Hydrologic Ensemble Forecasting Service (HEFS)

Seminar D

ConOps Discussion

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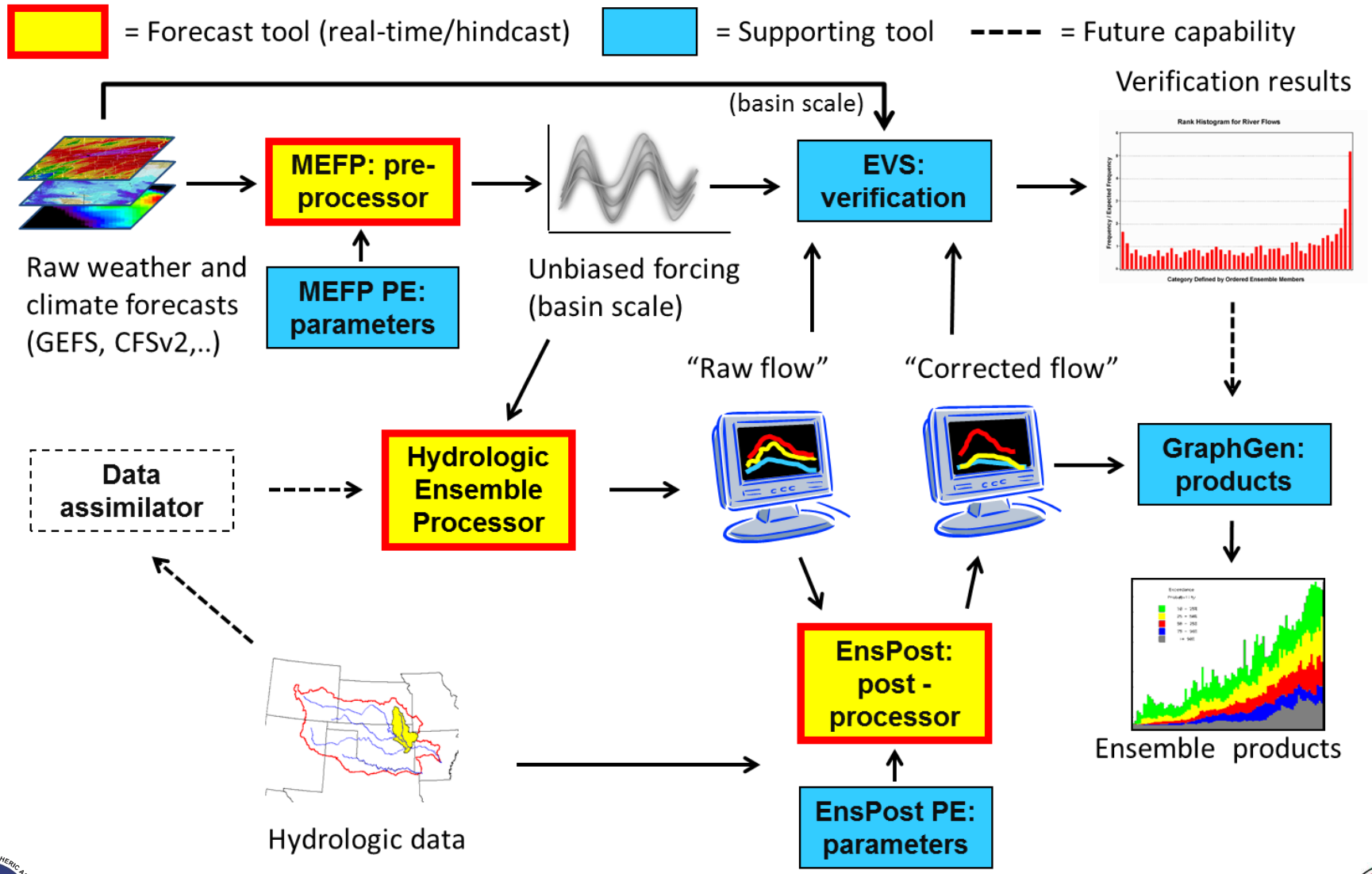
HEFS Training Workshop 4, Silver Spring, MD
September 19, 2013

HEFS Components



Status of HEFS ConOps

- **Less progress than planned since last workshop (May ’13)**
  - Last month (August 2013) a small group started meeting regularly (Ernie Wells, Lee Cajina, James Brown and Mark Fresch)
  - Early October, plan on two days of HEFS ConOps and planning
  - In late 2010, HEFS High Level Requirements/ConOps took several months of dedicated effort
  - Have some recommendations on how to run to get the best results
  - Need more interaction with RFCs

- **Propose using a session of the next workshop (Dec ‘13) to work on the ConOps with the RFC Test Team. More interactive – not just a presentation**

HEFS ConOps - Proposed schedule

- **Now until Nov 1, 2013: Ernie, James, Lee, and Mark rough draft**
  - Rough draft to HEFS RFC Test Team on Nov 1st
- **Nov 1 - Dec 6: HEFS RFC Test Team review and feedback**
- **Dec 9 (week of): Interactive session during HEFS Workshop**
- **Dec 20 – Jan 14, 2014: Second draft to HEFS RFCs (not just the test team) and OHD Mgmt for review and feedback**
  - Teleconference discussion on Tue., Jan 14, 2014
- **Jan 22 – Feb 11: Draft to all RFCs and OHD Mgmt for review and feedback**
  - Teleconference discussion for all RFCs and OHD Mgmt on Tue., Feb 11th
- **Feb 15 – March 1: Final draft to all RFCs and OHD Mgmt for final review**
  - Teleconference discussion for all RFCs and OHD Mgmt on Tue., Mar 4th
- **Complete March 8, 2014 (AOP)**

Existing and Planned use of HEFS at RFCs

- **AB (Eric Jones):**
  - Existing: running on approximately 50 forecast locations
  - Plans: initially use HEFS for water supply forecasts in their western basins. Start with 90 day forecasts, including CFSv2 forcings, and plan to move to 9 month forecasts. So far, they've seen decent skill over the past year with the long range HEFS forecasts, but hindcasting and verification is needed. Short-medium term forecasts will be more appropriate in their eastern basins. Eric noted that he's concerned about mismatches between the operational forecasts and HEFS forecasts due to MODs. However, they may provide HEFS "as is" and tell customers about the potential mismatch, as is done with MMEFS forecasts.

Planned use of HEFS at RFCs

- **CB (John Lhotak):**
  - Existing: running on all locations above L. Powell, approximately 240 locations, and adding locations draining into Great Salt Lake.
  - Plans:
    - Add EnsPost to existing runs after the up-coming build.
    - Hindcasting/verification on HEFS performance on the Bear R. basin and potentially other locations (because of interest from an outside customer).
    - Use HEFS forecasts for long-range, water supply. This up-coming season provide the forecasts as "experimental" via the web-page. For forcings for this purpose, they will use resampled climatology, but may not use GEFS.

Planned use of HEFS at RFCs

- **CN (Brett Whitin):**
  - Existing: running on operational CHPS for approximately 150 locations (with EnsPost?)
  - Plans: hindcasting

Existing and Planned use of HEFS at RFCs

- **MA (Ned Pryor):**
  - Existing: running on all (14) NYCDEP locations, with specific settings (e.g. local flows) and running (or soon to be) all Delaware R. locations (includes NYCDEP locations) with EnsPost and total flows for internal use
  - Plans:
    - Support the NYCDEP HEFS runs
    - Considering comparing HEFS to MMEFS.
    - Start using ensemble graphics for short-term ensemble forecasts.

Planned use of HEFS at RFCs

- **NE (Erick Boehmler):**
  - Existing: running on all (6) NYCDEP locations, with specific settings (e.g. local flows)
  - Plans:
    - Consider both short-term and longer-term applications for this software. As indicated in a presentation locally on HEFS, in the short-term NERFC will be looking forward to replacing our weekly ESP based 90-day forecasts with HEFS based forecasts by use of the GEFS and climatology forcings, at least. Need to determine whether or not the CFSv2 based forecasts for the 16 to 90 day period are forcings we will want to include. Plan to generate for our own information some of the verification statistics to further document skill in forecast flows for different forecast ranges involving GEFS, CFSv2, and climatology forcings in our 90-day window.

Planned use of HEFS at RFCs

- **NE (Erick Boehmler):**
  - Plans continued:
    - Besides these publicly available forecast products, we will continue to provide the non-public ESP and HEFS output in support of OST for NYCDEP. We anticipate expanding our non-publicly available HEFS ensemble data and /or products for use by the NY Canal Corporation and the Massachusetts Water Resources Authority.
    - On the longer-term, we want to derive MEFP parameters based on our 2 to 3 day QPF/MAP, QTF/MAT records to provide uncertainty information in our regular publicly available forecast plots. As part of providing these deterministic forecasts with uncertainty information we plan to pursue hindcasting and verification statistics for forecast flows to demonstrate skill / performance measures concerning our locally adjusted / derived QPF / QTF and those from straight GEFS forcings.

Assumptions

- **Assume that HEFS will eventually be run at many locations at all RFCs with forecasts available directly to end-users**
  - Eventually replace AHPS-ESP runs
  - Provide more skillful forecasts and more information for internal and external use (i.e. products)

- **Many flavors of HEFS based on customer and RFC needs**
  - Water supply
  - Flooding
  - Short-term v. long-term
  - Frozen (i.e. NYCDEP) vs. continuous updating

Assumptions (continued)

- **As a result, some (all?) RFCs will likely have multiple and different HEFS runs (similar to ESP)**
  - Dictated by local needs, such as forecaster guidance, specific customers
  - So far, in testing at OHD and use at RFCs, HEFS runs don't take much longer than ESP runs
  - Unknown how many HEFS runs can be added. Likely depends on the RFC

Goal of HEFS ConOps

- **ConOps Goal: Describe the characteristics of a system from the viewpoint of users**

- **HEFS ConOps Goal: Describe the characteristics of HEFS from the viewpoint of users**
  - Users: RFCs, OHD/National Water Center?, others?)
  - HEFS:
    - This phase of HEFS development, extended beta testing period at the five HEFS Test RFCs and
    - Eventual national use (by all RFCs)
  - First step? Describe national HEFS runs for eventual AHPS-ESP replacement

National HEFS runs

- **National HEFS run for eventual AHPS-ESP replacement**
  - Provides HEFS forecasts in consistent manner
  - Based on best / recommended settings
  - Remote runs, for example at the National Water Center (NWC)?
    - OHD/HSD is starting to do this now with MA and NE RFCs HEFS runs for real-time testing at HQ (output goes nowhere)
    - Alleviate run-time demand at RFCs
    - Alternate is to have each RFC provide one set of HEFS runs, e.g. similar to AHPS-ESP runs now
      - Is this doable? A good idea?
  - Provide this HEFS run (or another 'best' run?) for regular archive and verification, whether or not it is from the RFCs or NWC
    - Consistent archiving
    - Alleviate local archiving requirement?

National HEFS run

- **National consistent HEFS run continued**
  - Should this be a “pristine” run?
    - Use RFC configuration and parameters, no warm states, no MODs, similar to NYCDEP runs, and perhaps others
    - Makes sense from a scientific standpoint, but is this realistic in operations?
    - Consequences?
      - Pristine run will result in ensemble forecasts which don’t envelop (or closely match) the operational deterministic forecast, especially near T0
      - Non-pristine runs risk inconsistencies (e.g. probabilities)

Questions?