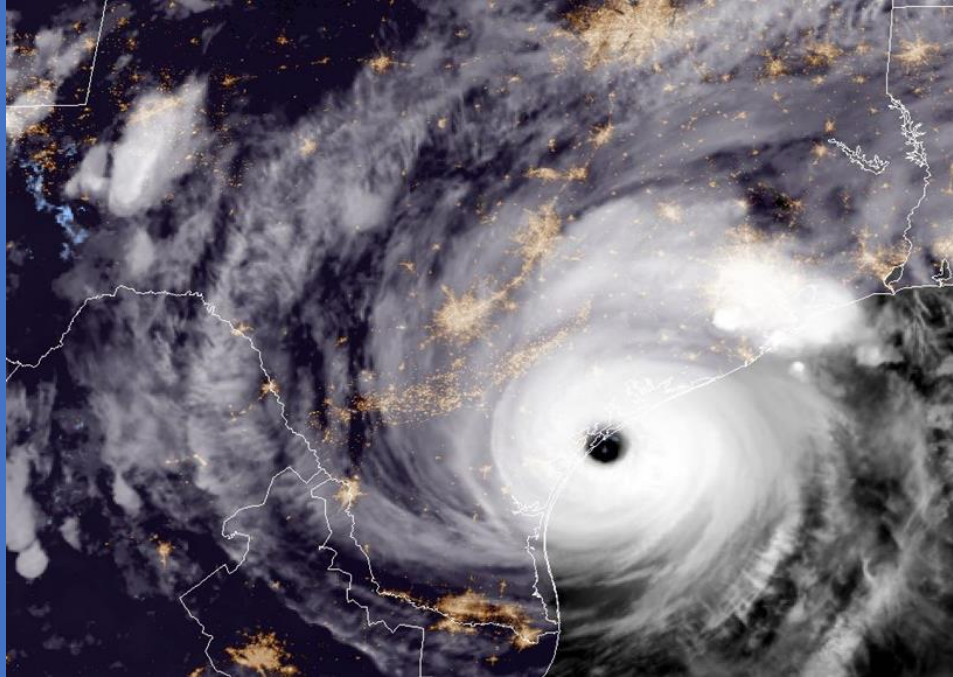


Evaluation of GfsFV³ on Hurricane Prediction



**Morris Bender, Andy Hazelton, Shian-Jiann Lin
and the GFDL FV³ Team**

Focus of Talk

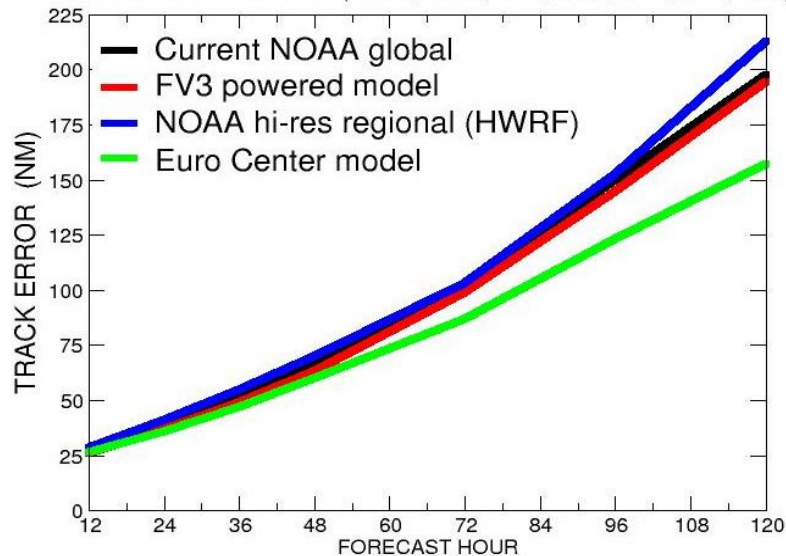
- Evaluation of 2 versions of GfsFV³ run on the Jet Computer facility by GFDL group (*near real time*):
- Global version : 13 km Horizontal Resolution
- Second version: 3 km nest over Atlantic, two-way interaction with Global model
- 63 Vertical Levels
- *Global model*: Older version of SAS and PBL
- *Nested model* : Scale-Aware SAS
- GFDL 6-class Micro-Physics replacing Zhao-Carr
- Both versions start from GFS initial fields (*cold start*)
- Evaluate Performance for 2017 seasons for Atlantic, East and West Pacific Basins and compare with operational guidance (*i.e. GFS, HWRF, ECMWF, UKMET*)
- Comparison with other GFS based guidance (e.g., HRD Basin-Scale HWRF)

Statistics for 2-year period: 2015 & 2016

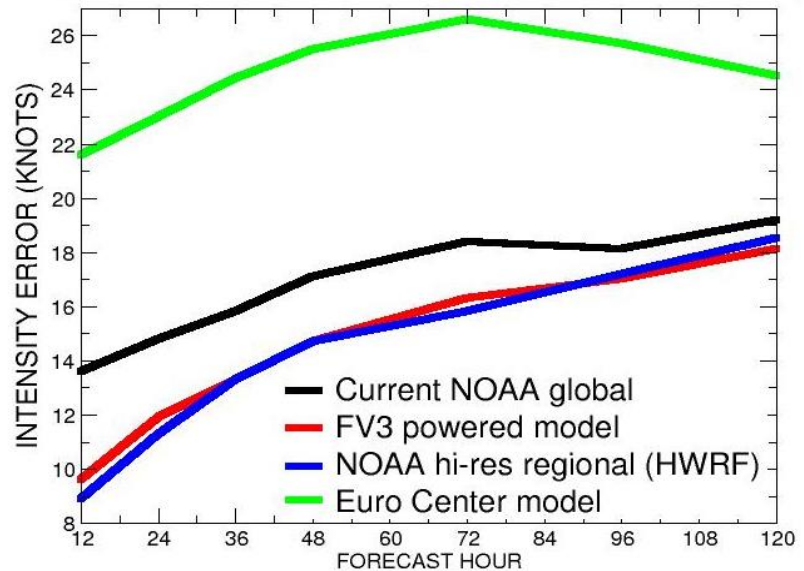
C768L63 (13-km) for all basins

Comparison with Operational Models

2015 & 2016 ATLANTIC, EAST PACIFIC, WEST PACIFIC
NUMBER OF CASES: (1217, 1102, 995, 890, 697, 547, 420)



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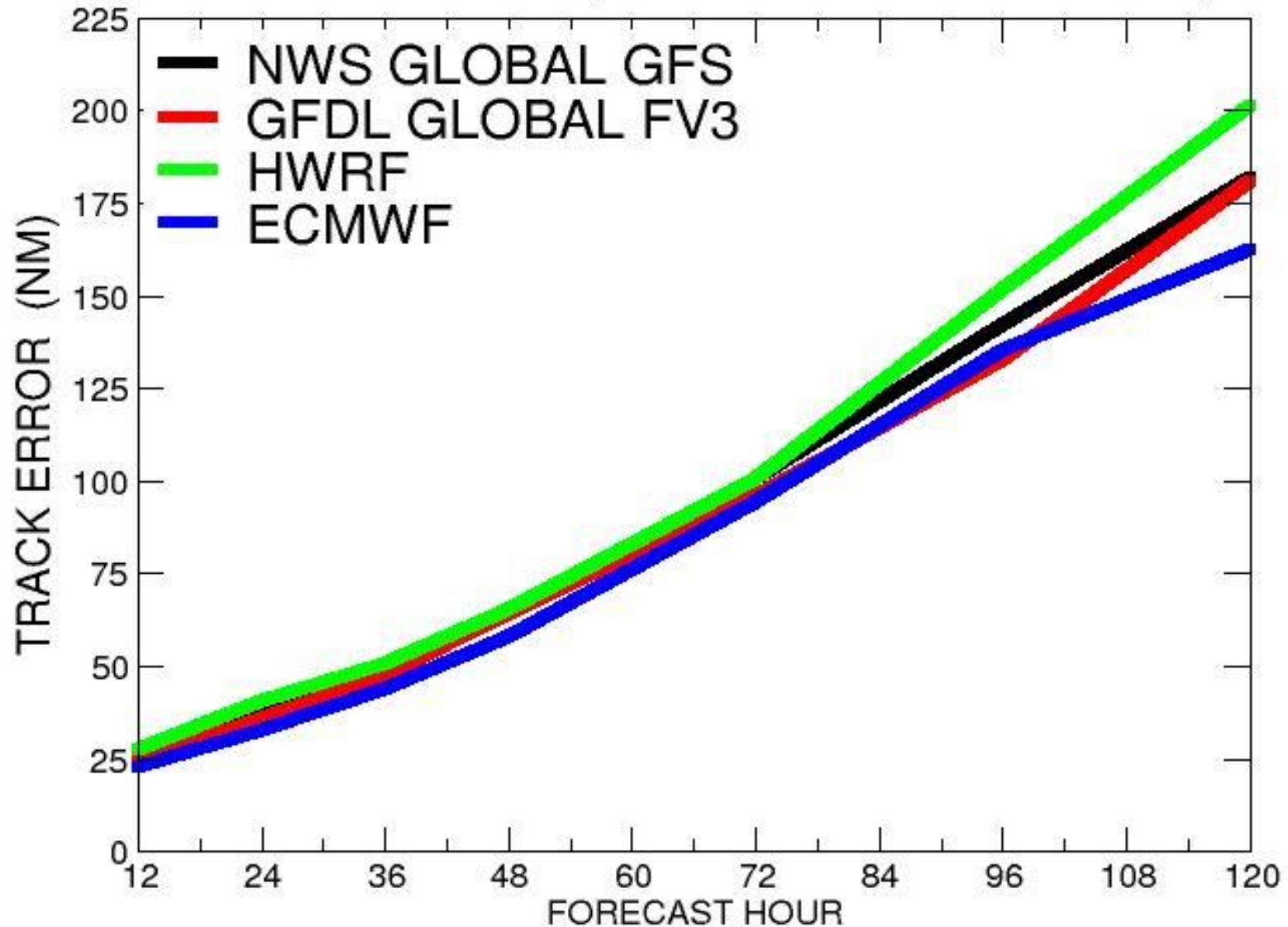


Intensity skill was as good as HWRF for Retrospective runs

Comparison of Performance of
GFDL **GfsFV³**
with
operational GFS, HWRF and ECMWF

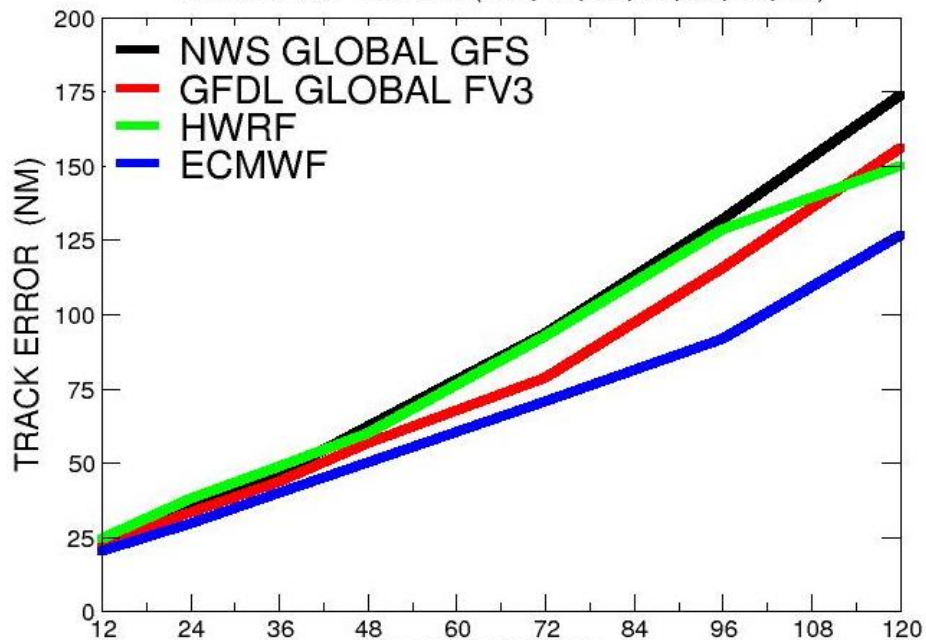
2017 WPAC, EPAC, and ATLANTIC SEASONS

NUMBER OF CASES: (386, 345, 297, 260, 197, 147, 115)



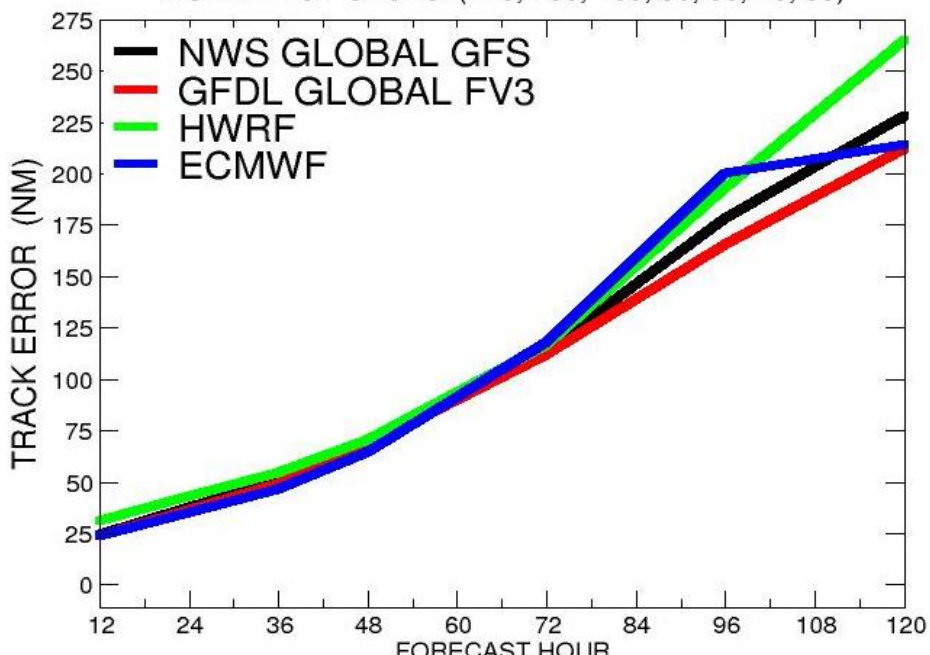
2017 ATLANTIC SEASON

NUMBER OF CASES: (106, 97, 86, 75, 60, 49, 44)



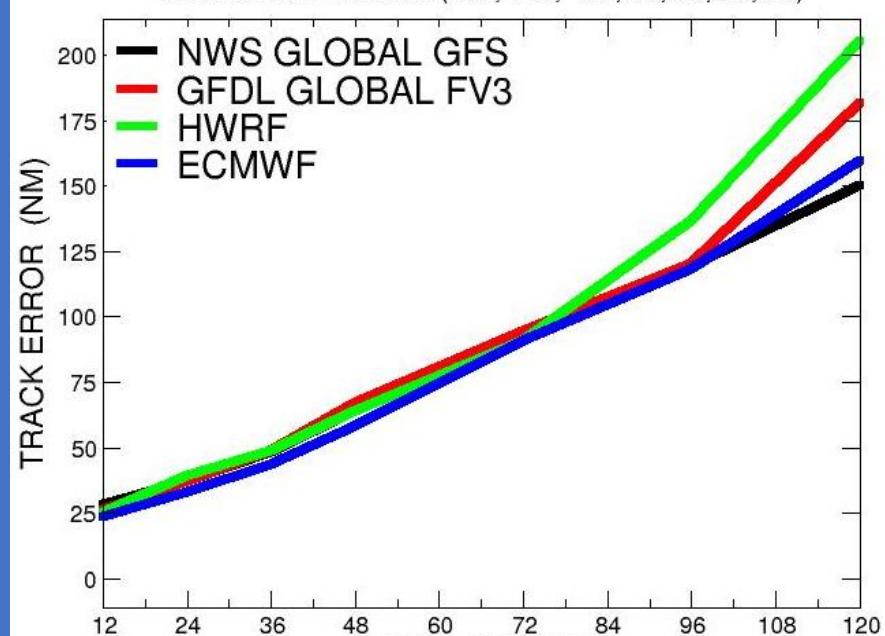
2017 WPAC SEASON

NUMBER OF CASES: (145, 130, 109, 95, 68, 46, 33)



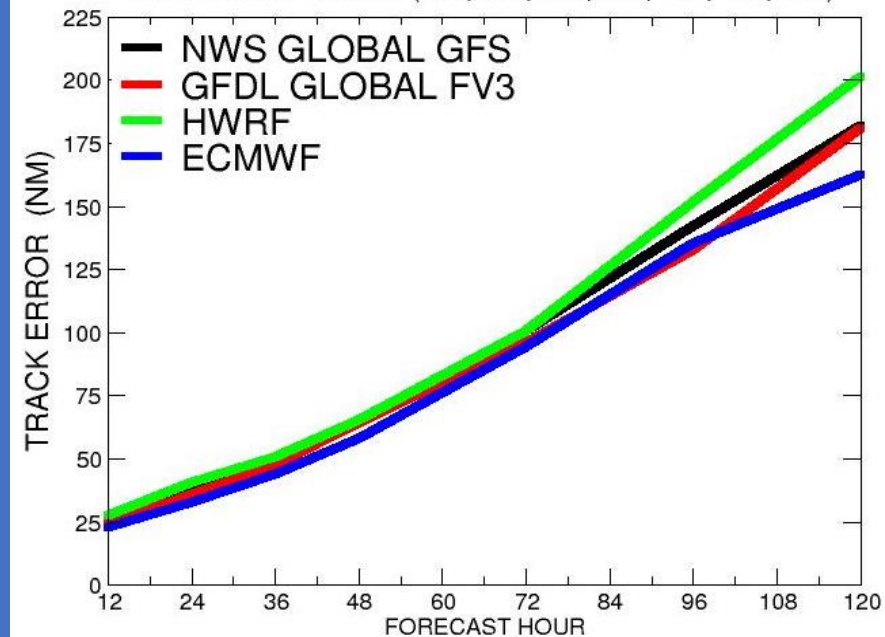
2017 EPAC SEASON

NUMBER OF CASES: (135, 118, 102, 90, 69, 52, 38)



2017 WPAC, EPAC, and ATLANTIC SEASONS

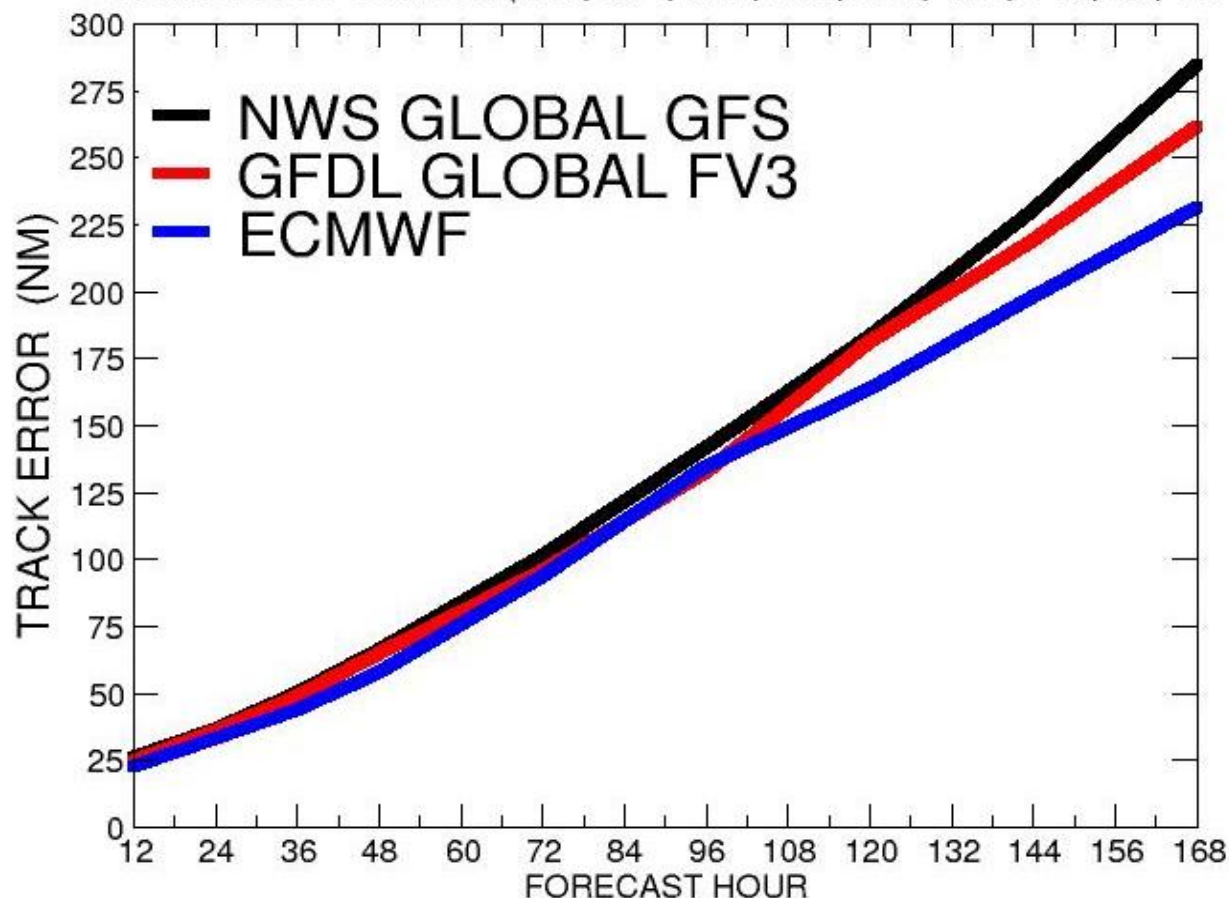
NUMBER OF CASES: (386, 345, 297, 260, 197, 147, 115)



7 Day Track Error

2017 WPAC, EPAC and ATLANTIC SEASONS

NUMBER OF CASES: (399, 354, 307, 268, 204, 152, 118, 93, 72)



7% reduced 6-7 day track errors for GfsFv³ compared to current operational GFS

ECMWF significantly better in 6-7 day lead times (9% GfsFV³; 16% GFS)

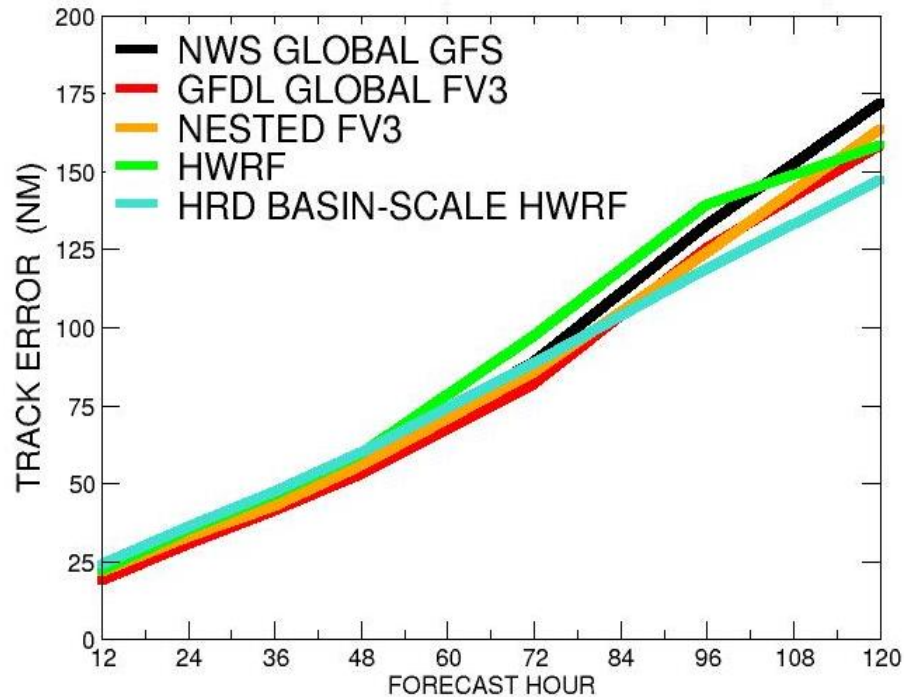
2017 Atlantic Season

Comparison of GfsFV³ with GFS Based Guidance

Comparison with other Global Model Guidance

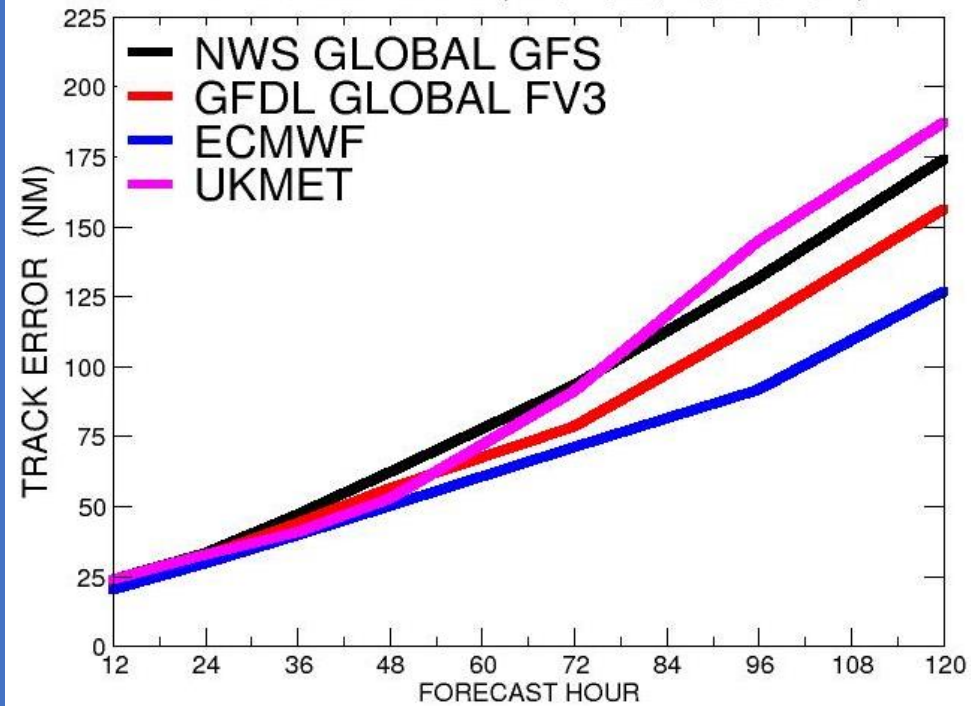
2017 ATLANTIC SEASON

NUMBER OF CASES: (141, 134, 126, 112, 90, 78, 70)



2017 ATLANTIC SEASON

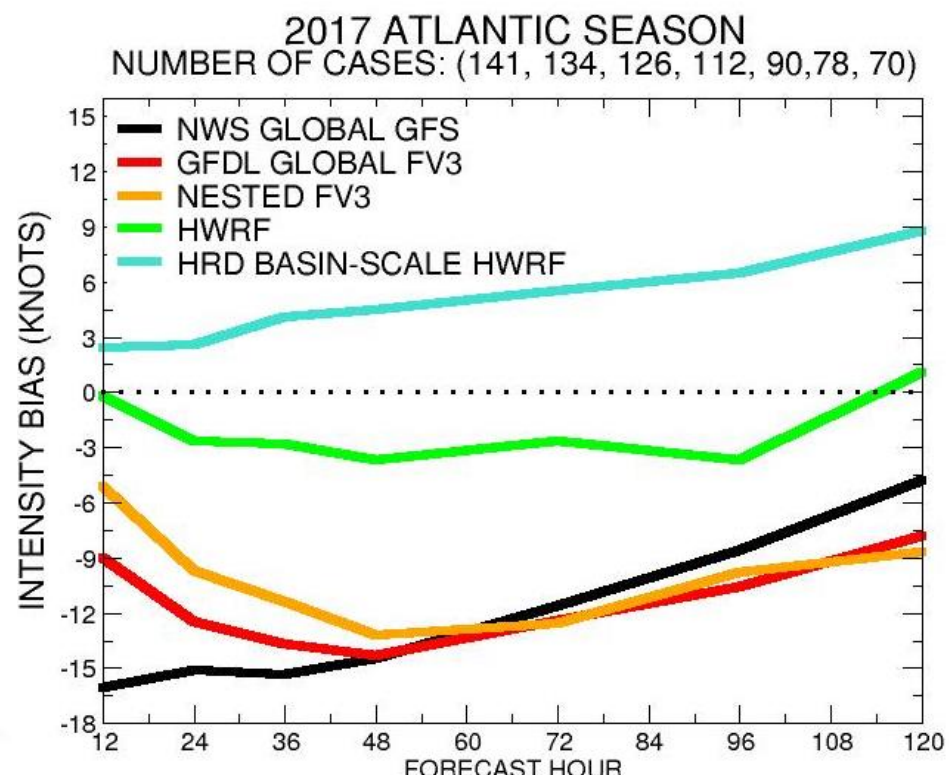
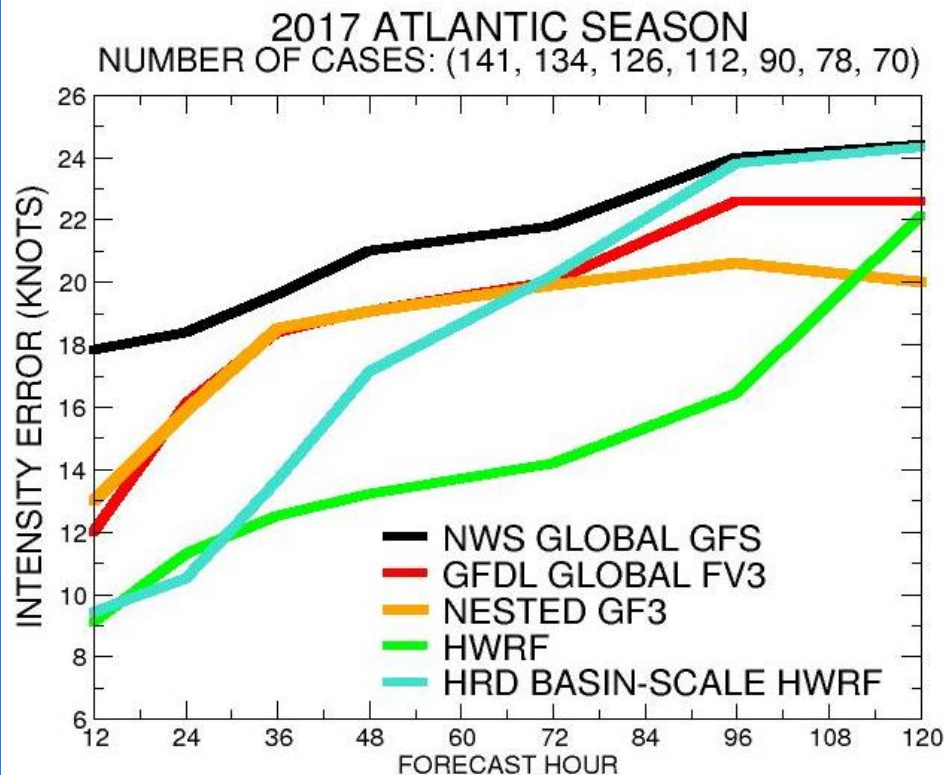
NUMBER OF CASES: (105, 95, 83, 75, 60, 49, 44)



Summary of Intensity Guidance

Intensity Errors (Knots)

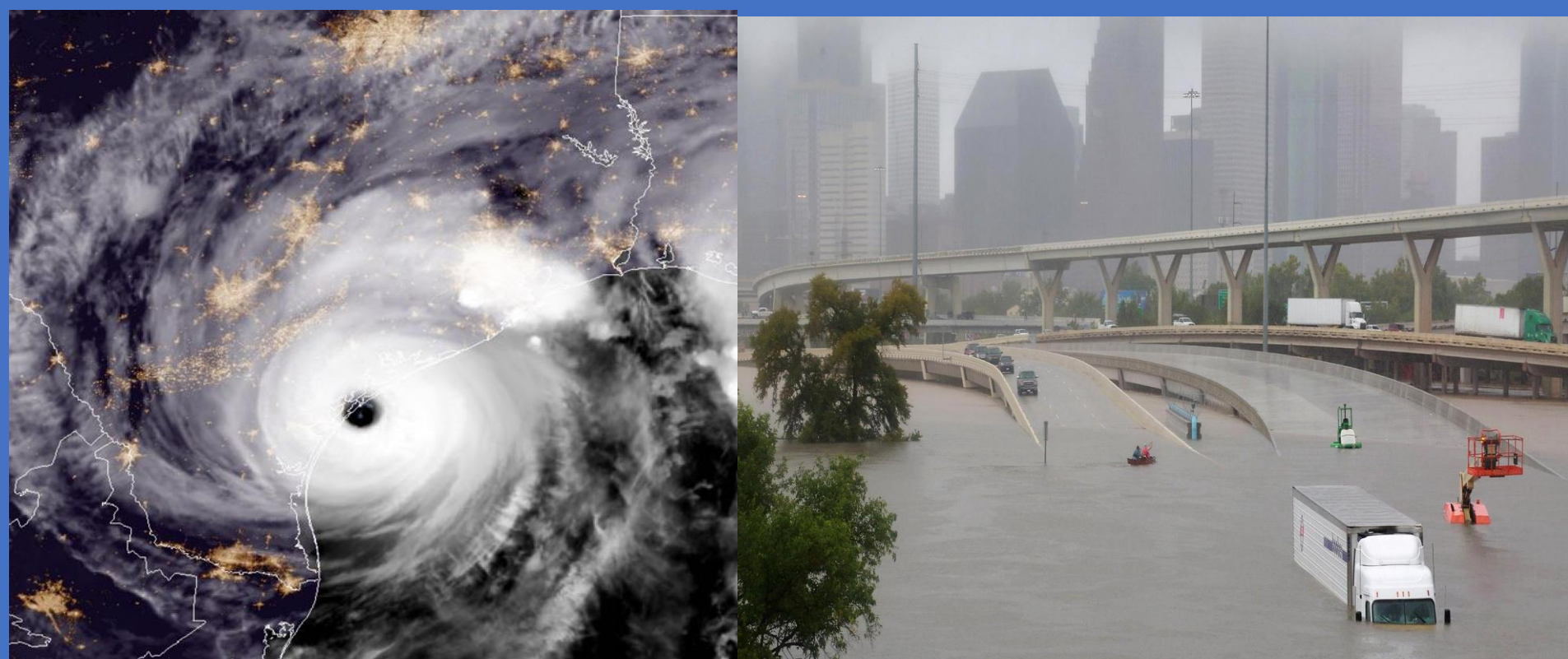
Intensity Bias (Knots)



***HRWF Intensity Guidance Far More Superior !!
GFDL GfsFV3 Has Reduced Intensity Errors & Bias Compared
to operational GFS. BS HWRF had consistent positive bias***

Summary

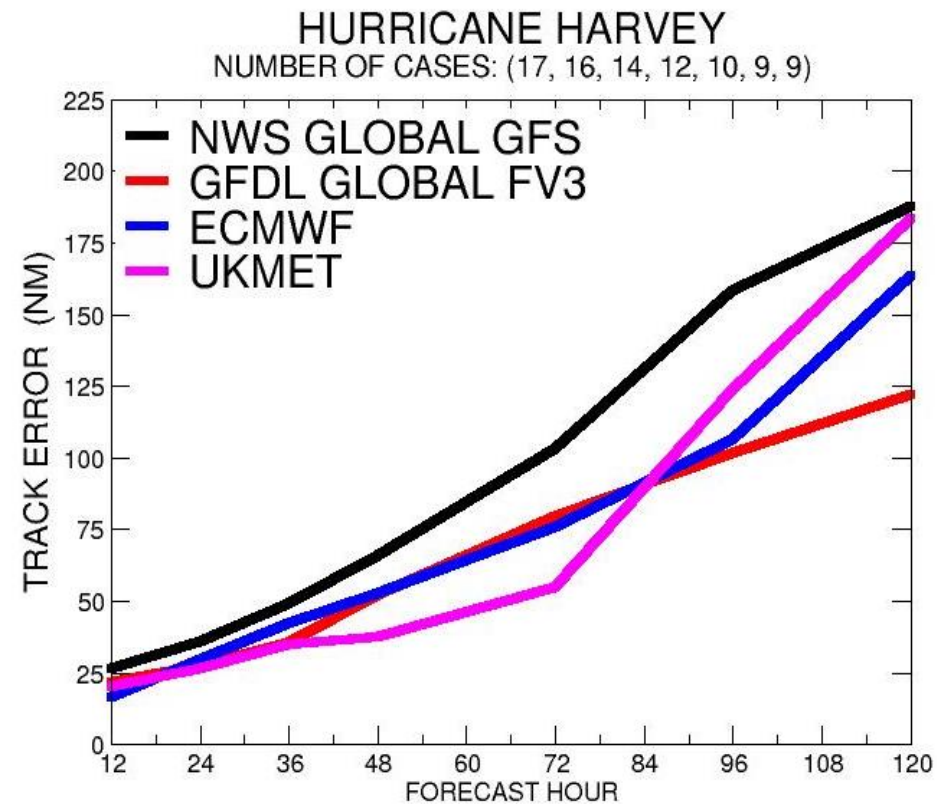
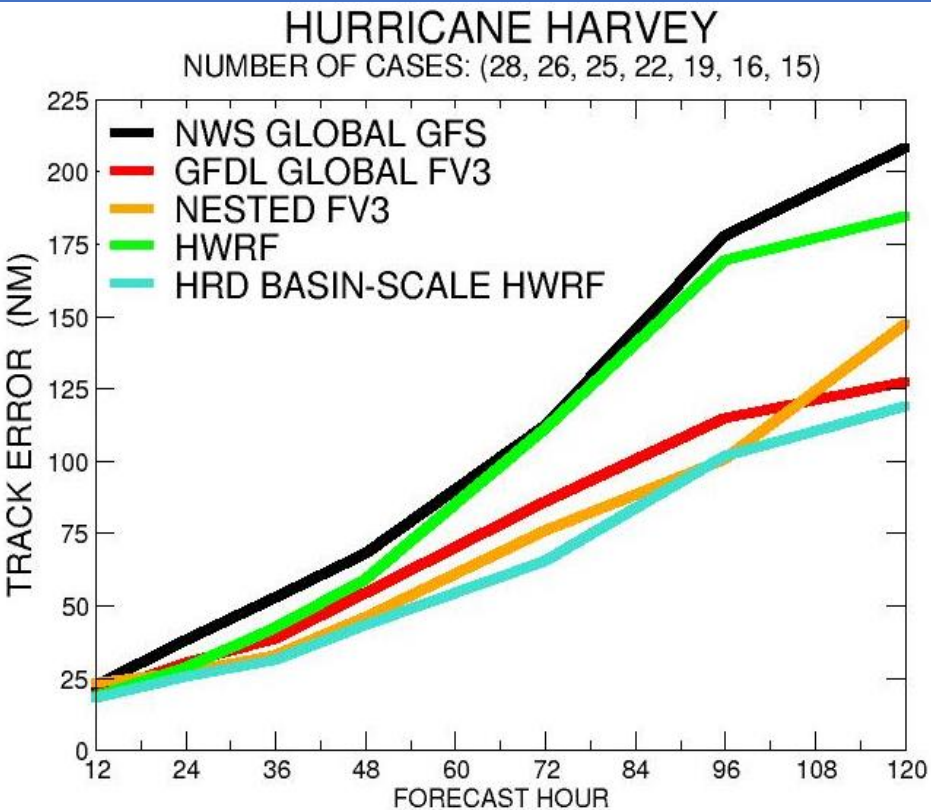
Hurricane Harvey Performance



Hurricane Harvey Track Errors

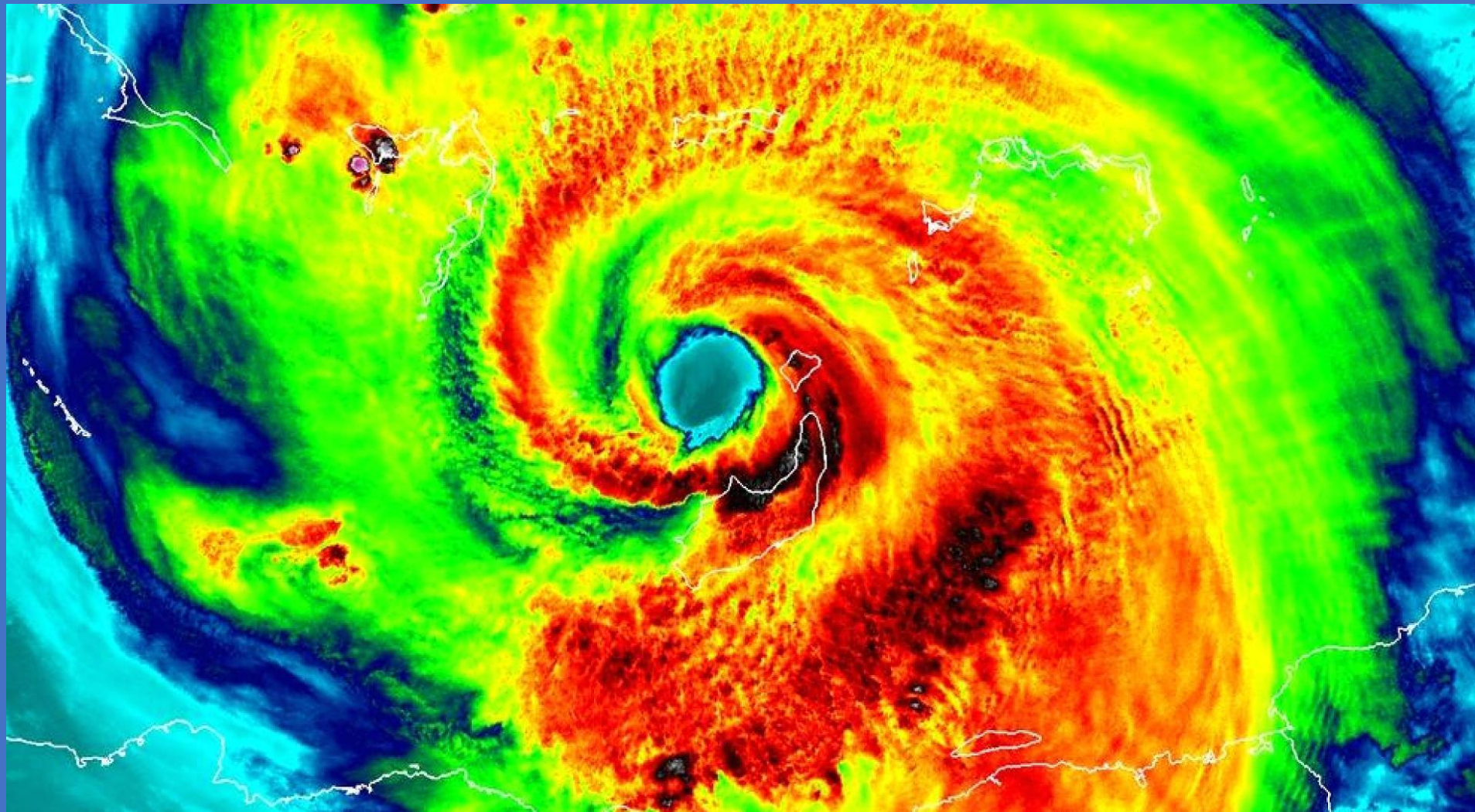
Comparison of GfsFV³
with GFS Based Guidance

Comparison with other Global Model
Guidance



Summary

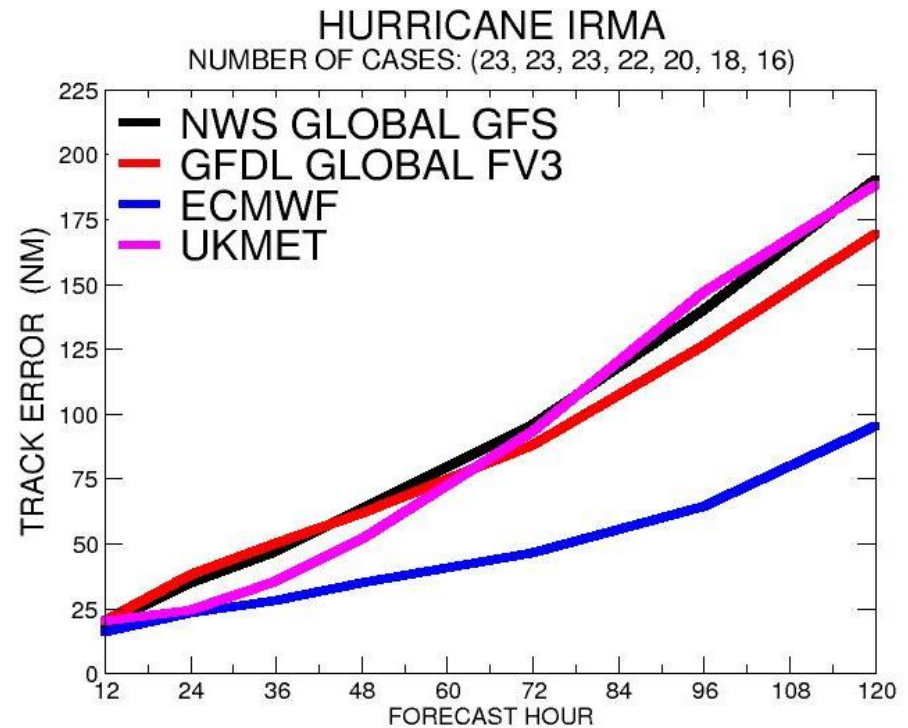
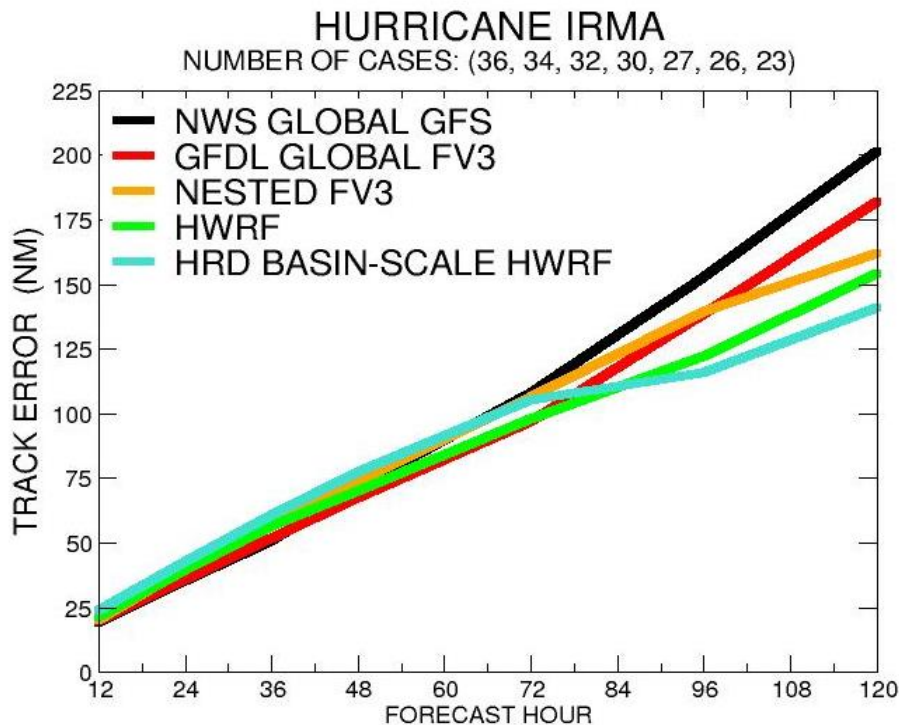
Hurricane Irma Performance



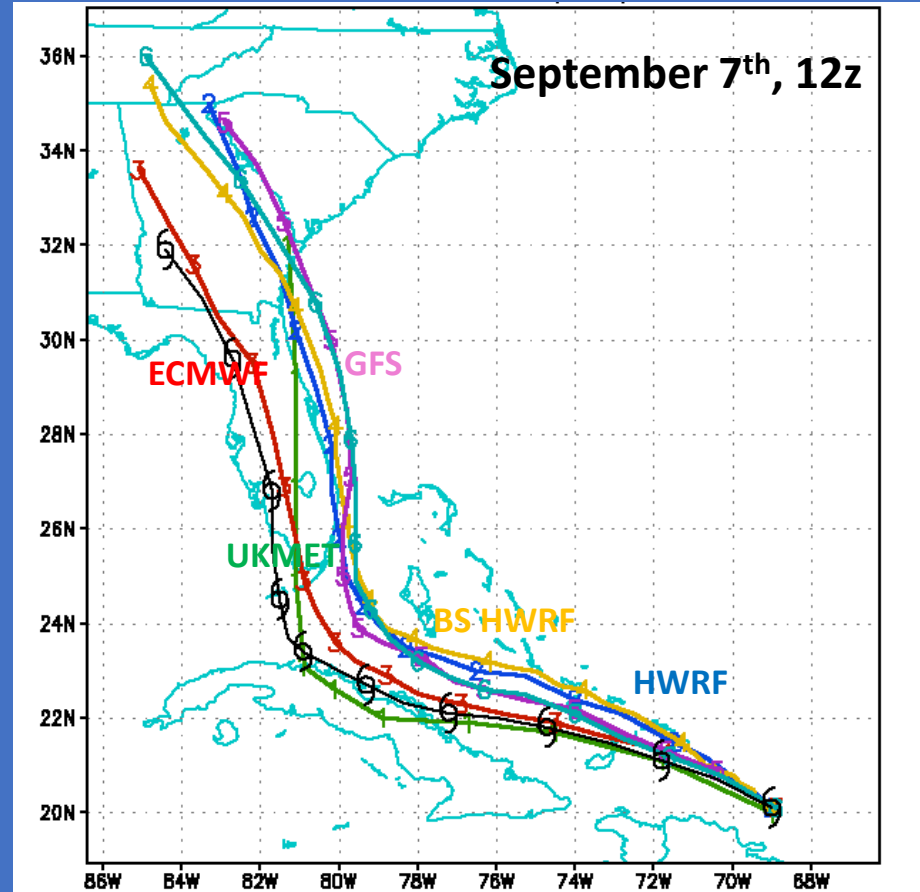
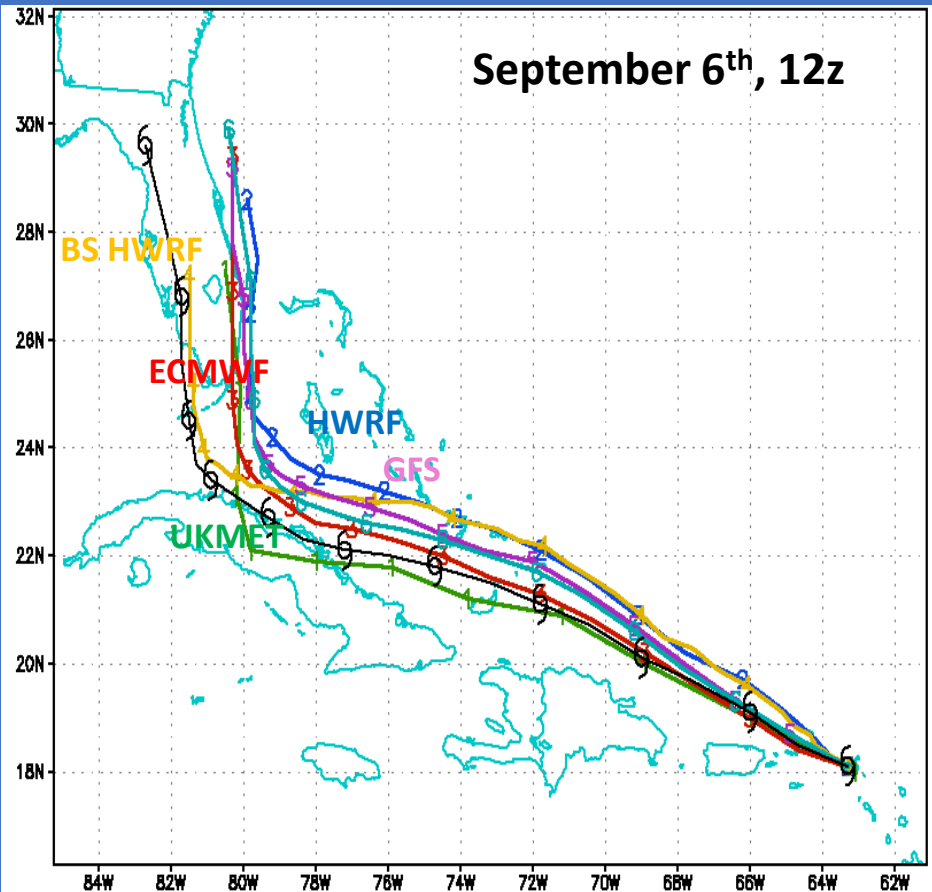
Hurricane Irma Track Errors

Comparison of GfsFV³
with GFS Based Guidance

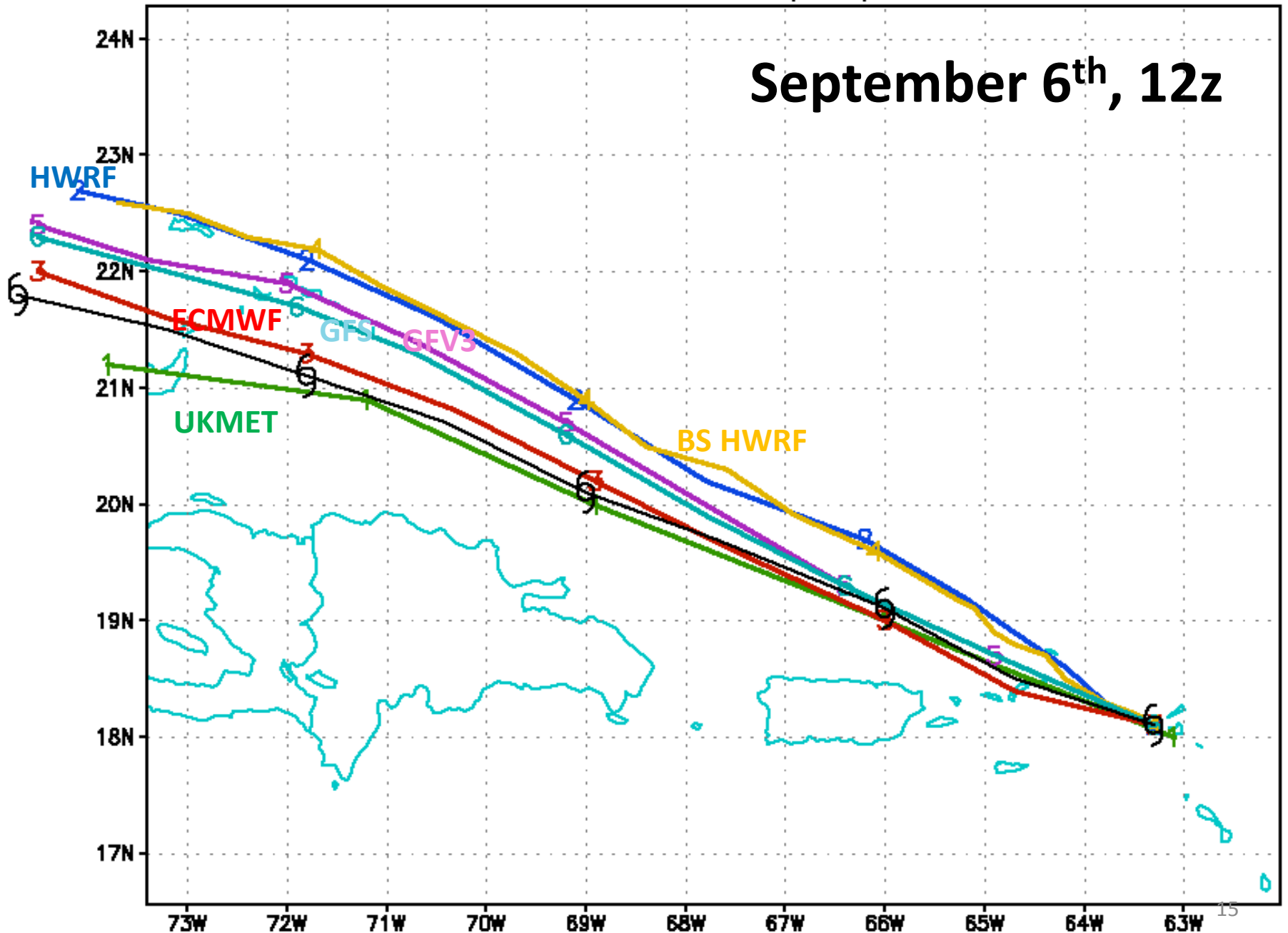
Comparison with other Global Model
Guidance



Comparison of Track Guidance Hurricane Irma



September 6th, 12z



SUMMARY

- **GfsFV³ had modest improvements in track guidance compared to operational GFS particularly in longer day lead times (~8%) .**
- **ECMWF track errors were superior in the Atlantic to any guidance. GfsFV³ had smallest track errors in WPAC.**
- **The HRD BS HWRF performed better than operational HWRF for track, particularly for Harvey.**
- **ECMWF and GfsFV³ track errors were comparable for Hurricane Harvey. ECMWF track errors are much smaller for Hurricane Irma than any other guidance.**
- **Operational HRWF Intensity Guidance was much superior compared to either version of GfsFV³ or HRD BS-HWRF with very little intensity bias.**