A successful Gate 3 was held on May 25, giving us approval to proceed to the Operational Development stage.

The next NEXRAD Software Recommendation & Evaluation Committee (SREC) meeting is scheduled for June 15-16 2005 in Norman,Oklahoma.The SREC will consider all candidate enhancements for Builds 9 and beyond.

2.1.3 OTHER NEXRAD DEVELOPMENT NEWS

Dual Polarization:The NEXRAD software development group continued to support the Dual Polarization project through regular meetings led by the project manager (Greg Cate, OS&T/ PPD) and the Independent Validation & Verification (IV&V) task lead (Dave Kitzmiller, HSMB). This period we reviewed proposed changes to the NEXRAD System Specification (SS), and accepted an ORDA-RPG Interface Control Document (ICD).HSMB has been evaluating dual-polarization rainfall estimates and expects to complete their evaluation by June 15 2005; HSMB's evaluation of NSSL's new Hydrometeor Classification Algorithm (HCA) is due September 15 2005.With support from OS&T/SEC the NEXRAD software development group will begin to work on implementing a production quality version of the HCA and polarimetric based precip estimate software beginning in FY06.Meanwhile, the Dual Polarization project as a whole is tracked via the NWS Operations & Service Improvement Process (OSIP) (see https://osip.nws. noaa.gov/osip/index.php); an Integrated Work Team (IWT) led by OS&T/SEC (Roger Hall) held its first meeting on May 18.Documents for HOSIP Gate 2, due mid-August, are being prepared by the IWT.

Future Radar Capability Improvements:OS&T/SEC (Mike Istok) is leading an effort to identify and prioritize future candidate radar capability improvements.A second meeting was held on 25 May to discuss recent feedback on the list of proposed improvements.Field offices were

represented at the regional level by the Science Services Division (SSD) Chiefs; representatives from the Norman WFO, OCWWS, OS&T, OOS (ROC), and OHD also participated.Not surprisingly, although there are a total of 68 candidates on the list, the clear front runners included the Dual Polarization, TDWR, and "Super-Res".The NEXRAD software development group will work closely with scientists in HSMB and OS&T SEC to determine what work can be accomplished for Build 10.

Increased resolution DSP product:This project is on hold until a priority can be assigned via the group mentioned above.

Software Engineering:We continue to streamline our software engineering practices, to improve the group's efficiency and pave the way for future enhancements.This period we focused on introducing a new software version control system (S*ubversion*), enhancing our test scripts to minimize human error during execution, using NOAA's CasaNOSA system for project status reporting and tracking, and developing a system to house our test data and results.A task to document the design of the RPG's Precipitation Processing System (PPS) is also underway as a first step toward designing future major enhancements (e.g., Dual Polarization).

Coordination with the ROC:Lt. Col. Randy George (Applications Branch Chief), Mark Fresch, and Dan Berkowitz met with OHD personnel in Silver Spring.With shrinking budgets and growing requirements, we agreed that we must focus on tasks with the greatest impact.Among topics discussed were: future direction, prioritization of tasks, roles and responsibilities, consolidating resources, existing MOUs, OSIP/HOSIP, and PPBES.

2.2AWIPS RELEASE OB4.X

2.2.1RFS

(no updates to this section in this newsletter)
RFS OB4/Release 25 has been superceded by RFS OB5/Release 26.

2.2.2WHFS/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/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.Sites can deactivate their AS servers after the install of OB4.2 and after all local applications have been moved off the AS.

2.2.3PRECIPITATION 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.

2.3AWIPS RELEASE OB5.X

2.3.1RFS

We have issued six interim releases for the OB5-R26 software.There are many interim releases for OB5 because we cannot deliver the OB6 software until AWIPS delivers the new operating system.

a) **FCST**
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.
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

Corrected a problem which caused the Melting Factor Correction (MFC) mod to not be applied for a segment on an hourly time step.Bug R25-65.
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
Corrected a problem with the RES-SNLG operation which caused the inflow time series takes a major dip for the time periods with rainfall.Bug R25-59
b)**ifp_nwsrfs**
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

Corrected a problem which caused the Melting Factor Correction (MFC) mod to not be applied for a segment on an hourly time step.Bug R25-65

Corrected a problem with the RES-SNLG operation which caused the inflow time series takes a major dip for the time periods with rainfall.Bug R25-59

c)FCINIT

Corrected a problem in the FLDWAV operation which caused initial conditions to be improperly computed in some tidal situations.Bug R25-54

Increased the maximum number of rating curves which can be processed in FCINIT and REORDER.Bugs R25-44 and R25-55

d)REORDER

Increased the maximum number of rating curves which can be processed in FCINIT and REORDER.Bugs R25-44 and R25-55

e)ESPADP

Corrected a problem which caused espadp to core dump at CNRFC.Bug R26-14

Corrected the labels in the Forecast Information table with a monthly interval.Bug R25-1

Updated the colors of the flood levels according to direction from OHD Director.

f)IDMA

Corrected a problem which caused the program to crash when trying to manually put in break points with data that goes into the year 2000; the correction factor which is computed comes up negative.Bug R25-56

Corrected a problem which caused the program to crash when using >50 years of data.Bug R26-4

Corrected a problem which caused the plots to be incorrect when the sequence of the stations in the @F card and @S card are different.Bug R25-36

g)XDAT, XNAV and utilities

Updated the programs to use the OB5 database strucutres.Bug R26-19

h)RAX SHEF DECODERS

Time window checking is removed if the data is a forecast value.Bug R25-60

Fixed a software crash problem.Bug R26-6

Fixed problems with insert/update counters.Bug R26-7

Both decoders may now override existing values with missing values if a message instructs it to do so.Bugs R26-8 and R26-9

Fixed decoder to post max/min temperature data to correct table.Bug R26-10

Updated the SHEFPARM file.Bug R26-15

Implemented table changes to unkstnvalue and pehpsep tables.Bug R26-17

Added check to determine if data value is outside a time window prior to posting.Bug R26-21

Added ability for user to turn on messaging if location, ingest filter, or duplicate checks fail. ADB Bug ER-9

Added ability to post to pemrsep, peqfsep, and pehfsep tables.ADB Bug R1-19

Added ability to decoders to enforce the SHEF revision flag appropriately.ADB Bug R1-24

Implemented pempsep table in shef_decode_pro.Un-numbered Enhancement

Added error messaging to log file whenever a query of the archive database fails unexpectedly.Un-numbered Enhancement

Added ability to shef_decode_pro to check the Location and IngestFilter tables before posting data.Un-numbered Enhancement

Implemented part 3 counters for shef_decode_pro as part of the enhancement listed above for the ability to check Location and IngestFilter tables.Un-numbered Enhancement

Implemented the UnkStnValue table for the shef_decode_pro.Un-numbered Enhancement

Messages moved to the individual error files.Un-numbered Enhancement

Made the shef decoders more efficient by removing unneeded "trim" commands used within the SQL statements.Un-numbered Enhancement

Corrected a problem involving the gross and reasonable range checks.Un-numbered Enhancement

The performance logging feature was changed so that each decoder uses a separate flag to turn it on.Un-numbered Enhancement

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 has unfortunately been delayed until late June 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)The VTEC implementation schedule has changed so that hydro-VTEC will not be operational until Spring, 2006.Because of this, there will be no update of RiverPro delivered in OB5.2, as previously mentioned (in fact there is no such release as OB5.2 anymore).OB5.0 RiverPro has many of the changes necessary to support VTEC, but most of these will go unused until VTEC is mandated for hydro products.Release OB6 will include additional changes to match the latest NWS 10-1703 and NWS 10-922 directives.In particular, it will use a new method to determine which forecast points to include and which product category to generate, based on the VTEC events previously issued.

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; and 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 and 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 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 DailyQC (part of Mountain Mapper).

2.4AWIPS RELEASE OB6

The primary purpose of this build is to port our applications to PostgreSQL and to the new RHEL 3 operating system.We have delivered this release to AWIPS.

2.4.1RFS

Thanks to APRFC and NCRFC for installing the build and doing some testing.We rely upon the RFC beta testing to insure we will deliver a release to the field which works, and we thank all of our beta testers past, present and future.In addition to the NC and AP RFC tests we also collected FS5FILES from NWandMB RFCs and we ran their daily jobs with the new release.Proper and sufficient testing is a constant question for us and helpful input on the degree of testing and appropriate procedures is always welcome.

2.4.2WHFS/IHFS DATABASE

Work is complete 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.This change affects both the IHFS database and the DamCREST database.Testing is continuing.

A few features are new to OB6 and include the ability:to view MPE hourly grids in D2D; to

include flow-based impacts in RiverPro, to assign proper durations to AWOS METAR data precipitation data that has unique sensor reset times, and to display Contingency data in TimeSeries.It also includes additional RiverPro changes to ensure compliance with NWSI 10-1703 and NWSI 10-922 changes and to be compatible with the workstation test mode operations to be introduced in OB6.With this latter feature, an AWIPS workstation is designated to be in either 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.

2.4.3 PRECIPITATION PROCESSING

Other than providing the ability to display MPE output in D2D, no work was done in this area for OB6.

2.5DEVELOPMENT SUPPORT ACTIVITIES

2.5.1NEW OHD SOFTWARE ARCHITECTURE

These past two months have been slow months for our Data Services development.We have been reviewing the results of the work done to date and determining what steps to take next.We have written a Statement of Objectives for Phase 3 of the Data Services task and have received a Statement of Work in return from the contractors.We are continuing to clarify the details of Phase 3 of the work.Part of Phase 3 is to evaluate the performance of several methods of collecting observation data out of the PostgreSQL IHFS database.It turns out to be difficult to construct such a test that will be valid and not require implementing a complete solution in an operational office.The departure of Martin Bennertz has slowed our work on developing a Control Service. However, the addition of Andi Voellmy should get that kick started again.

2.5.2AWIPS BETA TESTING

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

Testing of modifications to RiverPro made to support CNRFC-WFO operations is ongoing.These features were initially provided in OB3 and are undergoing field-requested refinements through OB6.

2.5.3AWIPS SYSTEM CHANGES

On the AWIPS systems front, the PostgreSQL DBMS will be used by the hydrologic applications as of Release OB6.The PostgreSQL web site: http://www.postgresql.org and an HSEB http://www.nws.noaa.gov/ohd/hrl/hseb/postgreSQL/index.htm web site provide helpful information in managing this transition.The HSEB has also been active in supporting the NWSTrainingCenter course for PostGreSQL understanding.One course was given in April, and another is planned for July.Paul Tilles from the HSEB helps out on the NWSTC courses.

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 downloadable scripts to convert a site's currentIHFS 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.

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 as the first phase of the OB6 upgrade.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) will be converted to RH Enterprise 3 in OB7 and the database engine will be converted to PostgreSQL.We thank all of our RFC partners in this project, especially Julie Meyer and Steve Shumate who have worked very hard to plan and get started on the OB7 database transition for the RAX.

2.5.4WHFS/PRECIPITATION PROCESSING DEVELOPMENT ACTIVITIES

During the OB6 development period, design work was completed for incorporating the ABRFC P3 application into MPE operations.Improvements are planned for the MPE component in HydroView to improve the management of user polygon edits in gridded precipitation fields.This activity will be delivered in OB7.

Work also continues on a new task implementing the "Mapper" (not to be confused with the Mountain Mapper) function into WHFS.The Mapper currently operates as a local application used primarily in the Western Region.It provides a robust method for displaying hydrometeorological data, similar to the existing WHFS TimeSeries and HydroView point data control functions.Its benefit are in its more direct methods for displaying desired data sets (i.e., less clicking), its time-stepping features, and its speed of display.Implementation of Mapper functionality into WHFS will allow the existing local application, which is dependent in part on the Western Region HydroMet system to be retired.

Also, design work is beginning for incorporating the DailyQC 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.