HAFS Coordination Meeting Minutes
June 3, 2020 (2-3 pm ET)

Participants: S. Gopal, Frank Marks, Henry Winterbottom, Xuejin Zhang, Andy Hazelton, Bill Ramstrong, Gus Alaka, Avichal Mehra, Bin Liu, Jili Dong, Zhan Zhang, Man Zhang, Mike Ek, Evan Kalina, Mrinal Biswas, Tara Jensen, Ligia Bernardet, Morris Bender, Tim Marchok, Dan Rosen, Youngsun Jung, Ligia Bernardet, Sikchya Upadhayay.

EMC (HAFS-SAR Development and Workflow Updates -Jili Dong and Bin Liu)

HAFS-SAR Development

- Testing horizontal advection scheme (Hord5 and Hord 6) with Lateral Boundary blending rows (10, 20)
    - Track sensitive to hord, hord6 smoother than Hord5 with larger storm size
    - Need more cases to test hord5 stability and compare to hord6 in track, intensity and size forecasts, plan to verify with obs. in future
    - Further test on blending rows (20, 10 or less)
- Increasing horizontal resolution for HAFS-SAR
    - With increasing horizontal resolution from ~ 3km (2019 HAFS) to 2 km and 1.5 km with static HAFS SAR domains, stronger storm is predicted in higher resolution
- Testing with 3 km Extended Schimdt Gnomonic (ESG) grid
    - With ESG 3 km grid, 22% computing time is reduced when compared to GFDL 3km by increasing timestep
    - Plan to continue to explore in the 2020 real time experiment of HAFS V0.1J with lower model top, increased vertical resolution to 75, and scale-aware cumulus convection.

WorkFlow Updates

- Recent updates in the HAFS workflow system
    - Upgrade from Python2 scripts to Python3
    - Sync submodules with their develop/master branches, next round of sync will be after a newer version of dycore and the HWRF CCPP suite are updated in UFS-weather-model in about 1-2 weeks
    - Added the capability to do lateral boundary condition blending for the regional configuration
    - Enabled using different vertical levels/distributions: GFS/HAFS_L64, HWRF_L74, L75, L85, L91, L96, etc.
    - Enabled using grib2 format GFS input files to generate model initial conditions.
- Ongoing developments in the HAFS workflow
    - Jet disk migration and directory change - in a feature branch now, but will soon be ready to merge back into the develop branch
    - HAFS-HYCOM coupling: workflow is ready to support both uncoupled and coupled runs in different modes - running side by side with no variable

exchanges, direct coupling through nearest point regridding method, etc.; direct coupling through bilinear regridding method is ongoing
    - Enable supporting multiple static global nesting in the workflow is ongoing: the workflow has been generalized to support both one and multiple (2+) global static nests for the pre-processing and forecast jobs.
- Connecting with HRD GPLOT graphics package.

Q. Any technical documentation for developers? Yes, a possibility.

AOML (HAFS Development at AOML- Xuejin Zhang, Bill Ramstrom, Andy Hazelton, Gus Alaka)

- HAFS moving nest
    - Optimizing moving nest code in open MPI
    - Integrating moving nest in dycore
    - Preparing to run real time experiment with HAFS-globalnest (HAFS v0.B) with single Atlantic nest on Jet.
- HAFS Physics development and evaluation
    - Modifications to EDMF-TKE were made based on observed height and mixing length
    - Results compared to default and modified EDMF-GFS, modifications improve inflow structure and TC intensity
- Basin Scale HWRF configuration same as operational HWRF with multiple (upto 5) storm capability
- Capability to produce GPLOT graphics for all HAFS (& HWRF-B) experiments (Maps, Storm-centric, SHIPS, Guidance & Verification); view HAFS graphics side-by-side with operational model graphics (GFS, ECMWF, HWRF)
- Graphics shown on the AOML Hurricane Model Viewer at https://storm.aoml.noaa.gov/basin.

GFDL (Proposed 2020 GFDL T-SHiELD Near Real-Time System - Morris Bender)

- 2020 T-SHiELD was evaluated on selected cases from past 5 hurricane seasons for a robust sample of 200+ cases
- Multi-Season evaluation demonstrated a 16-20% reduced track error in 3-5 day lead times compared to the operational GFSvs15
- Improved Atlantic track skill appears to be a combination of running less diffusive advection scheme and improved model physics. Most promising physics upgrades appear to be a combination of disabling deep convection and returning of the shallow convection scheme.
- 2020 T-SHiELD is demonstrating significant intensity skill, with lower intensity errors compared to the HWRF in 4-5 day lead times. This is likely due to the combination of recent FV3 and physics upgrades.
- 2020 T-SHiELD is showing promise in prediction of RI in some of the RI events evaluated.

- Preliminary 2020 T-SHiELD track performance in the eastern Pacific is comparable to GFSvs15 after some modifications were made to topography (smoothing of highest mountains).
- 2020 T-SHiELD will be run in the Atlantic Basin for all Invests to give a robust evaluation of model skill for TC genesis.

Q. Can T-shield go up to Mexico? Yes.
C. Hord5 is good for track, if there is no deep convection, it is not ideal for intensity.

DTC (DTC updates on HAFS development - Evan Kalina/Man Zhang/Mrinal Biswas)

- HAFS Infrastructure
  - Planning on distribution of CROW report.
  - Working with NCAR to integrate CROW report into HAFS workflow.
  - Working on developing a prototype HAFS workflow that incorporates CIME for HAFS coupled forecast system.
- HWRF Physics in CCPP
  - HWRF Physics suite into CCPP has been completed.
  - Testing on HAFS 0.A has been launched.
  - In the preliminary results, differences in precip and wind fields are seen, need more cases for testing.

NCAR (MetPlus for HAFS - Tara Jensen/Mrinal Biswas)

- Received radar data from HRD to get started on the project.

NESII (HAFS Developmental Updates - Dan Rosen)

- Directly coupled FV3-HYCOM using nearest neighbor remapping is complete with unrealistic extrapolation.
- Directly coupled FV3-HYCOM using bilinear interpolation with merged GFS/climatology is in review.
- CMEPS coupled DATM-HYCOM using CIME infrastructure is complete.
- Directly coupled FV3-HYCOM workflow is complete.