## Evaluation of Increased Vertical levels Within 2020 T-SHiELD

- Increase of vertical levels from 63 to 79 <u>only</u> within 3km nested domain. Global domain remains <u>unchanged</u>
- Utilizes <u>vertical nested capability</u> within FV3 core (controlled by parameters npz and npz\_type in the nest namelist)
- Significantly reduces increase in overhead (~5% increased run time for 25% increase in number of vertical levels)
- Vertical interpolation of the initial condition in SHiELD onto the new vertical level setup is done on-line using a highly accurate remapping
- First test only slightly increased PBL resolution (increase of 12 to 15 vertical levels below 850 hPa)





COMPARISON of GFDL MODELS vs. OPERATIONAL MODELS 2018 - 2019 SELECTED CASES



COMPARISON of GFL Models vs. OPERATIONAL MODELS 2018 - 2019 SELECTED CASES



## COMPARISON of 2020 T-SHIELD VS. OPERATIONAL MODELS 2018-2019 SELECTED ATLANTIC CASES



- Initial test 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 days 3 and 5.
- Improvement in gale wind radii was tiny, however further tests need to be done with additional increased resolution in boundary layer. However YSU PBL parameterization is likely not as impacted by vertical resolution as TKE-EDMF based schemes.
- However 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 then chgres