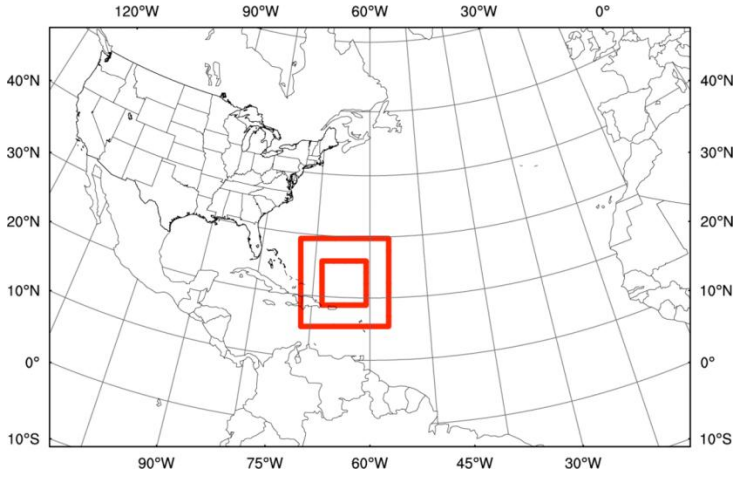
AHW Strategy

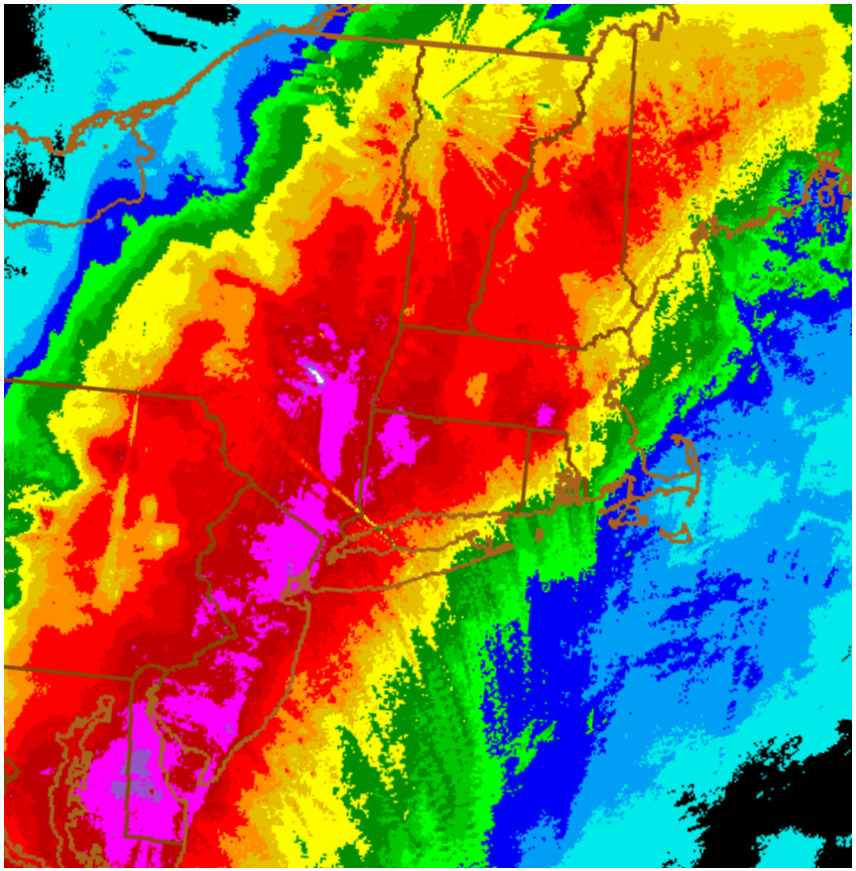
1. Continuous cycling over large domain
2. Errors due to physics clearly stand out (this is a good thing)
3. Extensive (and new) diagnostics of errors
4. Focus (for now) on reducing large-scale biases
   - Reduce track errors
   - Improve shear/moisture for better intensity forecasts
5. Inner-core assimilation only after large-scale errors significantly reduced

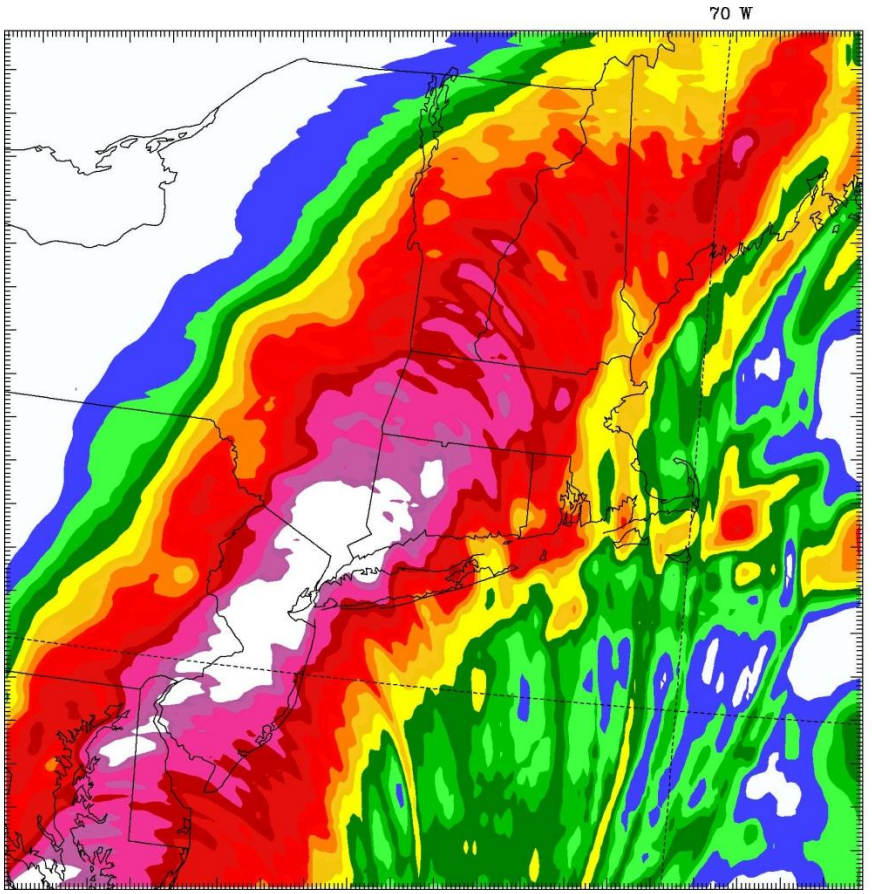


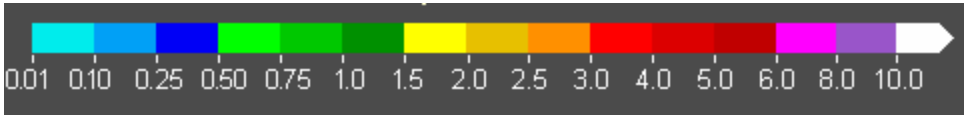
Irene: Precipitation Forecasts

(from AHW initialized 18 UTC 26 August)

2-day Rainfall, Ending 2 PM EDT August 28

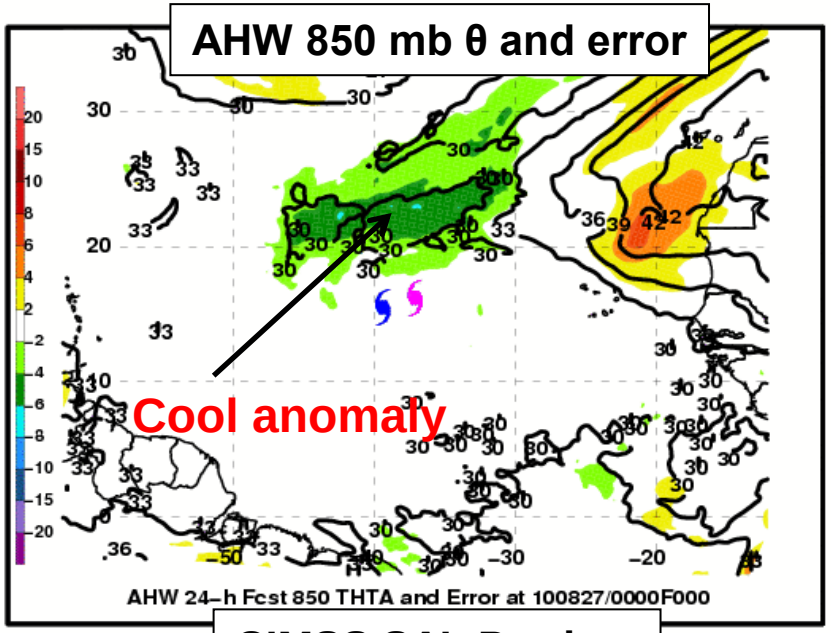


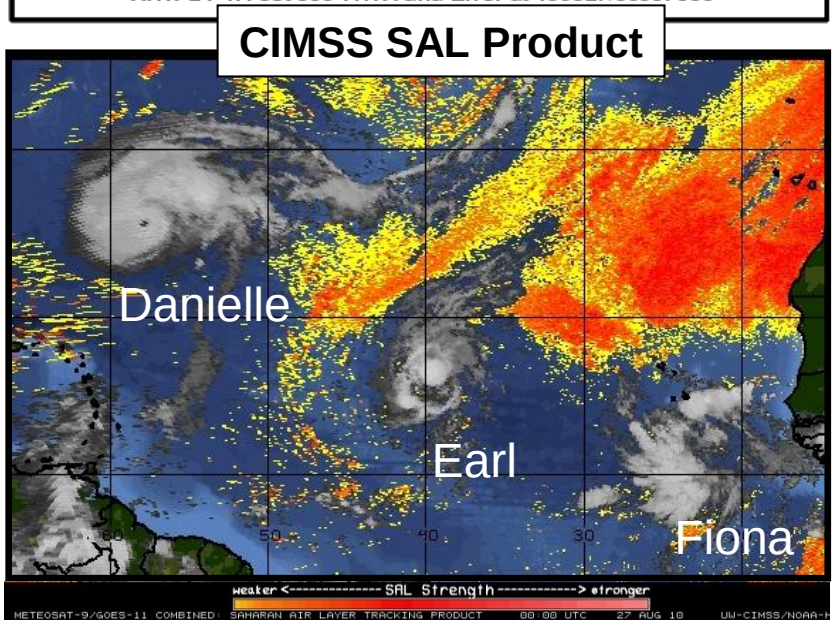




Inches

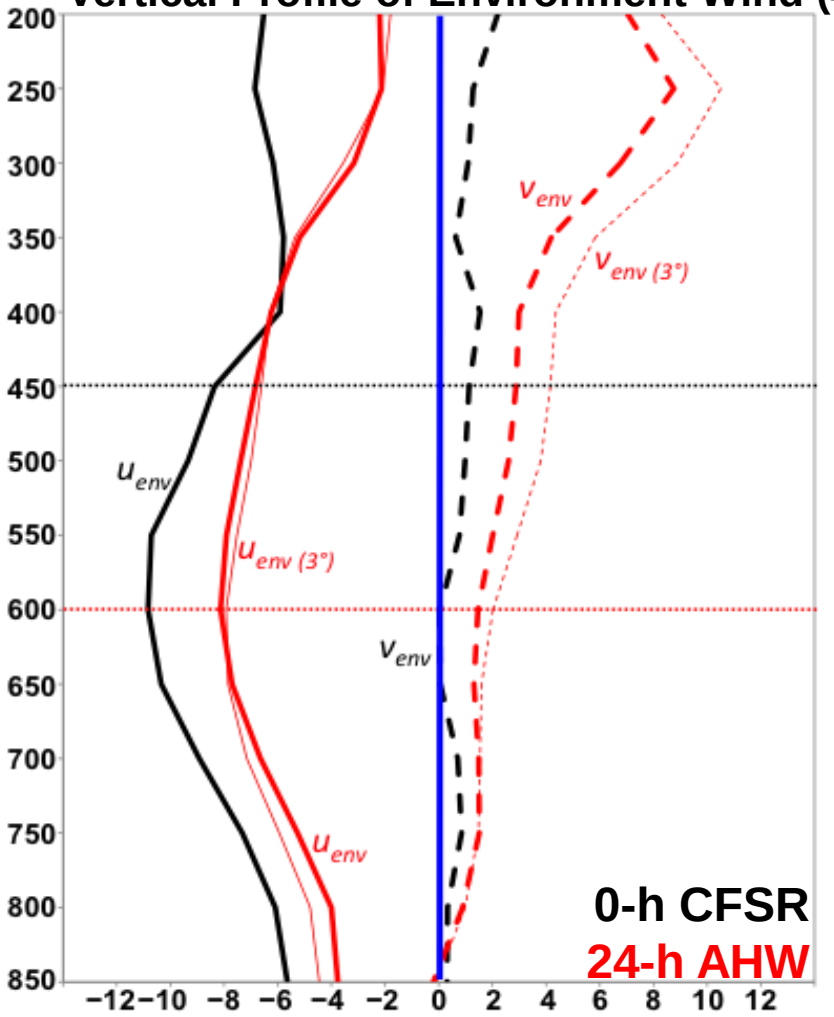
Environmental Wind Error Diagnosis





TC Earl 27 August 2010

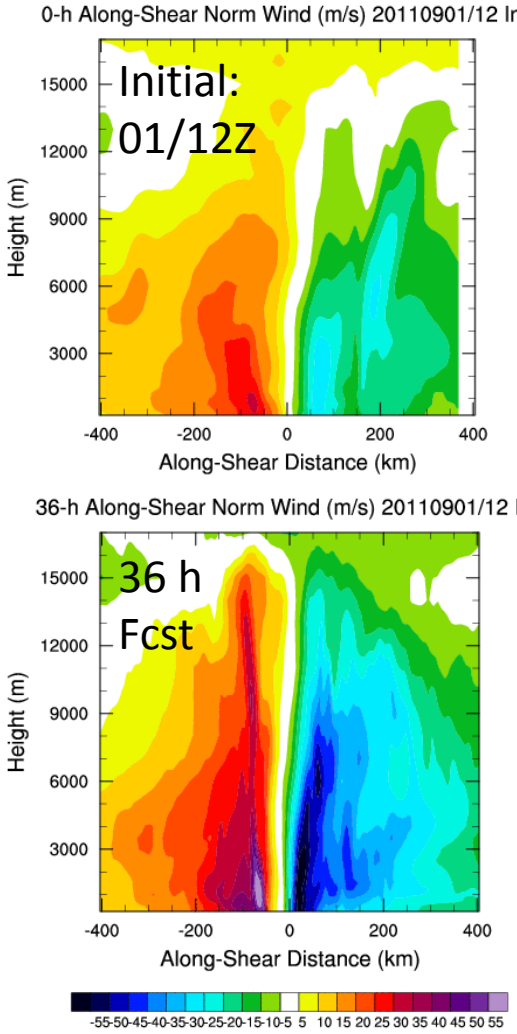
Vertical Profile of Environment Wind (4°)



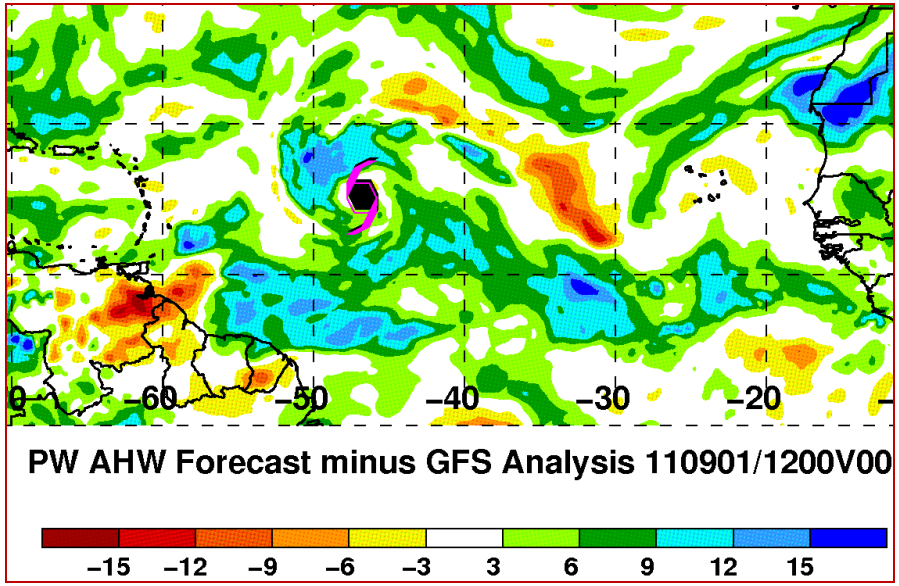
- **Cool anomaly contributes to subtropical ridge error; anomaly present at initial time and carried through forecast (not shown)**

Is all the error due to synoptic-scale PV errors? No.
Even with reasonable initial shear, storm intensifies too much

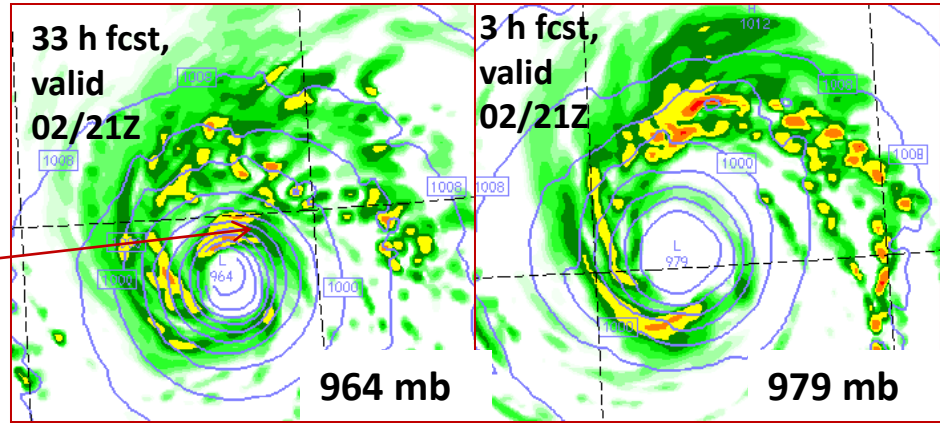
Katia, initialized at 01/12Z, is clearly shallow and sheared, but quickly develops deep hurricane structure

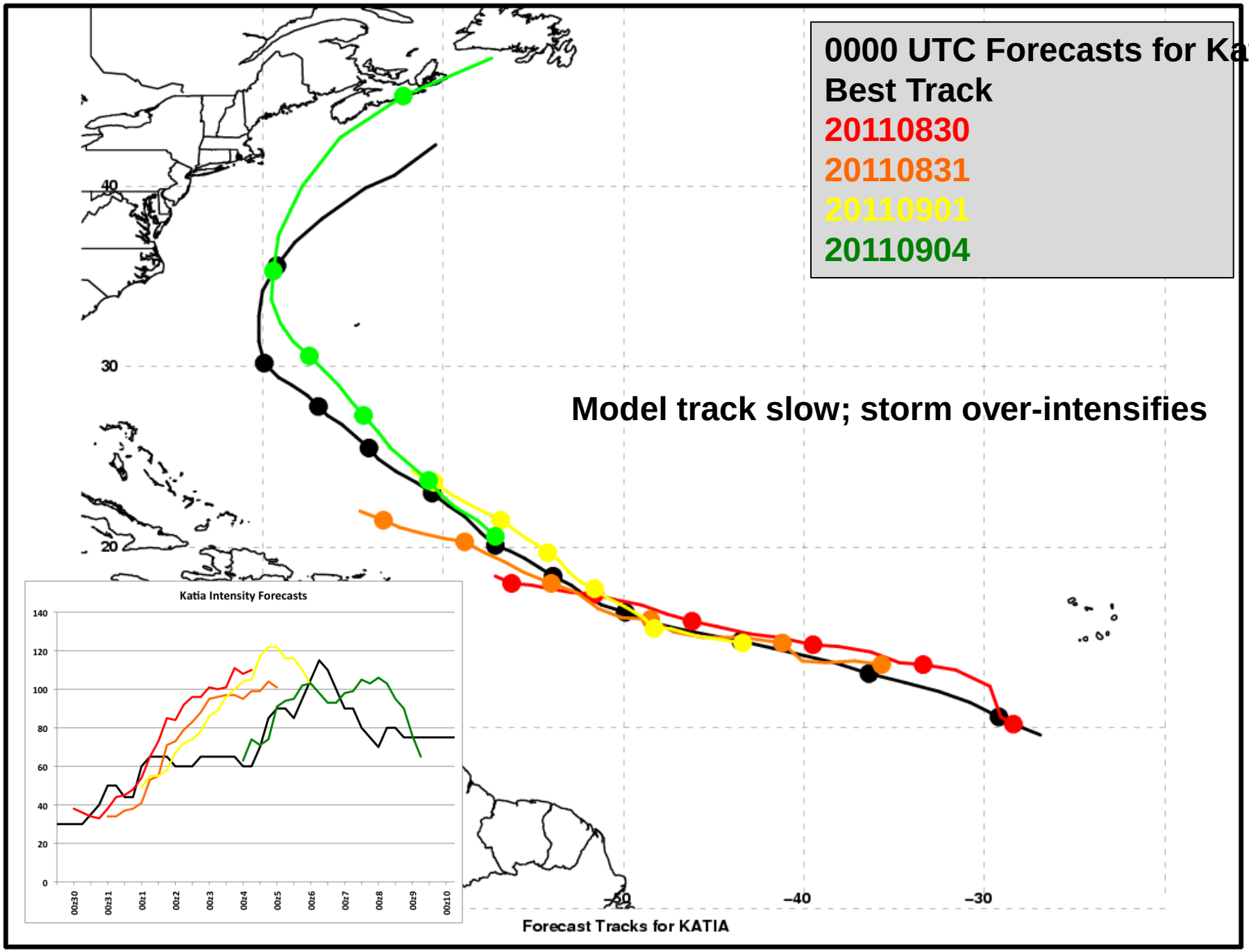


Why?
Probable
moist bias.



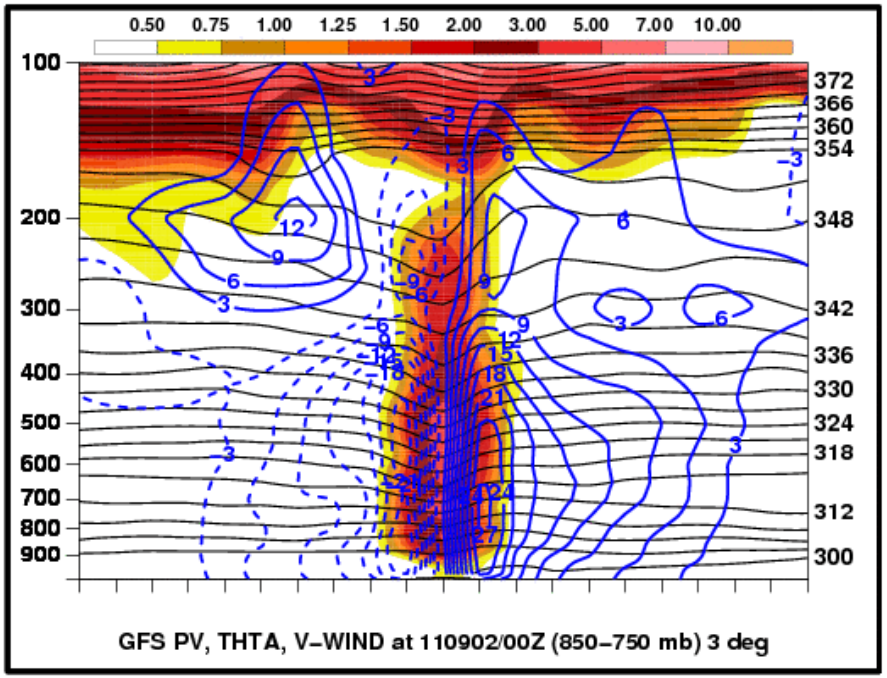
Result?
Too much
convection,
surrounds
core too
easily



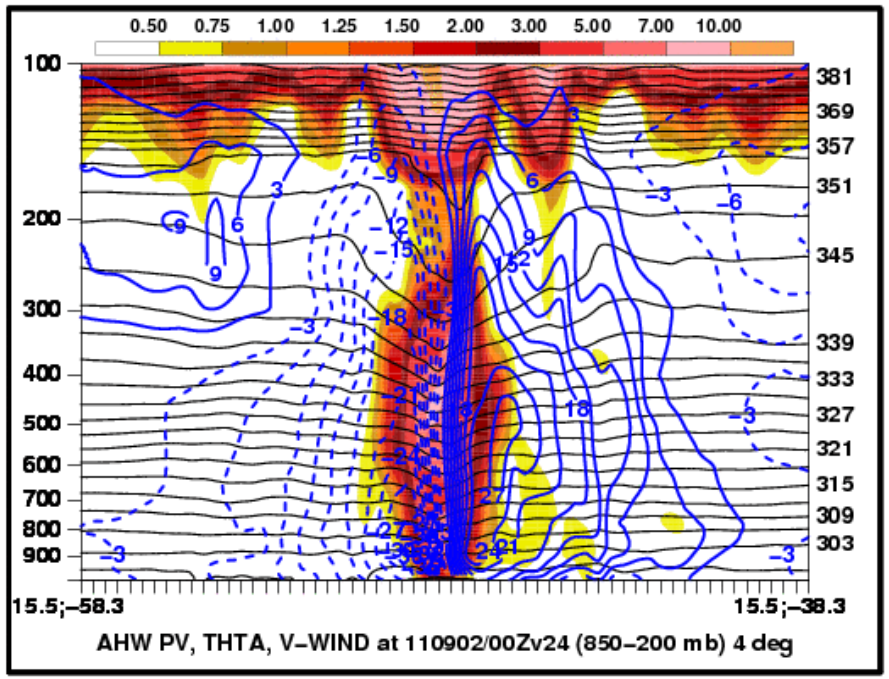

0000 UTC Forecasts for Katia
Best Track
20110830
20110831
20110901
20110904
Model track slow; storm over-intensifies
Katia Intensity Forecasts
140
120
100
80
60
40
20
0
00z30
00z31
00z1
00z2
00z3
00z4
00z5
00z6
00z7
00z8
00z9
00z10
40
30
20
-50
-40
-30
Forecast Tracks for KATIA

TC Katia 2 Sept 2010

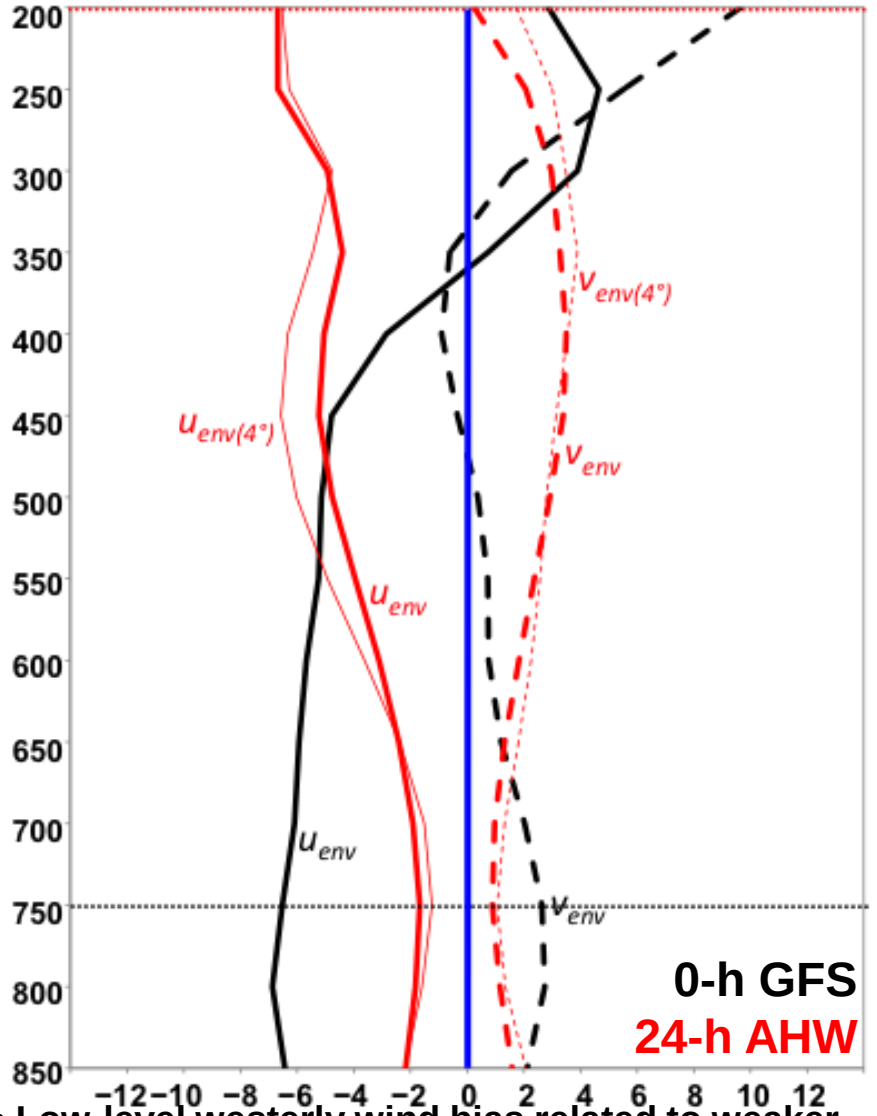
Vertical Profile of Environment Wind (3°)



GFS PV, THTA, V–WIND at 110902/00Z (850–750 mb) 3 deg

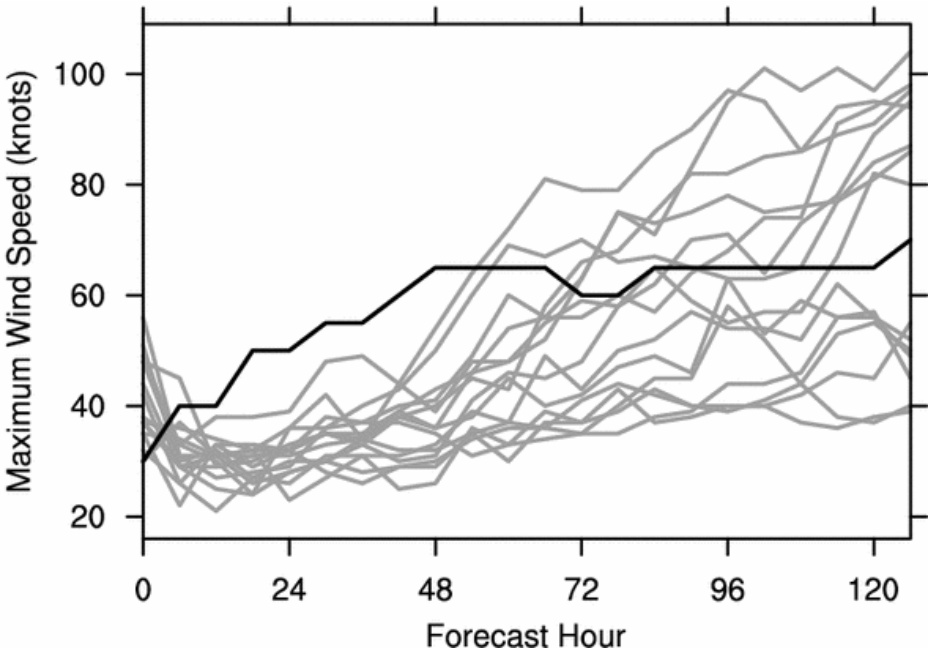


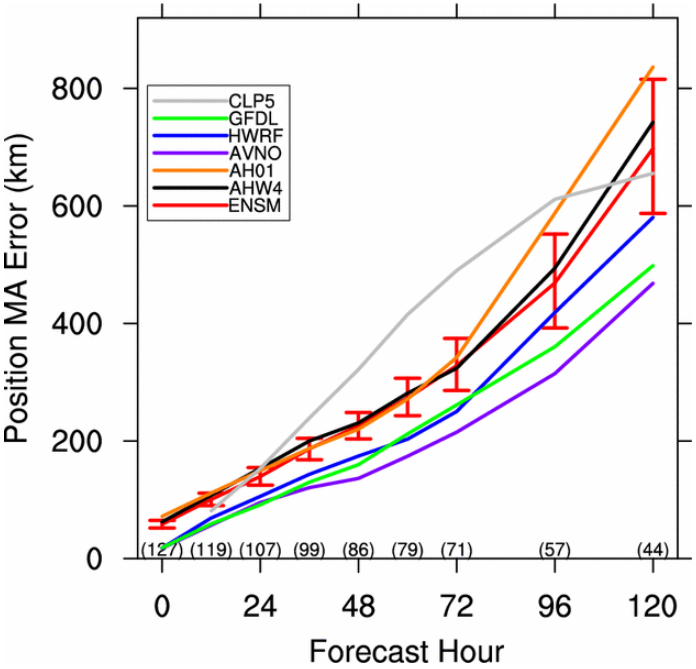
AHW PV, THTA, V–WIND at 110902/00Zv24 (850–200 mb) 4 deg

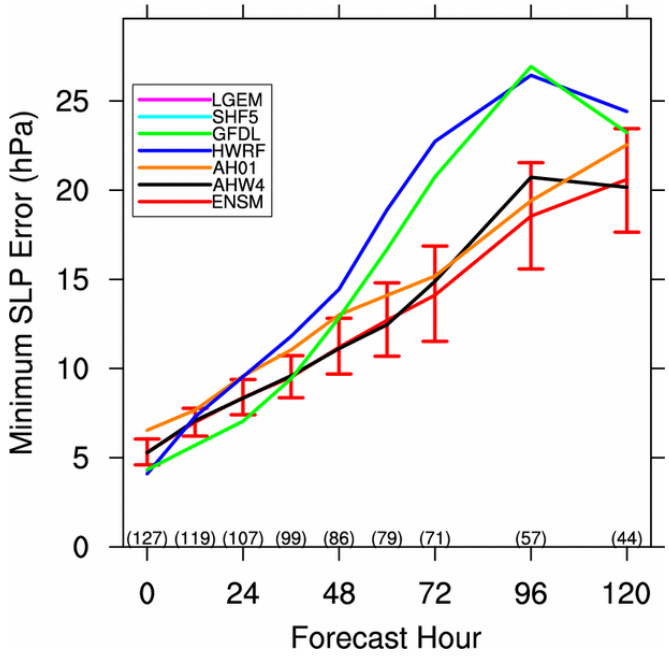


- Low-level westerly wind bias related to weaker subtropical ridge in AHW
- Upper-level easterly bias due to strong ridging in AHW; convection too strong in AHW (not shown)

Ensemble Prediction: Mean vs. Deterministic vs. Random Member





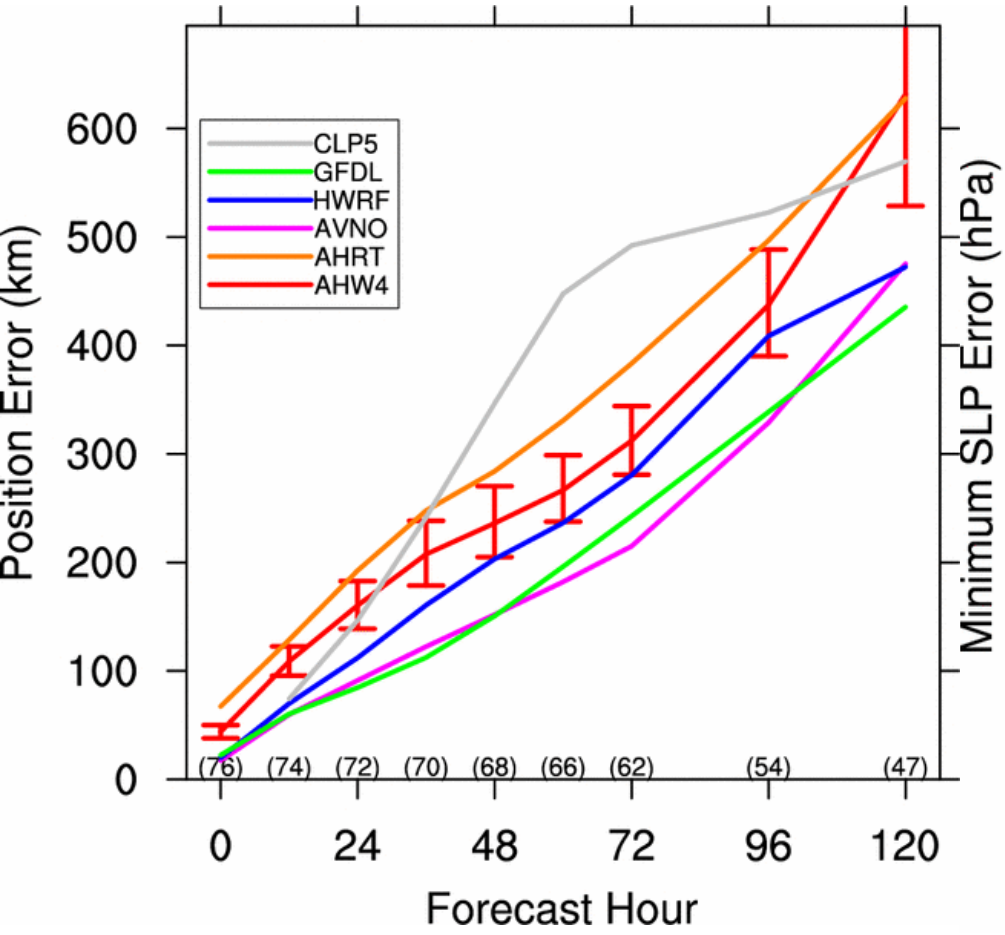


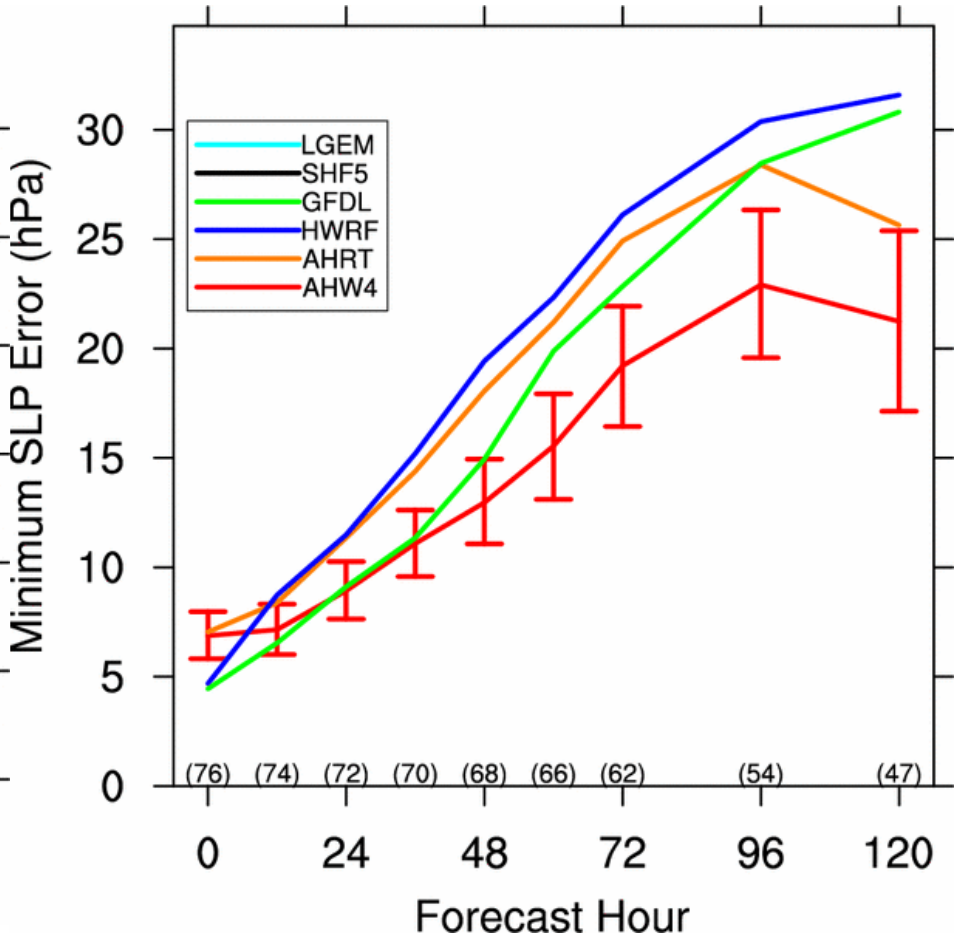
Current Research and Testing

Generally Aimed at Improving Forecasts of TC Environment (improving track prediction and convection response)

- Surface flux formulation: increase drag at low wind speeds, account for cool-skin, warm layer and salinity
- Adjust shallow convection (Tiedtke): too much detrainment and moistening
- Examine K-F (deep) and Tiedtke (shallow) cumulus together
- Modify radiative forcing (ozone and aerosol climatology): affects temperature, winds, and TC tracks
- Continue to develop TC motion diagnostics

Preview of 2012: Katia and Maria Reruns with Upgraded Shallow Convection & Surface Physics





2012 Stream 1.5 Interest

4 km deterministic forecast for all Atlantic Basin TC	Finishes around T+6h	Requires 120 cores on t-jet for 2 hours
Atlantic Basin 4 km ensemble forecasts for single Atlantic Basin TC (10-15 members)	Finish by T+7.5h Finish around T+6h	Requires 48 cores on t-jet for 3.5 hours per member Requires 120 cores for 2 hours per member
4 km deterministic forecast for Eastern Pacific TC	Same as Atlantic	Same as Atlantic