2020 HAFSV0.1B
(Global-Nested HAFS)
Real-Time Results

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2020 Real-Time Configuration

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- HREx real-time demo
- Global-nested HAFS (HAFSV0.1B)
- 3-km horizontal resolution
- L75 (2019 L64) with enhanced PBL resolution
- Slightly smaller Atlantic nest
- EDMF-TKE with modifications for hurricane PBL (MEDMF-TKE)
- Other physics options similar to the 2019 version
- Over 400 total cases in 2020

Grid Layout for 2020 HAFSV0.1B

Eddy Diffusivity from Several HAFS PBL Schemes and Observations
Summary Stats: Track

➢ HAFSV0.1B generally has lowest error out to D5
➢ Similar to GFS D5/6
➢ Slight degradation at D7 (small sample)
Summary Stats: Wind Radii

➢ R34 bias greatly reduced in HAFS-B
➢ Likely tied to PBL scheme (both HAFS-A, HAFS-B had more levels)
➢ HAFS-B RMW bias slightly higher than HWRF/HMON early (resolution & initialization)
HAFSV0.1B had a high bias at longer leads
Some of this may be due to the lack of ocean coupling
PBL physics may need to be slightly adjusted
Summary Stats: Rapid Intensification

➢ 24-hour intensity change vs. observed is fairly well-calibrated
➢ Overall RI skill is similar to HWRF/HMON
➢ This should improve with vortex DA
Hurricane Laura

- Tracks right of observed initially
- High bias from these runs due to missing Hispaniola
- Runs in the Gulf of Mexico got TC structure better

Top: All Laura Tracks, Bottom: All Laura Intensity Forecasts

Top: Model Vt (r-z mean)
Bottom: P-3 observed Vt (r-z mean)
Texas or Louisiana?

A few cycles where HAFS-B, HWRF were showing SW Louisiana, HAFS-A, HAFS-J Texas

Large-scale fields similar. Possible western boundary/2-way feedback differences
Hurricane Delta

- Slight right bias early
- Landfall location generally well-predicted
- Caribbean RI/RW missed
- TC structure too broad
- Secondary intensification in the Gulf well predicted
Hurricane Delta: Asymmetric Shear

- TC located farther south within shear band in reality
- Shear band stronger than forecast (orange circles), especially in upshear quadrants (red circles)
- This may have resulted in greater vortex tilt and/or ventilation that caused a weaker TC
2020 Summary

➢ Large set of cases from a very busy season
➢ Track skill of HAFSV0.1B was very good compared to other models
➢ Some issues with long-range intensity (high bias)
➢ RI skill was reasonably well-calibrated
➢ Hurricane Laura had a right bias; Gulf RI well-predicted
➢ Initial RI/RW of Hurricane Delta missed (asymmetric shear?)
➢ All 2020 graphics at: https://storm.aoml.noaa.gov/basin/?projectName=BASIN
Planned Upgrades

- Multiple static nests (prototype already working)
- Forecasts in other basins
- Moving nest addition
- Improvements to resolution (horizontal and vertical)
- Ocean coupling is needed to help with high bias
- Continuing model physics development and evaluation
- Use of observations to evaluate upgrades
Questions?


Texas or Louisiana?

➢ HAFS-A shortwave was too negatively tilted
Texas or Louisiana?

- HAFS-B had a more realistic positively-tilted shortwave
Hurricane Sally

- Moderate shear and asymmetry well-predicted
- Slight left bias in some cases, but track generally good
- Intensity “double peak” mostly missed