

A decorative horizontal bar with a black segment on the left and a green segment on the right is positioned above the title.

Performance and Evaluation of HWRF driven by FV3GFS for 2018 Hurricane Season

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HFIP Annual Meeting, November 6, 2018

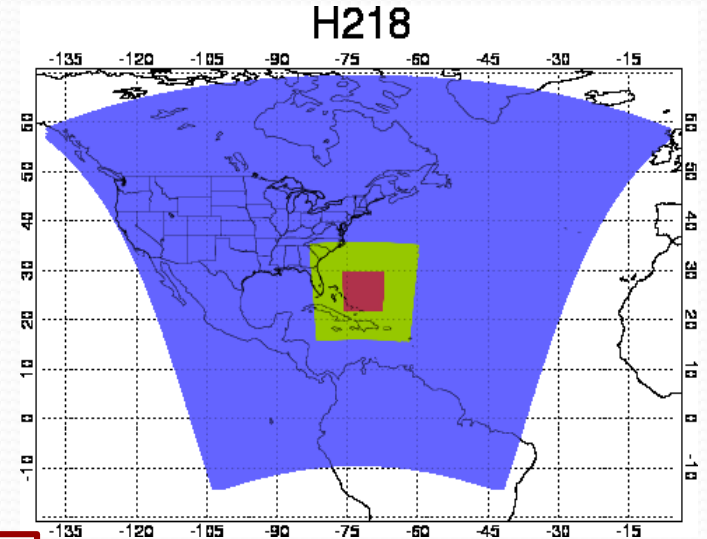
HFIP real-time Parallel HWRF experiment

- **HWRF configuration similar to 2018 Operational configuration***
- **Use FV3GFS model outputs as initial and boundary conditions**
- **Validate the FV3GFS based HWRF real-time runs (HFV3) against FY2018 operational HWRF runs**

Highlights of HWRf driven By FV3GFS Configuration

- Microphysics: Ferrier-Aligo
- Radiation: RRTMG with a modified cloud overlap method
- Convection: Scale-aware SAS
- PBL: GFS Hybrid Eddy Diffusivity Mass-FLUX
- Land Surface: Noah Land Surface
- Surface Layer: GFDL
- Ocean: MIPOM-TC with Unified HWRf/HMON coupler

- GSI : Self cycled DA is disabled.
- S218:
 - New method to merge GSI increments to update HWRf analysis
 - New blending method
 - New merging method in relocation for merging the domains
 - Change the method used to cycle the ENKF domains with the GFS, within identical domains, and relaxes the data-assimilation results to the GFS at the respective boundaries



Res: 1.5/4.5/13.5 km
d01: 390 x 780 (77.2°)
d02: 268 x 538 (17.8°)
d03: 268 x 538 (5.9°)

75 vertical levels with model top at 10 hPa

List of storms conducted in 2018 Hurricane Season

North Atlantic Basin

Strom Name	Start Cycle	End Cycle	# of Cycles
Ernesto 05L	2018081518	2018081800	10
Florence 06L	2018083012	2018091600	66
Gordon 07L	2018090218	2018090500	10
Isaac 09L	2018090818	2018091418	27
Leslie 13L	2018092312	2018100412	41
Michael 14L	2018100706	2018101206	21
		Total	175

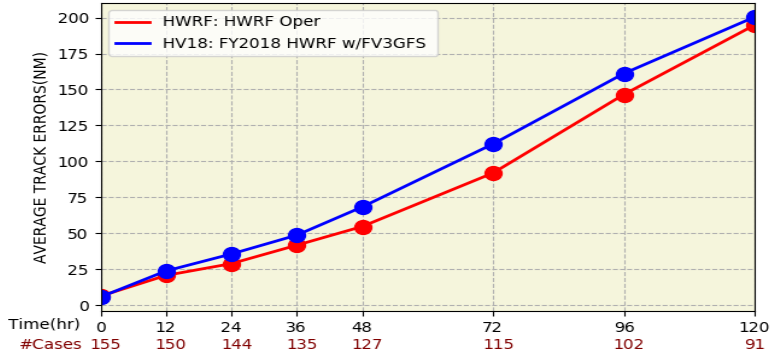
List of storms conducted in 2018 Hurricane Season

East Pacific Basin

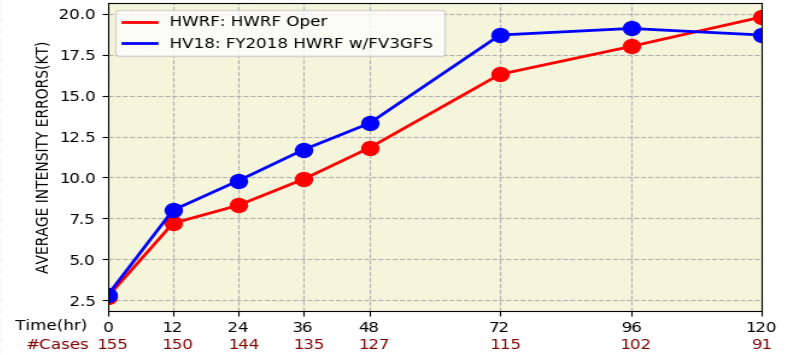
Storm Name	Start Cycle	End Cycle	# of Cycles
Hector 10E	2018080106	2018081318	51
Lane 14E	2018081518	2018082700	44
Miriam 15E	2018082612	2018090218	29
Norman 16E	2018082812	2018090800	43
Olivia 17E	2018090100	2018091012	39
Rosa 20E	2018092600	2018100212	27
Sergio 21E	2018092918	2018101212	52
		Total	285

Track and Intensity Verification for NATL (HV18 vs HWRF)

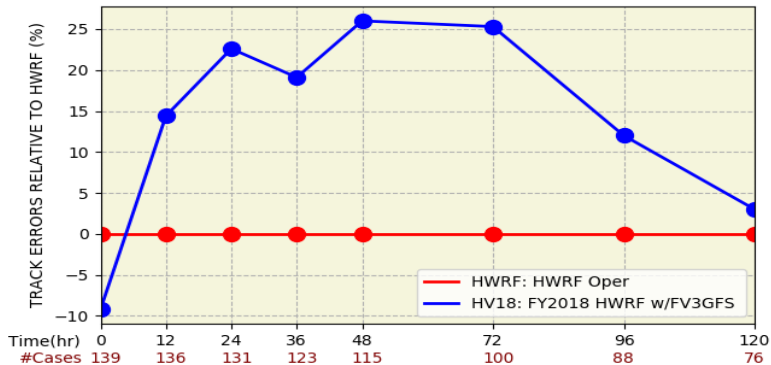
MODEL FORECAST - TRACK ERROS
VERIFICATION FOR ATLANTIC BASIN 2018



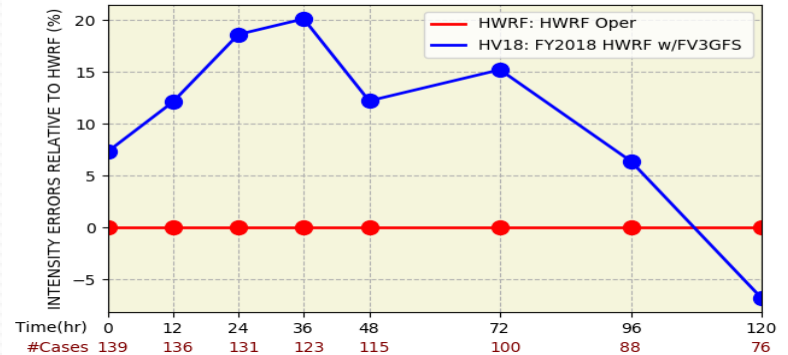
MODEL FORECAST - INTENSITY ERROS
VERIFICATION FOR ATLANTIC BASIN 2018



MODEL FORECAST - ERRORS RELATIVE TO HWRF
VERIFICATION FOR ATLANTIC BASIN 2018

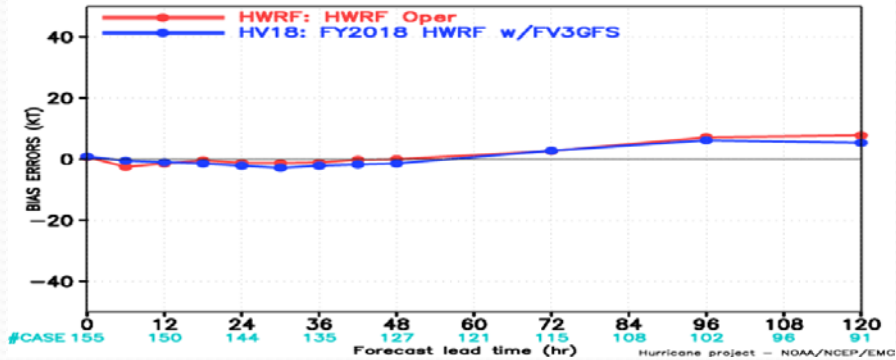


MODEL FORECAST - ERRORS RELATIVE TO HWRF
VERIFICATION FOR ATLANTIC BASIN 2018

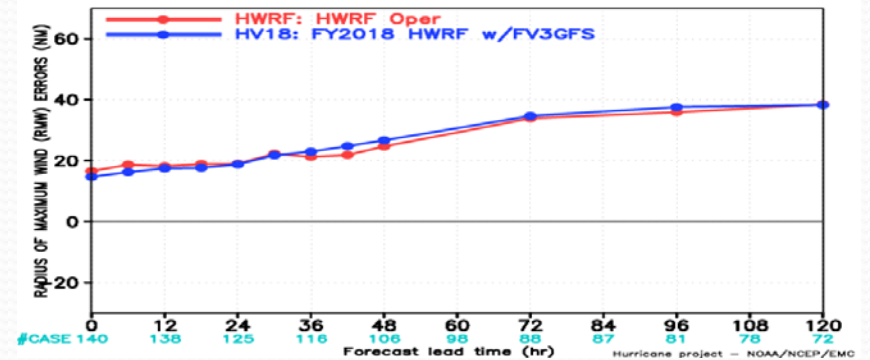


BIAS and RADIUS Verification for NATL (HV18 vs HWRF)

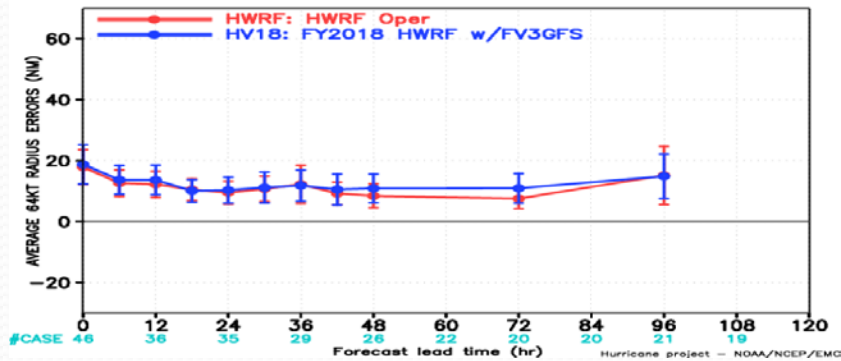
MODEL FORECAST — BIAS ERRORS (KT)
VERIFICATION FOR ATLANTIC BASIN 2018



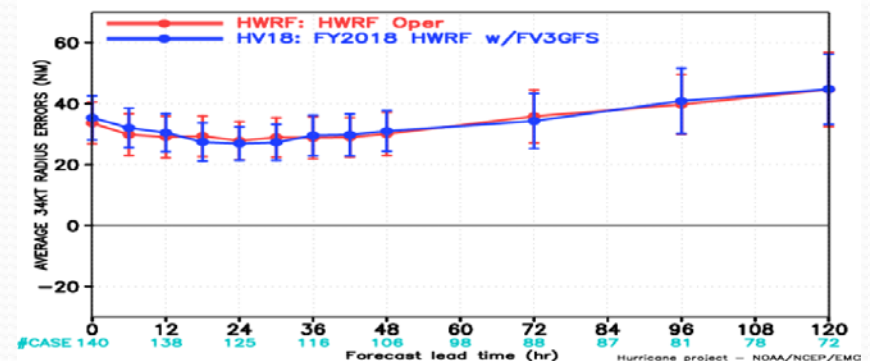
MODEL FORECAST — RADIUS OF MAXIMUM WIND (RMW) ERRORS (NM)
VERIFICATION FOR ATLANTIC BASIN 2018



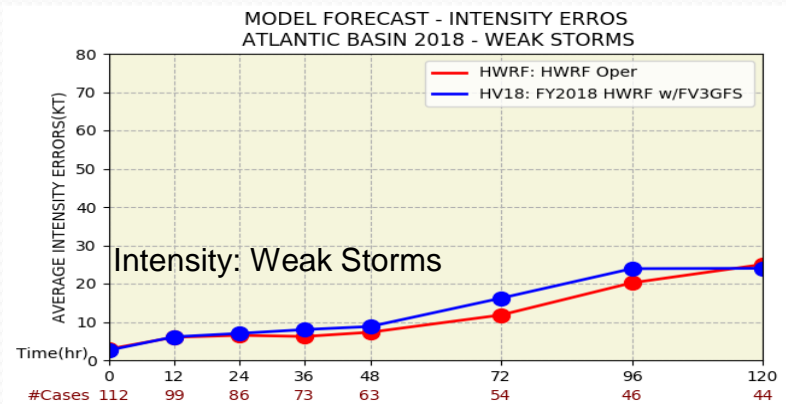
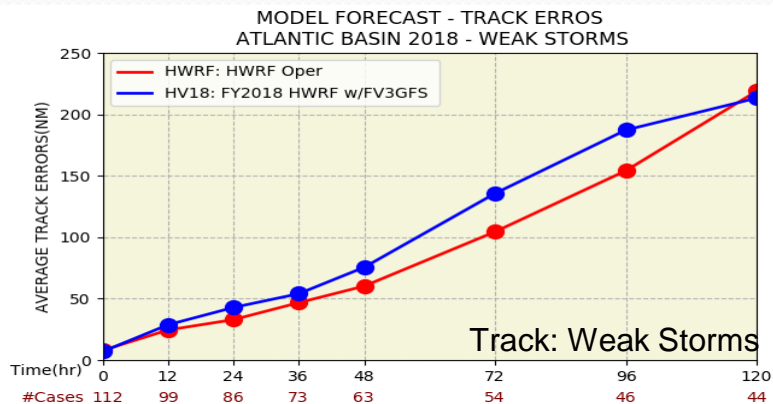
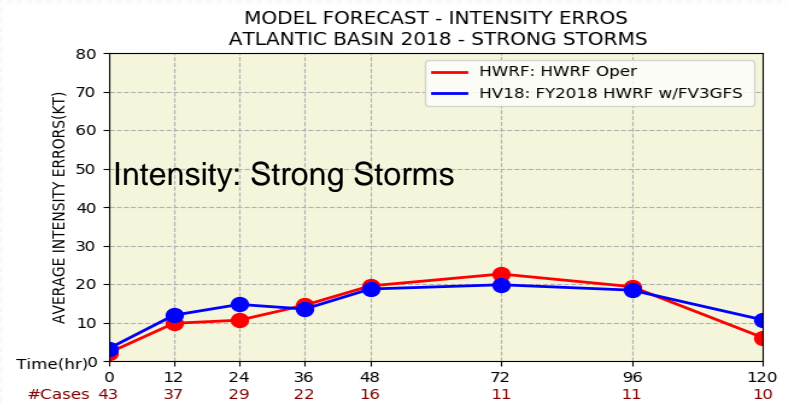
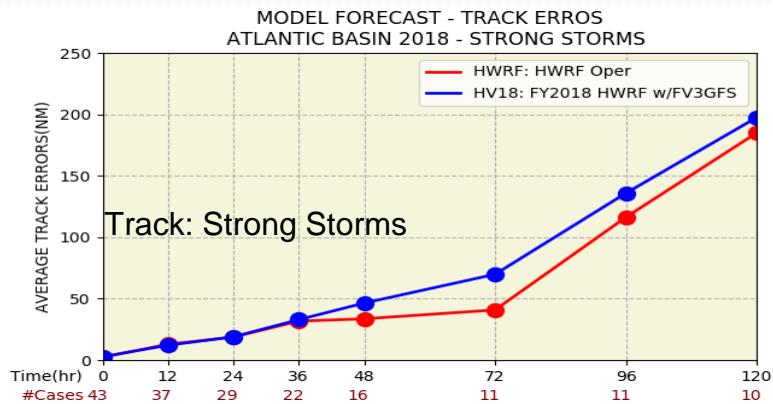
MODEL FORECAST — AVERAGE 64KT RADIUS ERRORS (NM)
VERIFICATION FOR ATLANTIC BASIN 2018



MODEL FORECAST — AVERAGE 34KT RADIUS ERRORS (NM)
VERIFICATION FOR ATLANTIC BASIN 2018

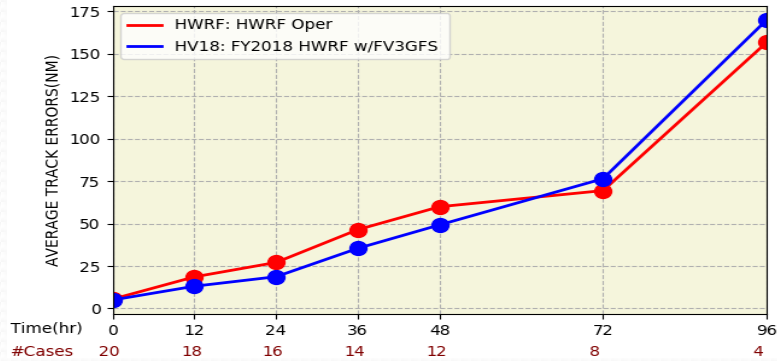


Track and Intensity Verification for NATL Strong & Weak Storms

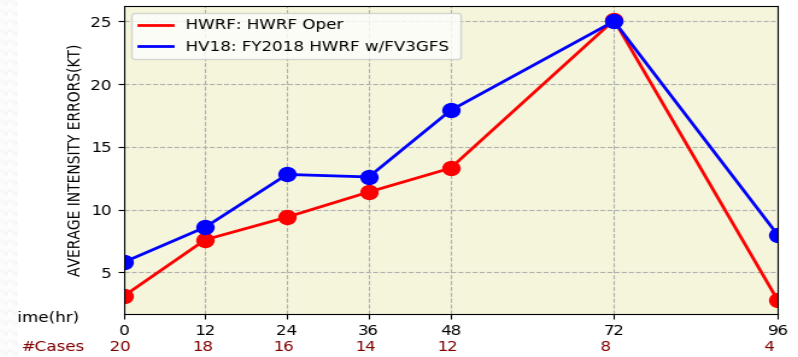


Track and Intensity Verification for Michael(2018)

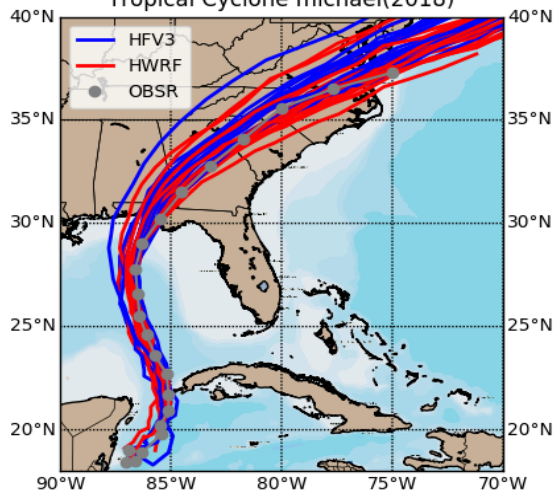
MODEL FORECAST - TRACK ERROS VERIFICATION FOR MICHAEL(2018)



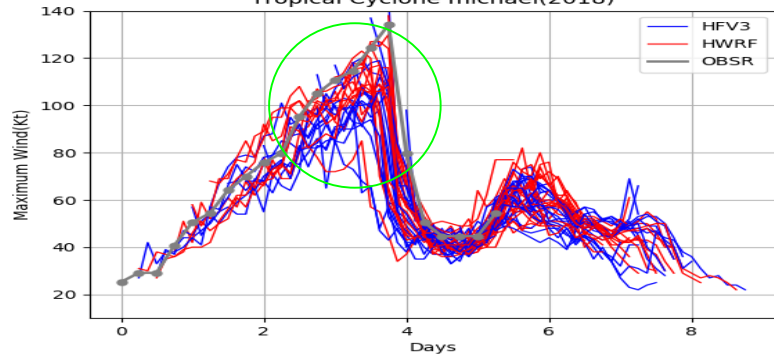
MODEL FORECAST - INTENSITY ERROS VERIFICATION FOR MICHAEL(2018)



Tropical Cyclone michael(2018)

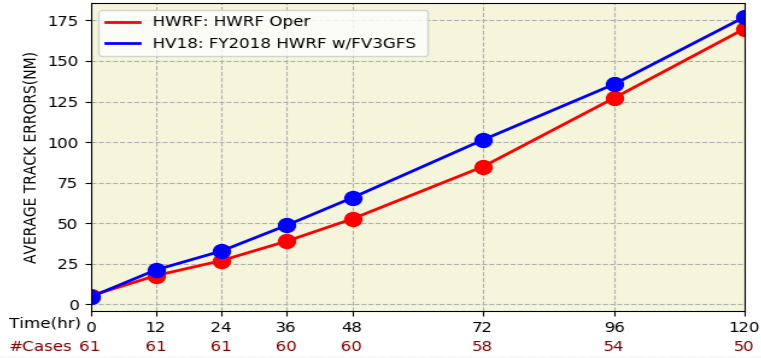


Tropical Cyclone michael(2018)

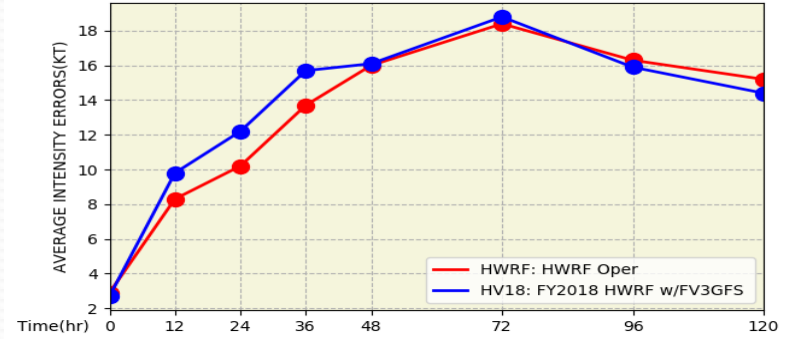


Track and Intensity Verification for Florence(2018)

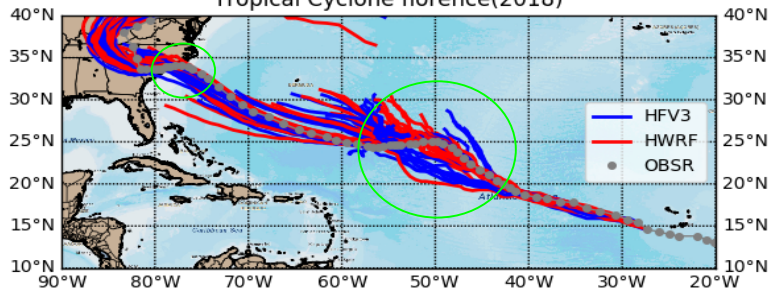
MODEL FORECAST - TRACK ERRORS
VERIFICATION FOR FLORENCE(2018)



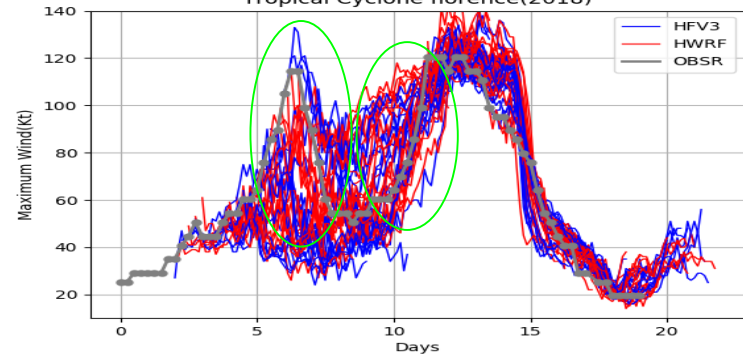
MODEL FORECAST - INTENSITY ERRORS
VERIFICATION FOR FLORENCE(2018)



Tropical Cyclone florence(2018)

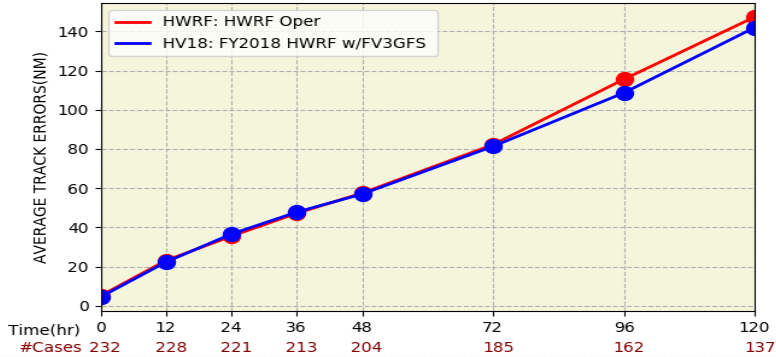


Tropical Cyclone florence(2018)

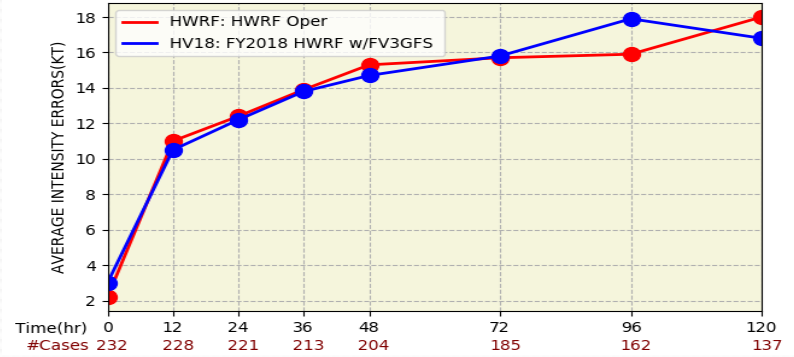


Track and Intensity Verification for EPAC (HV18 vs HWRF)

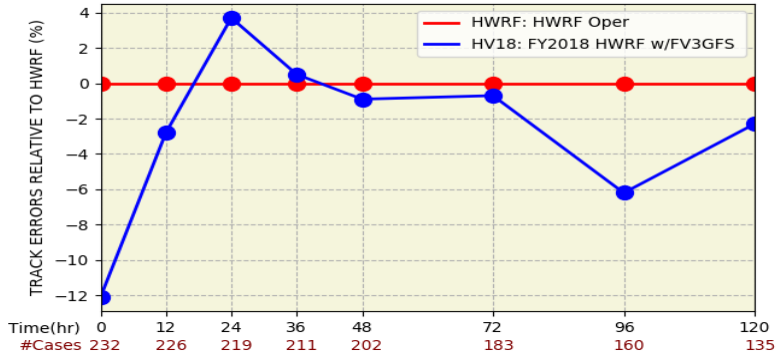
MODEL FORECAST - TRACK ERROS
VERIFICATION FOR EASTERN PACIFIC BASIN 2018



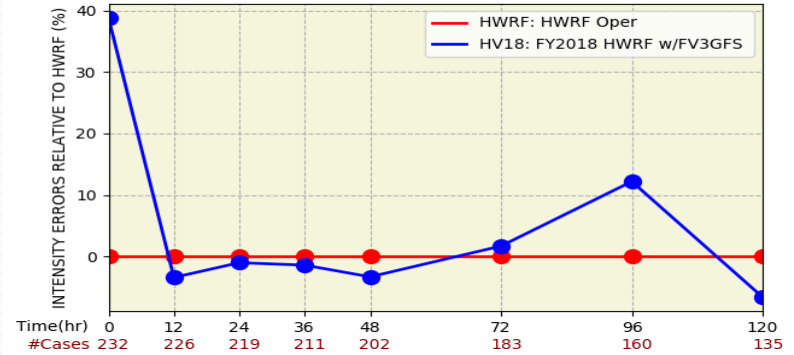
MODEL FORECAST - INTENSITY ERROS
VERIFICATION FOR EASTERN PACIFIC BASIN 2018



MODEL FORECAST - ERRORS RELATIVE TO HWRF
VERIFICATION FOR EASTERN PACIFIC BASIN 2018

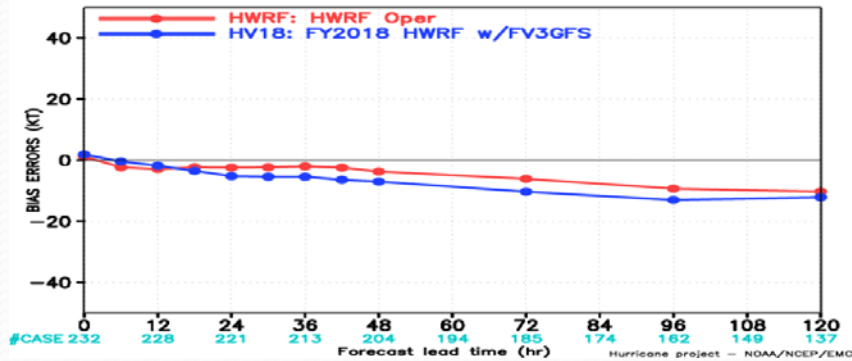


MODEL FORECAST - ERRORS RELATIVE TO HWRF
VERIFICATION FOR EASTERN PACIFIC BASIN 2018

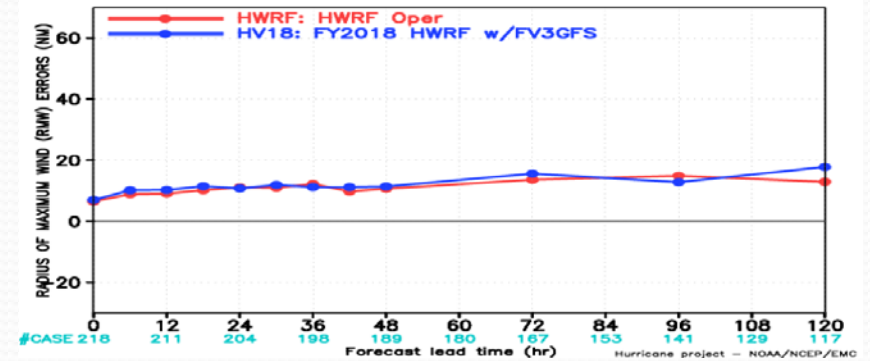


BIAS and RADIUS Verification for EPAC (HV18 vs HWRF)

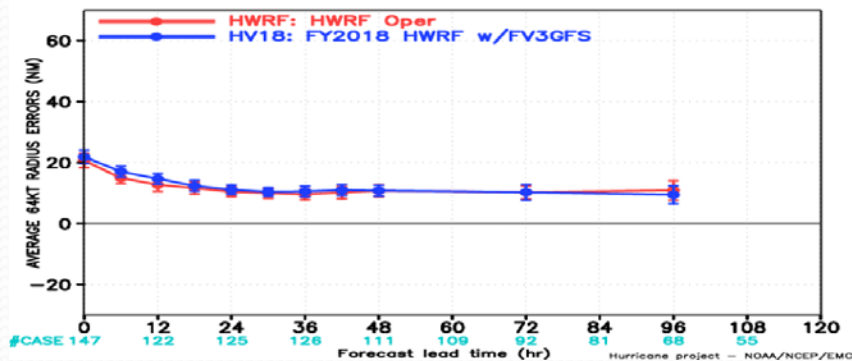
MODEL FORECAST – BIAS ERRORS (KT)
VERIFICATION FOR EASTERN PACIFIC BASIN 2018



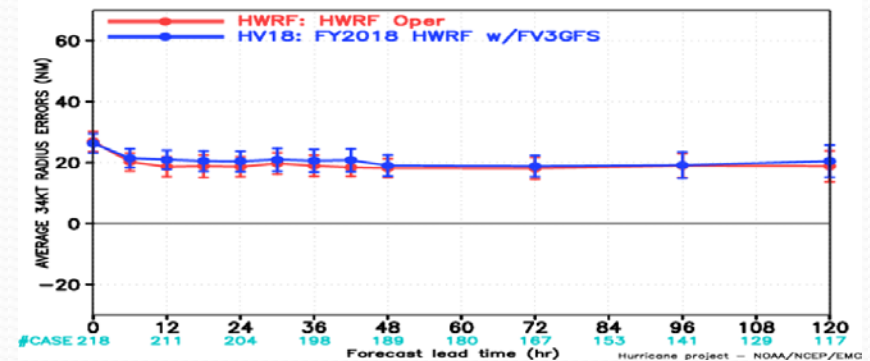
MODEL FORECAST – RADIUS OF MAXIMUM WIND (RMW) ERRORS (NM)
VERIFICATION FOR EASTERN PACIFIC BASIN 2018



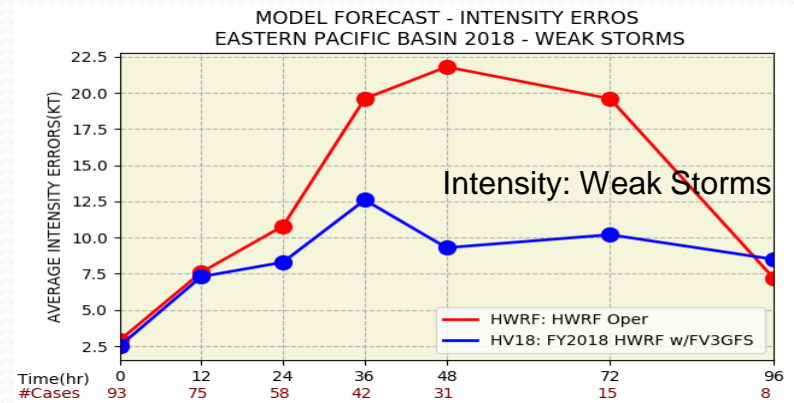
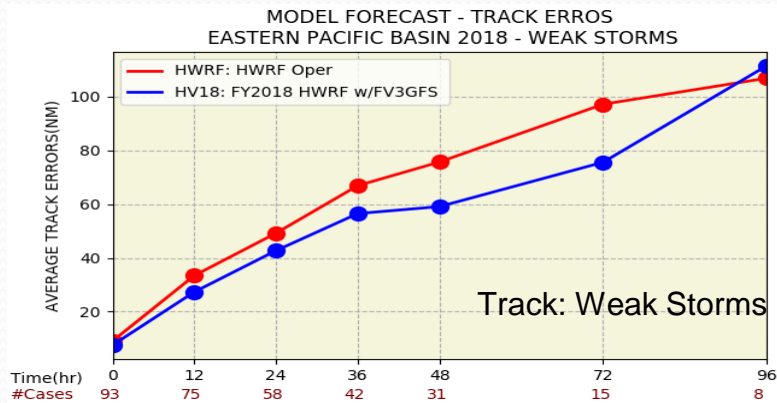
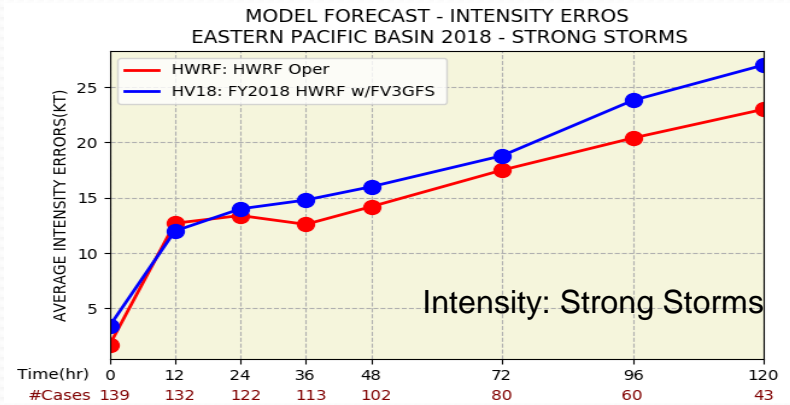
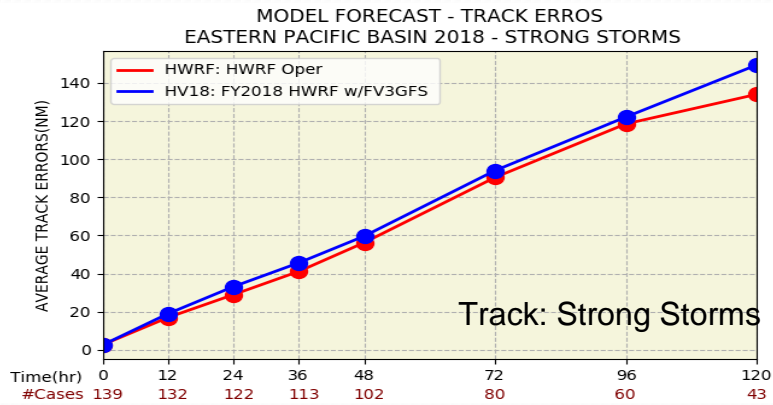
MODEL FORECAST – AVERAGE 64KT RADIUS ERRORS (NM)
VERIFICATION FOR EASTERN PACIFIC BASIN 2018



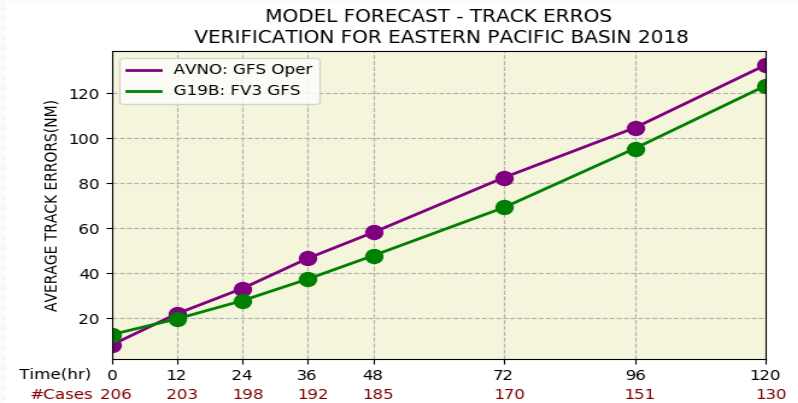
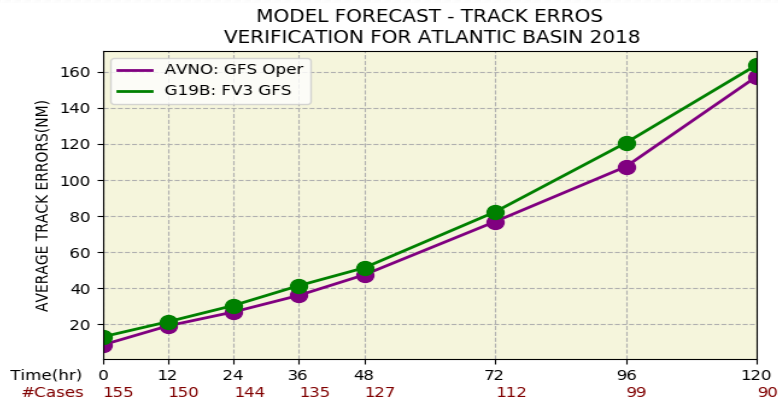
MODEL FORECAST – AVERAGE 34KT RADIUS ERRORS (NM)
VERIFICATION FOR EASTERN PACIFIC BASIN 2018



Track and Intensity Verification for EPAC Strong & Weak Storms



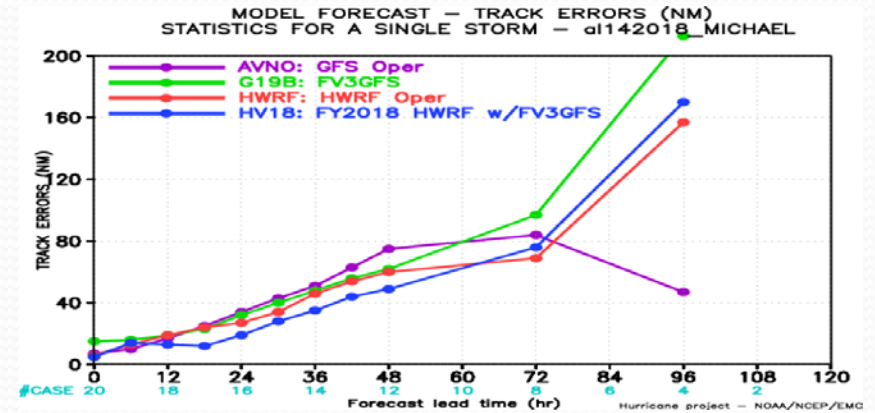
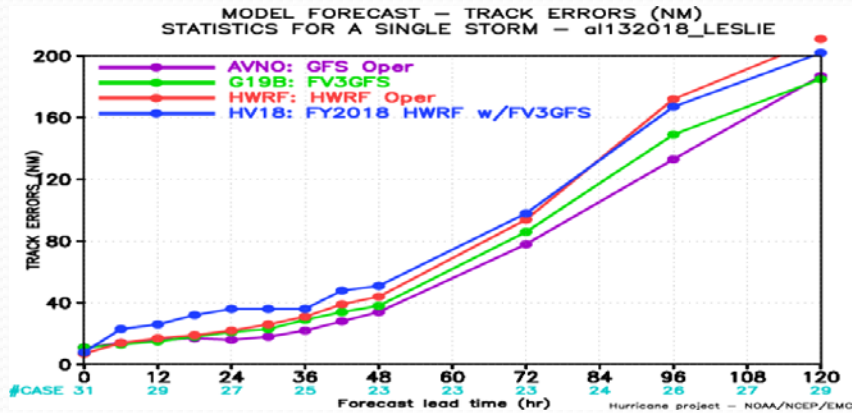
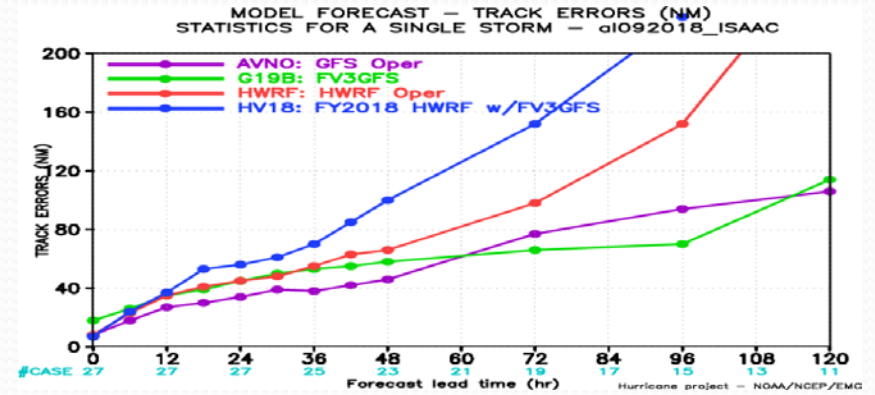
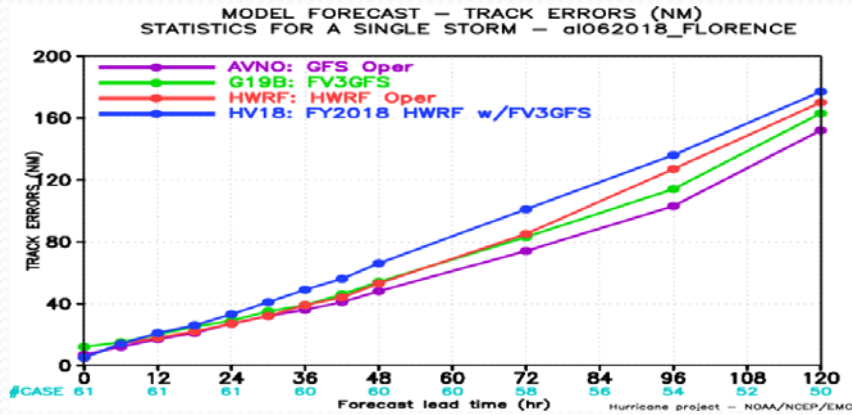
Track Verification for NATL & EPAC Opr GFS Vs FV3-GFS



Conclusion

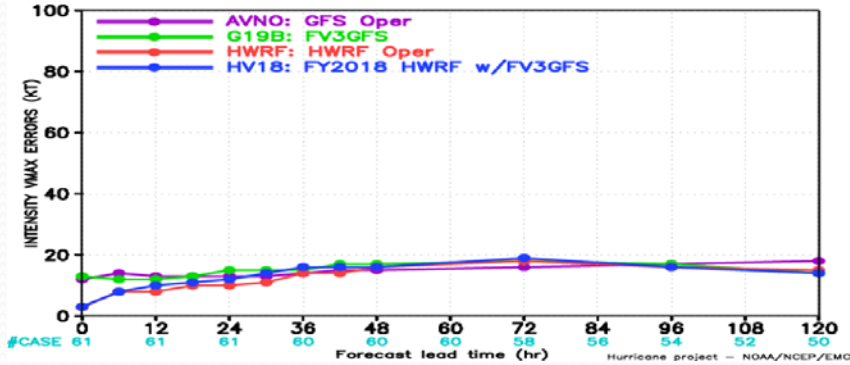
- With HFIP real-time reservation, 13 storms were completed
- HWRF Oper track/intensity outperformed the HWRF run driven by FV3GFS in NATL
- The differences in track/intensity errors less in EPAC between HWRF Oper and HWRF driven by FV3GFS, compared to NATL
- The wind radii errors are comparable between HWRF Oper and HWRF driven by FV3GFS

Track Verification for NATL Storms

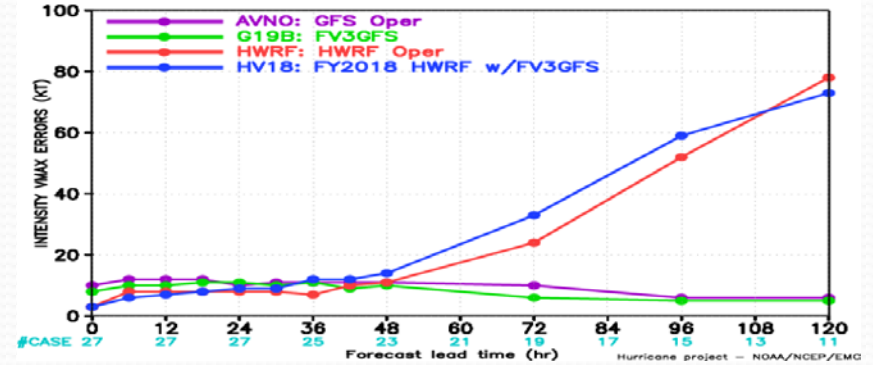


Intensity Verification for NATL Storms

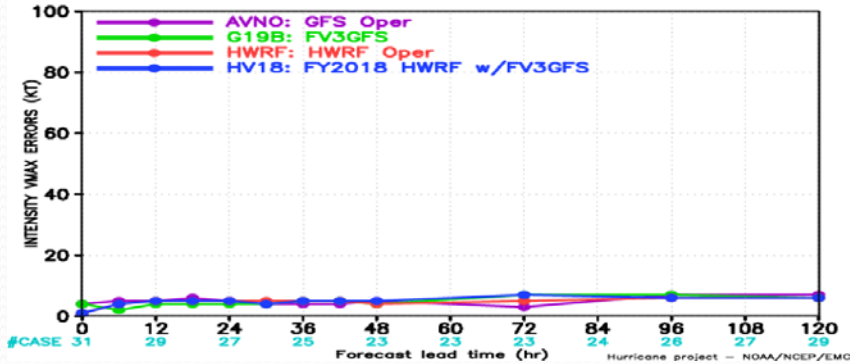
MODEL FORECAST — INTENSITY VMAX ERRORS (KT)
STATISTICS FOR A SINGLE STORM — a1062018_FLORENCE



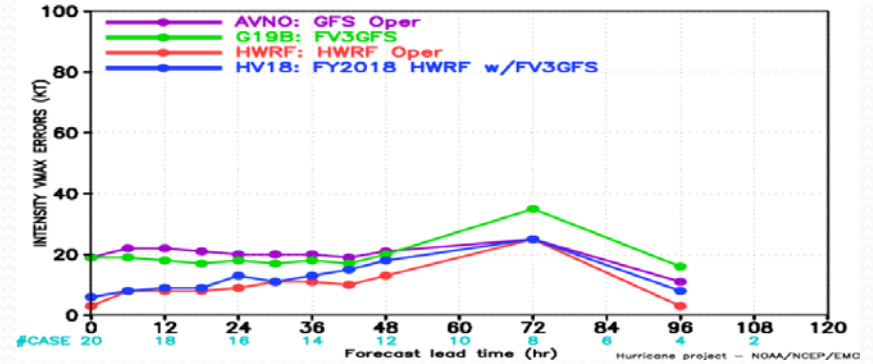
MODEL FORECAST — INTENSITY VMAX ERRORS (KT)
STATISTICS FOR A SINGLE STORM — a1092018_ISAAC



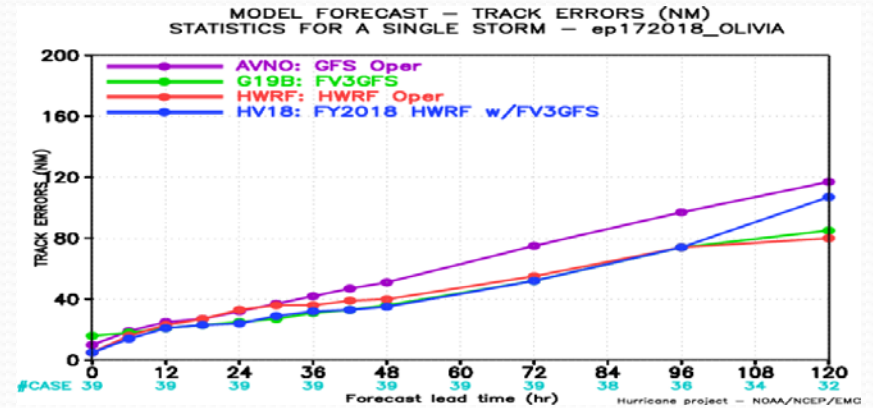
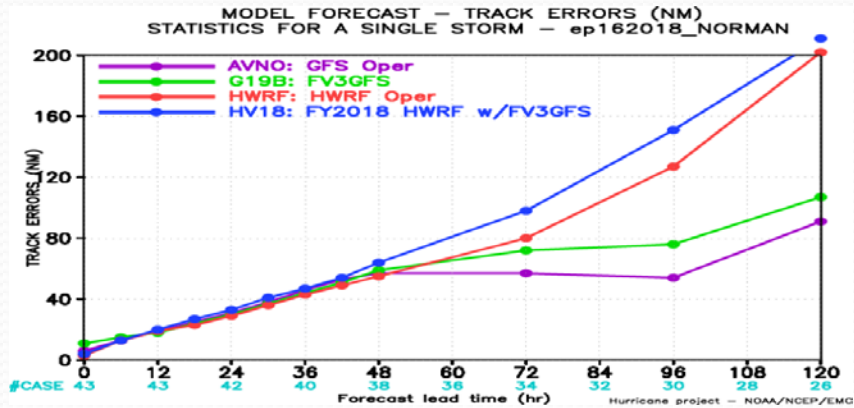
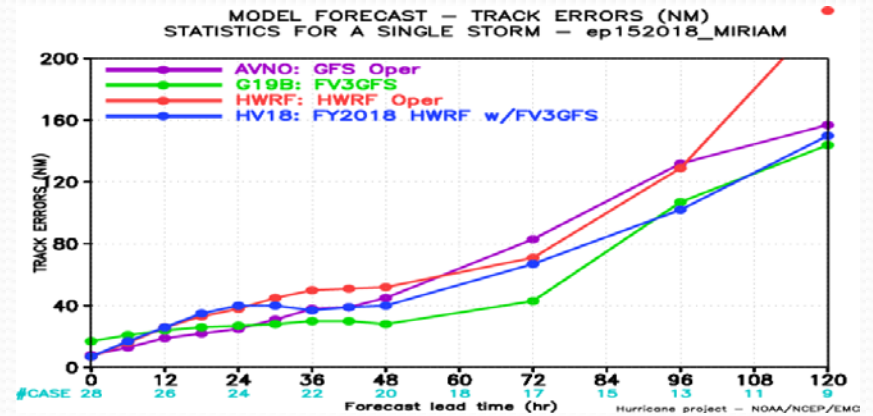
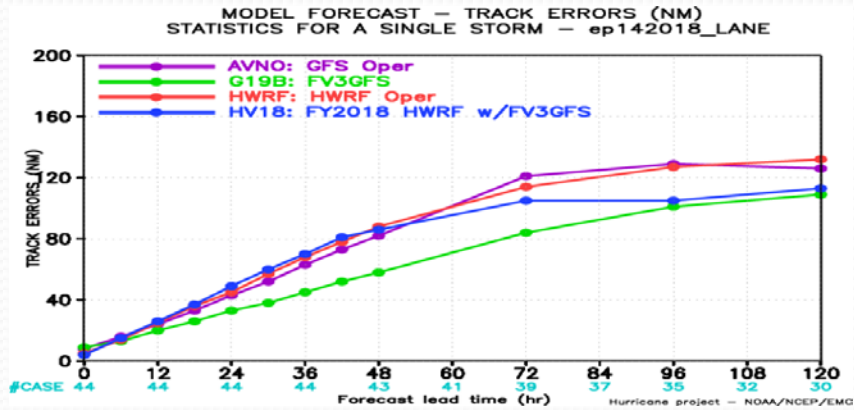
MODEL FORECAST — INTENSITY VMAX ERRORS (KT)
STATISTICS FOR A SINGLE STORM — a1132018_LESLIE



MODEL FORECAST — INTENSITY VMAX ERRORS (KT)
STATISTICS FOR A SINGLE STORM — a1142018_MICHAEL

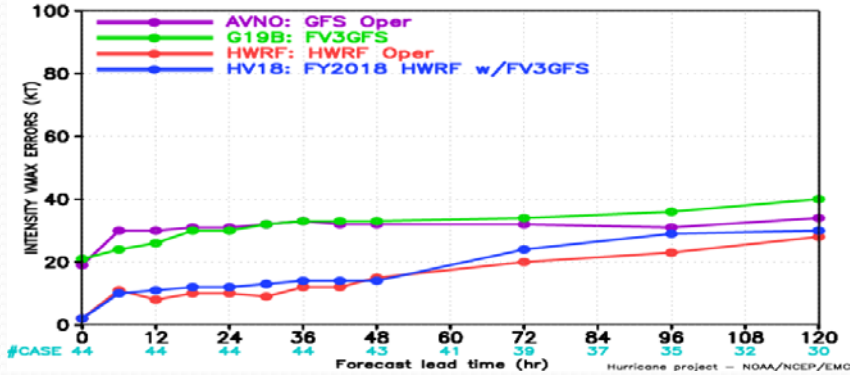


Track Verification for EPAC Storms

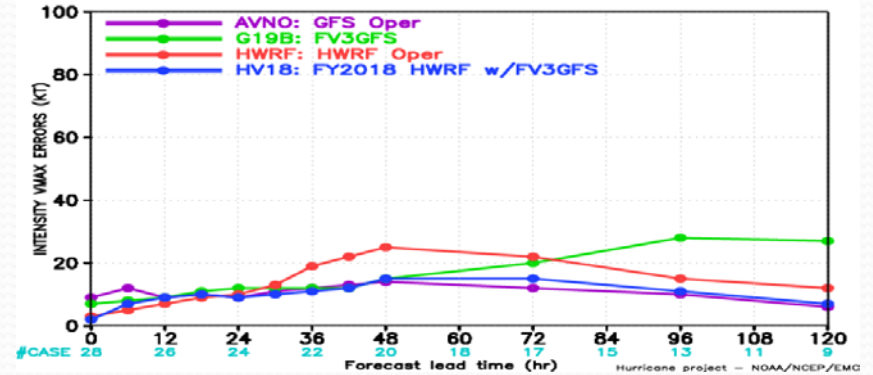


Intensity Verification for EPAC Storms

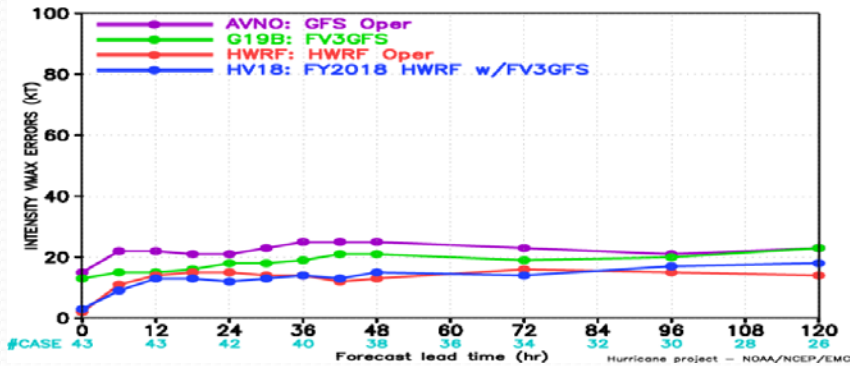
MODEL FORECAST – INTENSITY VMAX ERRORS (KT)
STATISTICS FOR A SINGLE STORM – ep142018_LANE



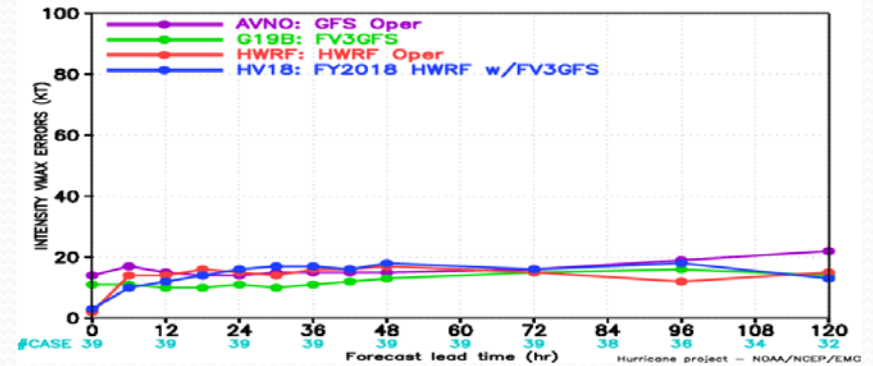
MODEL FORECAST – INTENSITY VMAX ERRORS (KT)
STATISTICS FOR A SINGLE STORM – ep152018_MIRIAM



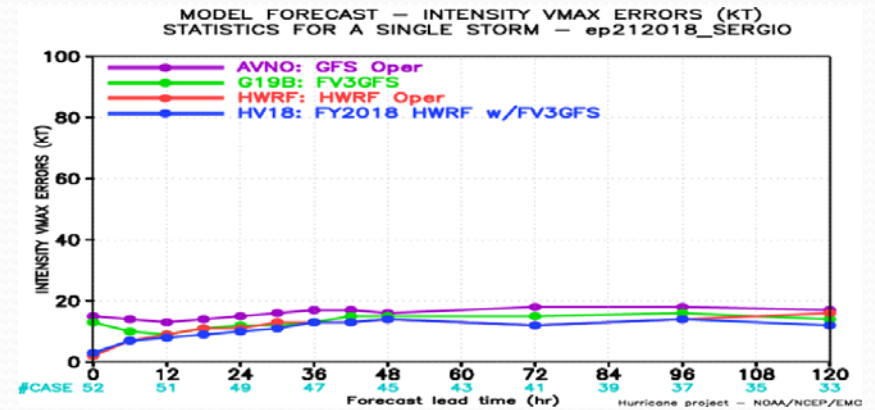
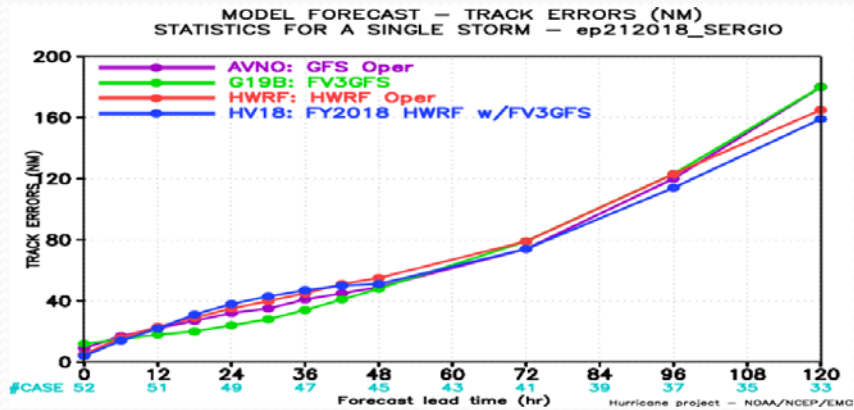
MODEL FORECAST – INTENSITY VMAX ERRORS (KT)
STATISTICS FOR A SINGLE STORM – ep162018_NORMAN



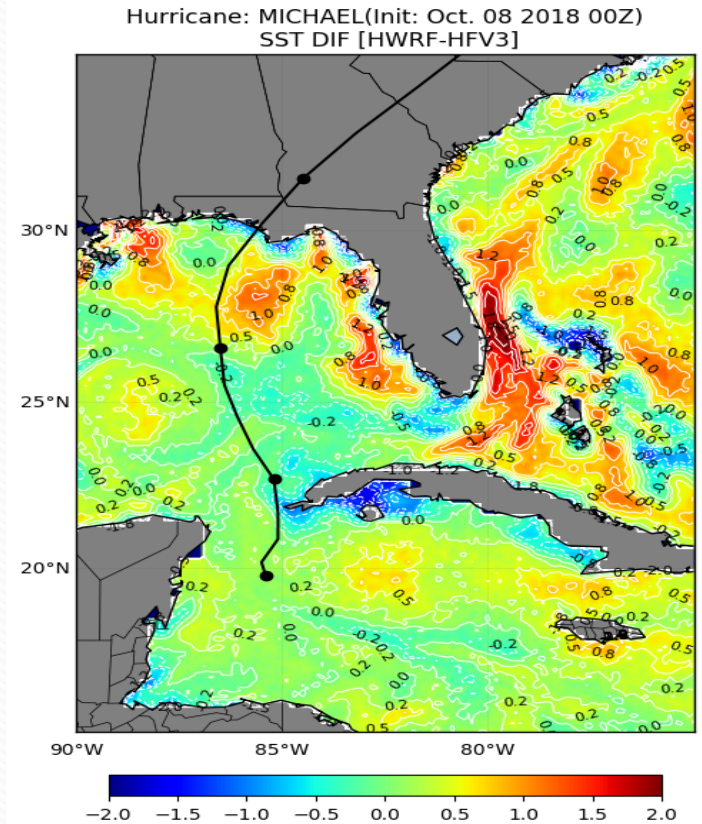
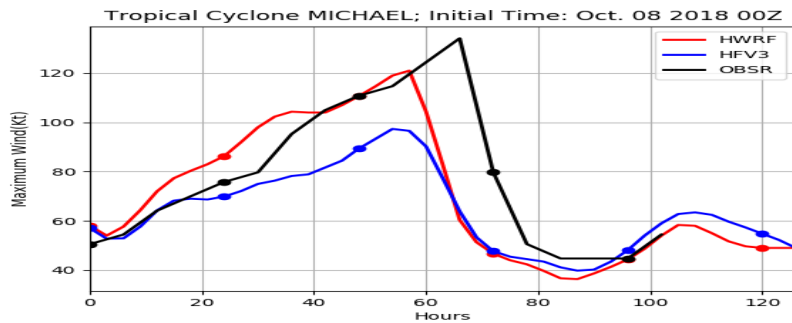
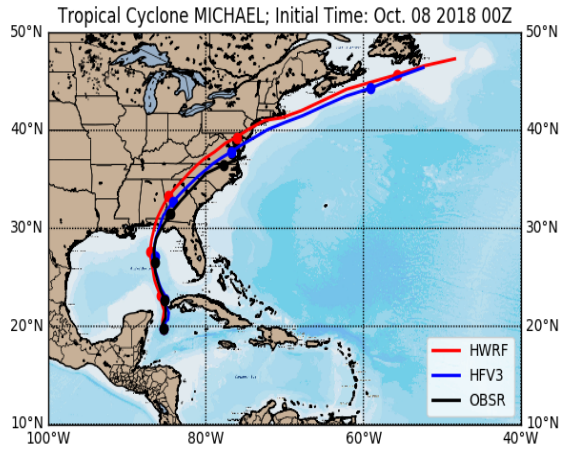
MODEL FORECAST – INTENSITY VMAX ERRORS (KT)
STATISTICS FOR A SINGLE STORM – ep172018_OLIVIA



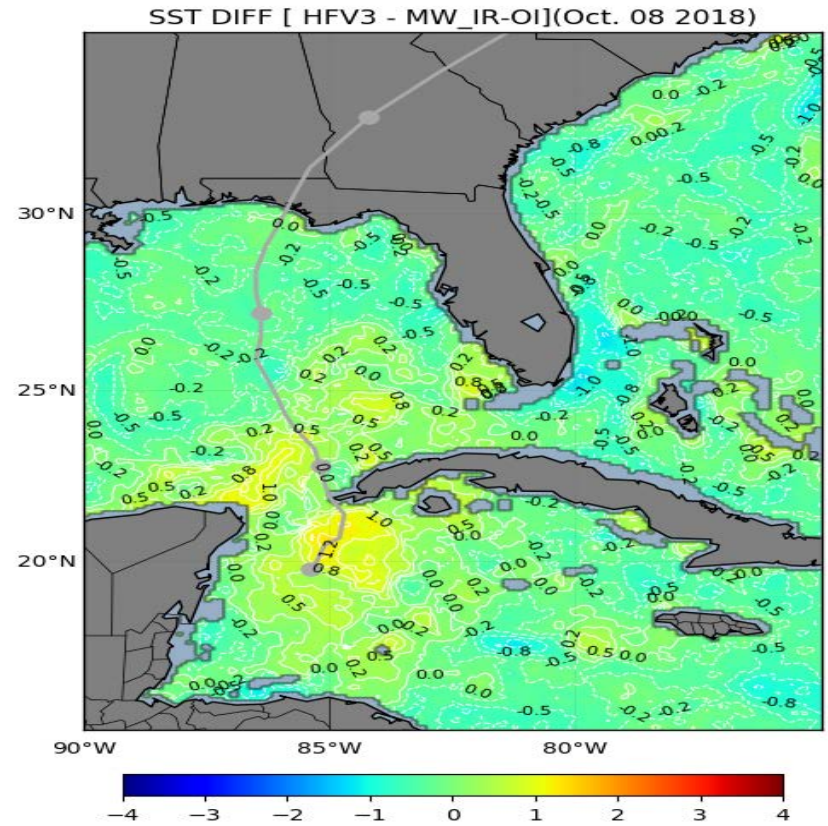
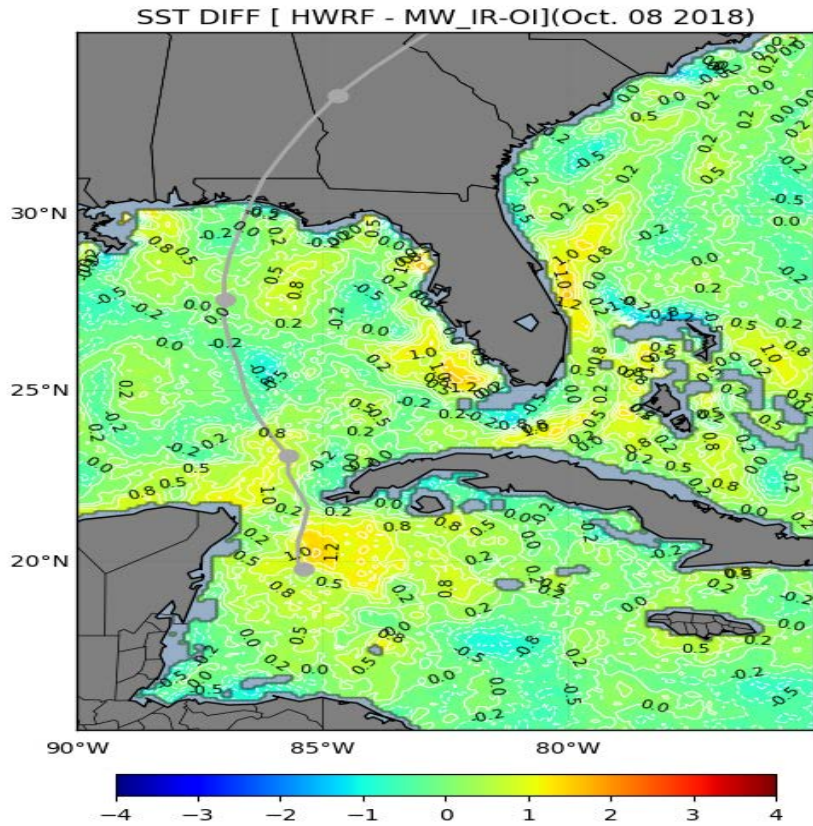
Track and Intensity Verification for SERGIO(2018)



Michael(Init: 2018/10/08 00Z)



Michael (Init: 2018/10/08 00Z)



Florence (Init: 2018/09/04 12Z)

