

**HFIP Annual Meeting Agenda**  
**Day 3 (Nov 19, 2020)**  
**12 noon - 5 pm ET**

**Notetakers:** Sikchya Upadhayay and Karen Keith

**Thursday, November 19, 2020**

**12:00 noon - 1:00 pm : HFIP (FFO) Funded External Research Reports**

12:00 noon      Using Dynamically-Based Probabilistic Forecast Systems to Improve the NHC Wind Speed Products (Alan Brammer/Andrea Schumacher)

- Global ensembles can provide useful uncertainty metrics
- Should be able to follow bimodal distributions

12:10 pm      New Frameworks for Predicting Extreme Rapid Intensification (Jonathan Vigh)

- Four areas - coupled system, ensembles, data fusion, intensification rates
- Deep learning and CNN provide skills in predicting RI
- SWAMI: forced balanced axisymmetric model
- Add tools for the public to access
- Implement GRIP

12:20 pm      Rapid Intensification Changes: Improving Sub-Grid Scale Model Parameterization and Microphysical-Dynamical Interaction (Ping Zhu)

- Tested HAFS-B for stability correlation
- TKE with stability tested with HAFS-A
- Forecast improved in HAFS-A
- New particle force perturbation was tested in HWRF
- Pathway to TC intensification

12:30 pm      Evaluating Initial Condition Perturbation Methods in the HWRF Ensemble Prediction System (Ryan Torn)

- Milestones: validate HWRF ensemble based probabilistic winds and rainfall forecasts; explore ensemble based sensitivity to understand sensitivity of hazard forecasts to forecast fields at earlier times

12:40 pm      Advanced DA Techniques for Satellite-Derived Atmos. Motion Vectors from GOES 16/17 in the HWRF (Agnes Lim)

- Milestones: dev HWRF quality control procedures hourly and 15-minutes; impact assessment
- 15-min winds - not handed over to NCO yet
- AMV above 125? Cut off at 100 mb; not much winds above

12:50 pm      Enabling Cloud Condensate Cycling for All-Sky Radiance Assimilation in HWRF (Lewis Grasso)

**Action Item 7:** Address the HFIP supported external research project that got caught up in machine access issue, and was not able to complete the project on time and unable to transition the research.

**1:00 pm - 1:30 pm : HFIP Supported External Research Reports**

1:00 pm      Ground-based Radar DA in HWRF Hybrid Ensemble-variational (Xuguang Wang)

- Also have delayed access to JET
- FL expected to be 7-8

1:10 pm      FV3 Model and Ensemble-based DA for Convection-permitting Hurricane Analysis and Prediction (Xingchao Chen)

- Frank would like to see him work with Jason Sippel and others; get him on Orion if he will continue this work

1:20 pm      DTC Updates (Kathryn Newman/Bin Liu)

- Centralized HWRF repository
- Provide user and developer support, moving to forums
- Encourage community to be more active in forums
- HWRF system was ported to Orion
- HAFS repository - 3 tier repository: Authoritative, community and personal
- HAFS subcomponents/submodules, quick start is available for users
- HAFS governance and regression testing, more eyes on the codes
- Frequency of sync between hafs-community and authoritative repository

**1:30 pm - 4:50 pm: HAFS Development and Computations**

1:30 pm      HAFS Configuration Strategies (Avichal Mehra)

- Four configurations of HAFS
- HAFS implementation planned right after the moratorium period
- Maintain the current CONOPS - 5 storms in NHC responsibility, maximum 7 storms in all global, maximum 12 storm for HWRF-HMON
- Need to develop functionality - coupling, VI, DA, workflow
- HAFS IOC based on evaluation
- Resources - op 833 nodes
- Target 1 options (slide 9)
- Need for FY21 season: (slide 10)
- FY22 IOC: separate domains, VI, coupling with ocean, DA
- Target option 2, to replace HWRF, 2B to replace HMON
- Target option 3A - basin scale at 4.5km, 127L
- Target option 3B - back-up for 3A

1:45 pm      Grid and Nesting Developments (Xuejin Zhang)

- Moving next development approach - telescopic and moving nest
- Moving nest running successfully
- Storm tracking algorithm (slide 7)
- Significant progress on moving nest, full functionality coming in months
- Roadmap to HAFS outlined (slide 11)

2:00 pm      T-Shield (Morris Bender)

- Key features of 2020 t-shield - updated core, microphysics, cloud-radiation schemes, nest refinement, new advection schemes
- Retrospective testing of 2020 version has encouraging results
- Intensity composite, ice-radiation interaction comparison shows improved track and intensity forecast
- Did not perform as well as GFS in track forecast but comparable to HWRF
- Spatial error distribution was different
- Top performer at short lead time for intensity
- Small bias compared to op. Models
- GFDL is currently evaluating model improvements for 2021

2:15 pm      LAM FV3 testing (Curtis Alexander)

- Considering a large RRFS domain 3km
- Lot of physics development (slide 5)
- FV3 LAM - interfacing DA, latent heat forcing
- 22hr forecast of composite reflectivity
- FV3 LAM testing in WPC
- Testing FV3 LAM ensemble
- Documenting FV3 LAM and pp tools
- LAM release Dec/Jan timeframe
- How does this synergize? Utilize the maximum what they are doing? Discuss later in the meeting

2:30 pm      Development of Coupling Strategies for HAFS (Avichal Mehra/ Dan Rosen)

- Major upgrade of RTOFS - implementation by Dec 8
- HAFS-A coupled with HYCOM
- Coupled version of HAFS-A showed improved in intensity esp. In lead times
- Larger negative bias in v<sub>max</sub>
- UFS coupled model dev - six applications (slide 14)
- Transitioning to CMEPS which uses NUOPC layer
- Wave coupling (three way)
- Coupled HAFS ocean DA using JEDI framework
- Advance DA and coupling of air-sea models in support of improved flood and inundation forecasting through coordination with NWS and NOS
- REgional ODA.

3:05 pm      Physics Priorities (Chunxi Zhang)

- The PBL schemes TEDMF has mixed results for V<sub>max</sub>
- Thompson schemes have improved results
- R34 bias small in SAAS scheme compared to Thompson scheme
- Also tested E-epsilon scheme
- Track improvements - large-scale circ.
- Intensity - land sea interaction
- Stratified verifications? Didn't separate strong and weak storms

3: 20 pm      CCPP Physics suite options for HAFS (Man Zhang/Mrinal Biswas)

- Multiple suites supported by CCPP

- Overall performance - excessive storm size in HWRF physics suite
- Testing sensitivity of the storm structure to cloud/precip physics
- CAPP is being used with SCM and HAFS apps.
- First HWRF suite in HAFS are promising - better mean track, cross track,
- On con side, excessive storm size, faster storm

3:35 pm      DA Advancements and Use of observations (Jason Sippel/Zhan Zhang)

- Improvement by providing large scale and vortex structure
- Leverage HWRF DA techniques to improve vortex structure
- Long term - multiscale DA for TC, JEDI transition
- HAFS ENSDA workflow
- Testing 3Dvar, 3DENvar for hurricane Laura
- GSI based TC relocation
- Storm scale before and after DA and GSI increments
- 3DENvar HAFS testing prove the initial compatibility
- First operational HAFS DA system with several target options (slide 14)
- Future work - leverage options from global DA, continue adding to workflow

3:50 pm      HAFS Workflow (Evan Kalina)

- Current HAFS workflow is rocoto based, supported on Jet, Hera and Orion
- Python elements are in the scripts
- HAFS workflow with ocean coupling
- Developing potential HAFS workflow with DA
- CROW review earlier this year, a configuration manager, will create a unified workflow manager
- Advantage of crow is to unify with global workflow; CROW review in April 2020
- CDEPS - community data models for earth prediction system - allows to make the coupling modeling system simpler
- CDEPS will add hierarchical testing capabilities
- Suggestions/feedback requested for CDEPS capabilities

4:05 pm      HAFS Computations (S. Gopal/Frank Indiviglio/Vijay Tallapragada/Gus Alaka)

- Priorities: user priorities, use engagement, mission focus, modernize with technology, make small bets for future success
- Plans to expand to cloud computing
- HUG to help with users needs
- Jet usage not optimal, old systems still being used by some users, most partitions are idle and unusable
- More burden into WCOSS, new WCOSS2 coming online soon
- UFS-R20 has 16M requirements but how do we meet that as HSUP projects ends
- HSUP2 requirements 65M
- HPC user issues - reservation unreliable for several days, esp for cycled runs, lack of disc space, who gets priorities, revisit the allocation method
- Ideas for Improvement - reservations on Orion or Hera, more resources for fallback options, full data access for DA on Orion, continue to build relationship with RDHPCS

**4:20 pm          Open Discussion (30 mins)**

- HPC issues

Q. What happens when we get 25 petaflop resources?

A. Working with budget and line offices

Q. Can Jet be refreshed?

A. Working on it!! Planning on funding to invigorate

Q. Should resources be used to upgrade Jet or expand Hera?

A. Looking into options.

- Access issue in Orion - easily to get an account

Q. How do we run the exp. On Orion on the HFIP funded projects? User support needed.

Q. In FY22, 90M needed, how do we fulfill that?

**Action item:** Tiger team for HPC

- Gradual decrease of use of Jet
- Next year real time needs new resources as Jet may not be able to support it fully

**4:50 pm          Meeting Summary and Concluding Remarks (Frank Marks)**

- Respond to SAB
- Six key strategies success in 2020
- Forecasters issues identified
- Model evaluation recommendations
- Need guidance evaluation

**5:00 pm          Adjourn**