HAFS Coordination Meeting Minutes
June 24, 2020 (2-3 pm ET)

Participants: H. S. Kim, Morris Bender, Evan Kalina, Lin Zhu, Gopal, Andy Hazelton, Mrinal Biswas, J-W. Bao, Li Bi, Youngsun Jung, Lew Gramer, Tim Marchok, Xuejin Zhang, Man Zhang, Chunxi Zhang, Ligia Bernardet, Gus Alaka, Kyle Ahern, Mike Ek, Jili Dong, Bin Liu, Daniel Rosen, Farida Adimi, Weiguo Wang, Avichal Mehra, Kathryn Newman, Tara Jensen, Vijay Tallapragada, Zhan Zhang, Linlin pan, Sikchya Upadhayay.

EMC (HAFS v0.1A and HAFS 0.1J -Jili Dong and Bin Liu)

HAFS v0.1A Development

- Preparing to run HAFS V0.1A Stand-Alone Regional (SAR) and ocean-coupled (HAFS-HYCOM) real-time experiment with CCPP physics for the 2020 hurricane season. The experimental design includes,
    - slightly increased domain size
    - increased vertical levels from L64 to L75 in lower and middle layers
    - lateral boundary condition blending with nrows_blend=10
    - GWD parameterization turned off
    - reduced radiation scheme time step from 3600s to 900s.
- Performance of the HAFS V0.1A baseline configuration from retrospective tests for some selected 2019 NATL storms shows 5% improvements at all lead times for both track and intensity forecasts.
- HAFS V0.1A further development and retrospective tests includes testing an alternative L91 vertical level/distribution, different GWD related options, hord=6 with shallow convection on together with high entrainment/detrainment rates, and exploring GSI-based TC relocation and simple 3DVAR DA.

HAFS 0.1J Development

- Preparing to run HAFS 0.1J SAR on ESG grids and reduce the computation.
- Comparison of different levels - L64 and L75 for Hurricane Dorian showed very similar performance for track and intensity forecasts. L75 has more cycles of storm when weakening.
- Testing with TS Cristobal showed - L64 has better track forecasts from Day 2-4 and L75 slightly better in intensity forecasts at Day 3-5.
- Further ongoing tests are horizontal advection of hord 5 vs. 6, sale-aware cumulus convection, HWRF CCPP suite and TKE EDMF.

Q. Are domains for HAFS 0.1J the same as HAFS 0.1A? Yes, only NATL.
Q. What is HYCOM resolution? 9 km.

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

- Preparing to run HAFS v0.1B realtime experiment on Jet over NATL for 2020 hurricane season. A double nested experiment is planned to be explored on Orion.

    - Workflow changes include output of global netcdf FV3 tile, installed tracker and GPLOT graphics added in workflow.
- HAFS Physics development and evaluation - continue to modify PBL schemes (EDMF-TKE) based on comparison with observations.
- Preparing to run HWRF-B for real-time experiment with self cycles DA for 3 storms.
- Graphics will be available on AOML Hurricane Model Viewer.

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

- Initial tests with increased vertical levels in GFDL 2020 T-SHiELD (63 to 70 levels) produced only modest improvement in track skill (7% at 3 days) however the sample size was quite limited. Intensity skill was a bit degraded at day 3 and 5.
- Improvement in wind radii was tiny, further tests need to be done with additional increased resolution in the boundary layer. However YSU PBL parameterization is likely not as impacted by vertical resolution as TKE-EDMF based schemes.
- Increased overhead was minimal only 5%, demonstrating the potential benefit of utilizing the FV3 vertical nested capability for the FV3 community, to improve vertical resolution within the high-resolution nests.
- The GFDL approach using a highly accurate remapping for vertical interpolation may be a more accurate approach than chgres.

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

- HAFS Infrastructure
    - CROW review report is completed and shared with EMC partners, hurricane app leads in early July.
    - Report is available on DTC website- report link.
    - One anticipated outcome of the report is to facilitate a decision by EMC on whether to use CROW in HAFS. Suggest decision by September 1, preferably sooner.
- HWRF Physics in CCPP
    - Successfully tested HWRF physics on Orion for both HAFS 0.1A and HAFS 0.1B at DTC.
    - Test results on track forecasts with HAFS physics suite with Dorian and Humberto shows larger cross track bias specifically for Humberto, while the HWRF physics suite produces encouraging track results with both regional and global-nest configuration.
        - HAFS A with HWRF physics tend to produce larger storm.
        - HAFS A with HAFS physics suite decreased downward solar radiation directly induces a reduction in surface fluxes, so buoyancy could be decreased and convection could be reduced.
    - Tested HAFS using HWRF physics suite (NCAR) on Orion
        - HAFS A produces produces better track forecast
        - HWRF physics suite produces larger storms.
        - Rainbands are more prominent in HAFS B with HWRF physics.

        - Area-averaged precip time series over entire 3 km domain shows same trend as the storm environment.

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

- TDR data is used for HAFS testing.

GSL (HAFS development at GSL - Curtis Alexander via email)

EMC and GSL have recently been doing some testing of the Hurricane Dorian case using the ESG grid formulation of the SAR FV3 (CAM). Additionally, we're still running some tests of that same Dorian case with a CAM physics suite to look at track/intensity forecasts. We'll have more reports in a future meeting.

NESII (Updates on HAFS Coupling with ocean model - Dan Rosen)

- Testing two-way coupling of FV3 and HYCOM - added windspeed computations, fixed cold bias in CCPP configuration and optimized HYCOM NUOPC cap.
- The test result showed the HYCOM fluxes are lagging when compared to RTOFS.
- Next steps planned - expand HYCOM domain, smoothing FV3 points outside HYCOM and HYCOM points outside FV3, adding mediator (CMEPS) and evaluate computational resources.