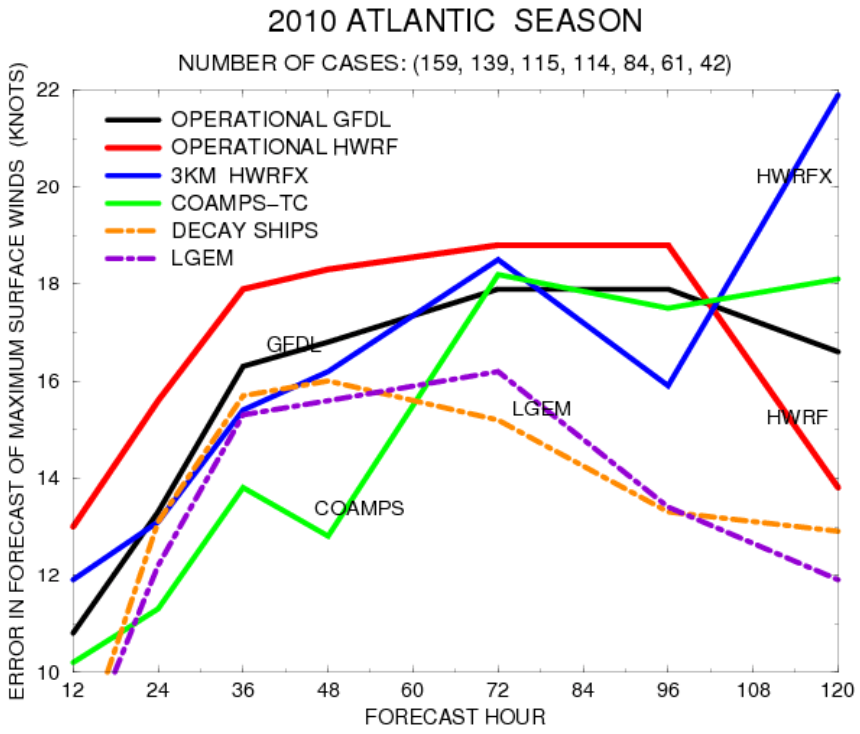
What is behind rapid error growth?



Is it due to model physics, numerics, initialization???

Note:

- Relative independent of dynamical or statistical model type
- Errors become roughly constant after 36 h

Could simply be error saturation from loss of predictability

Is predictability governed by two time scales?

1. Inner Core internal processes
2. Response of inner core to changes in environment

•Maybe we should be focusing on (2) rather than (1).
•Large sensitivities are a manifestation of lack of predictability.
•Great improvements of initial inner core structure will only last one day.
•Assimilation of larger scales paramount (with good representation of vortex response).

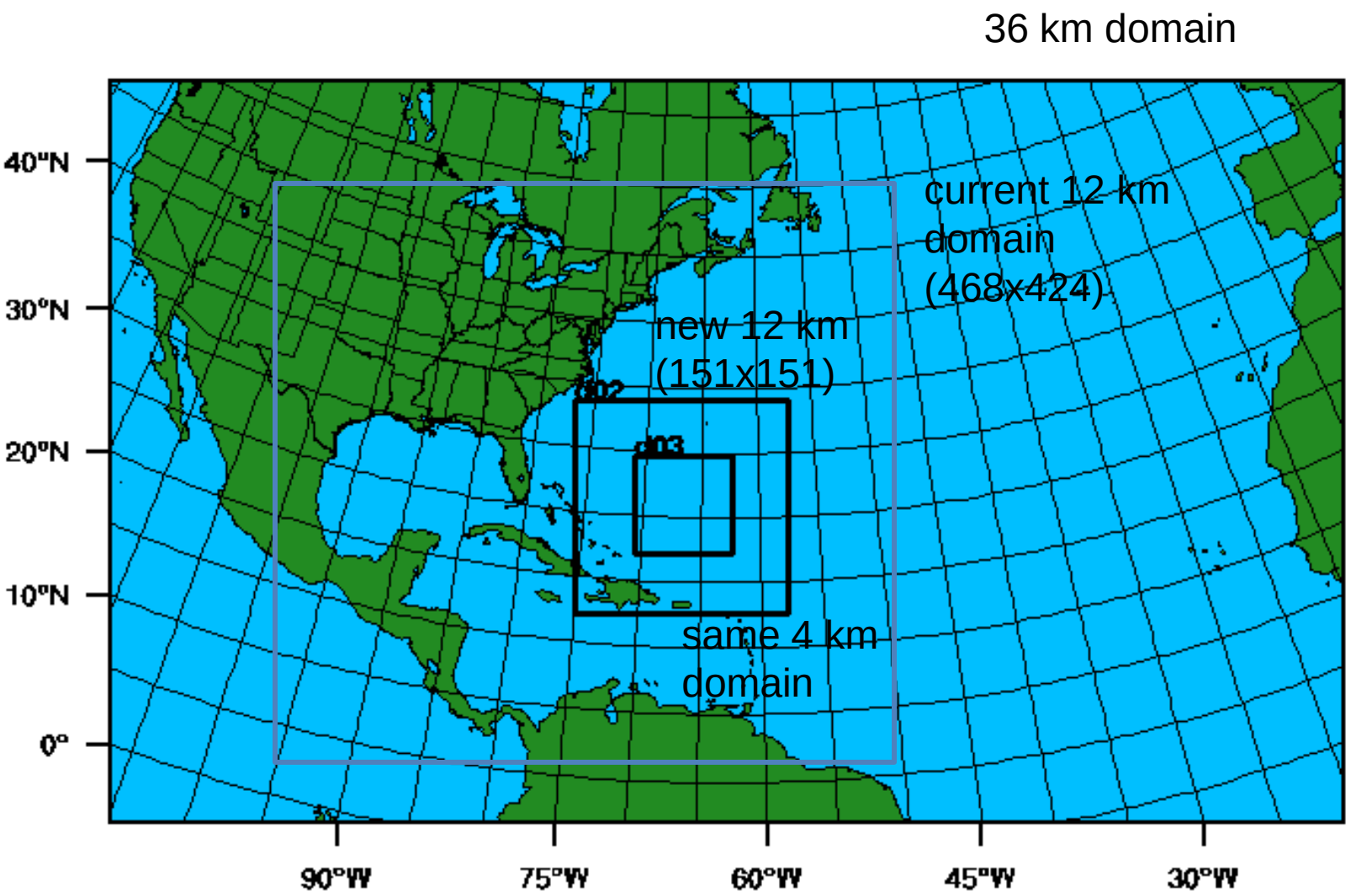
AHW Real-time Forecasts: Issues in 2010

1. Delivery time
   - Forecasts were not finished until t+10
   - Considered two cycles old at NHC
2. Multiple storms
   - Could only run one storm per cycle
3. Behavior on 12-km domain
   - Spurious genesis
   - Overintensification
4. Size of outer domain
   - Trouble with recurving storms farther north
5. Physics
   - Cases of overintensification (Earl)
6. Consistency with EnKF
   - Currently differing domains and physics could lead to spurious behavior in forecast

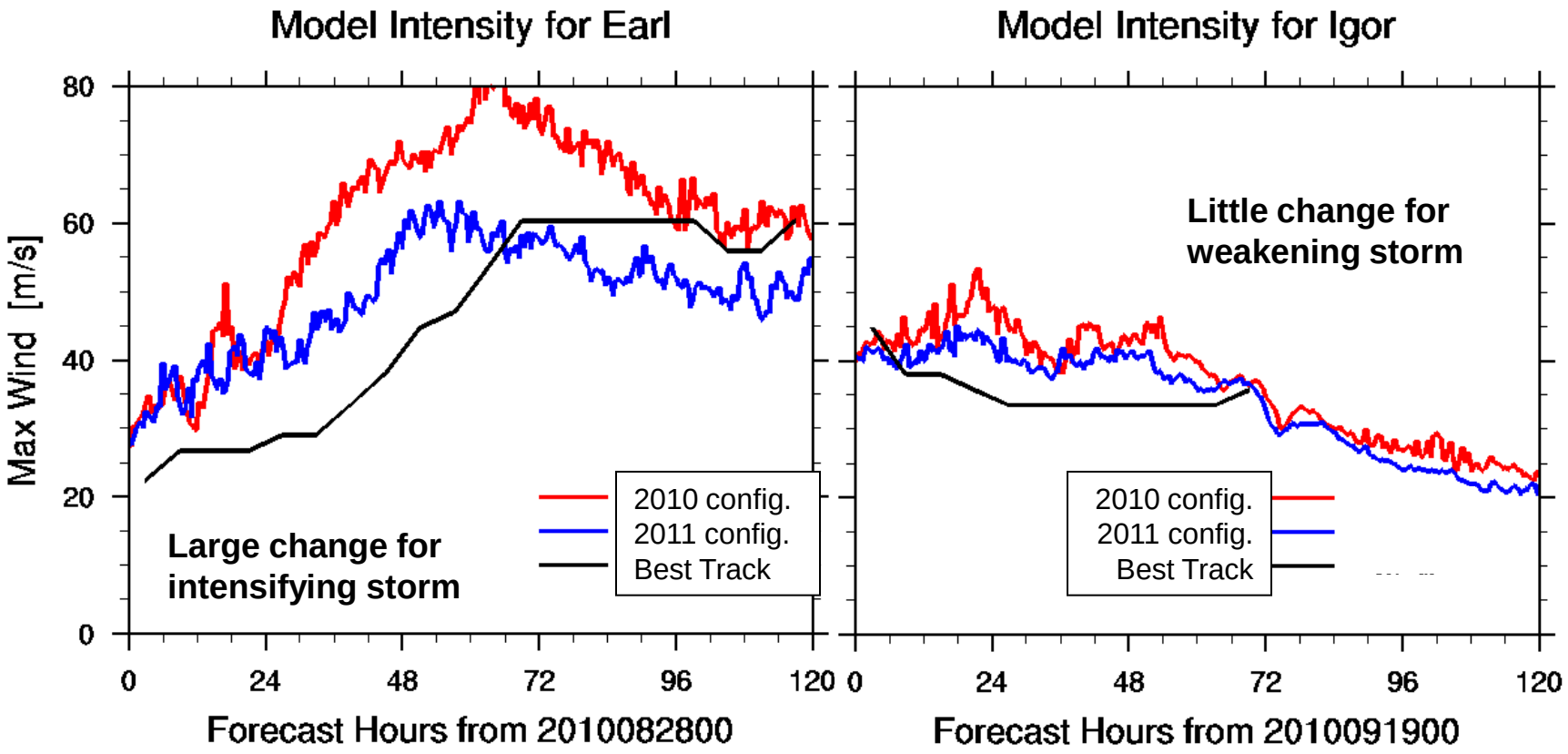
AHW Real-time Forecasts: Plans for 2011

1. Delivery time
   - Remove 1.33-km nest; use smaller 12-km domain
   - Estimated 2.5 h completion
2. Multiple storms
   - Add more nodes for more storms; all forecasts finish at same time
3. Behavior on 12-km domain
   - 12-km domain now a buffer between 36 and 4-km domains
   - Modified Kain-Fritsch trigger function reduces spurious genesis
4. Size of outer domain
   - Use larger 36-km domain as outer grid
5. Physics
   - Overdevelopment decreased on 4-km inner domain
   - Re-examine use of double-moment scheme
6. Consistency with EnKF
   - Make domain sizes and physics as close as possible (no 4-km domain or ocean coupling in EnKF)
   - Select member nearest ensemble mean for high-res. forecast

New domains


36 km domain
current 12 km domain (468x424)
new 12 km (151x151)
same 4 km domain
40°N
30°N
20°N
10°N
0°
90°W
75°W
60°W
45°W
30°W

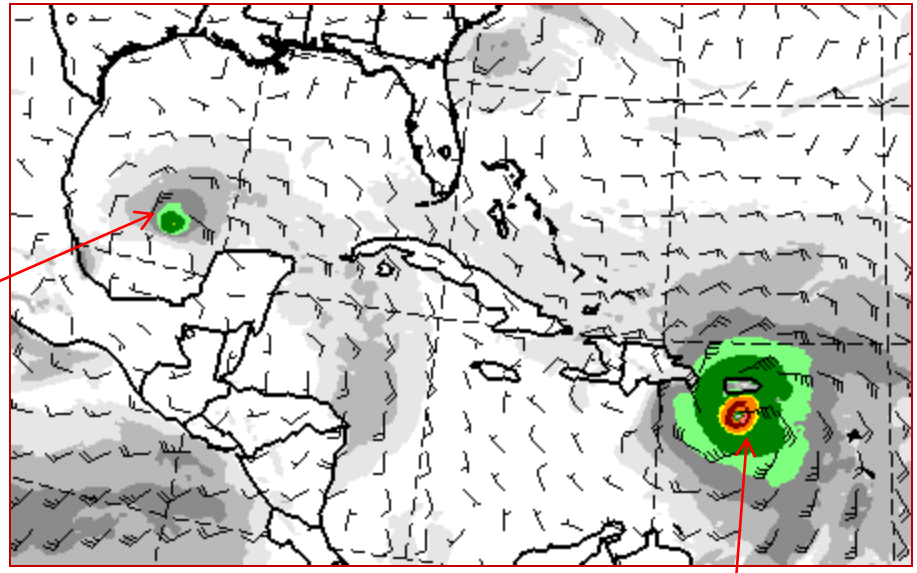
2010 vs. Proposed 2011 Configuration



Tracks are similar

Examples of Fake Vortices

120 h fcst from 090700

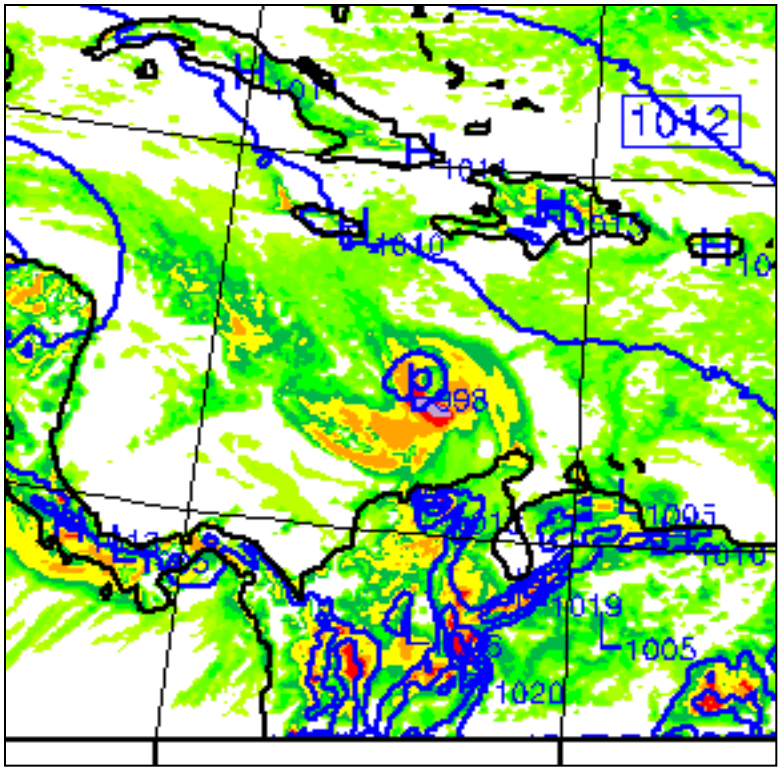


Never Happened

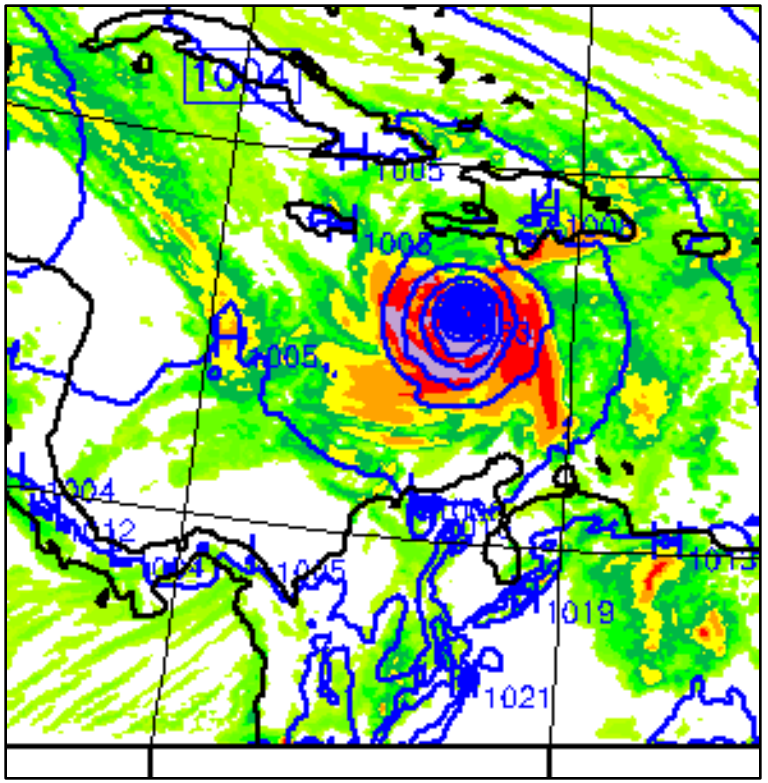
Karl, too soon (by 3 days)

Examples of Fake Vortices

60 h fcst from 092312



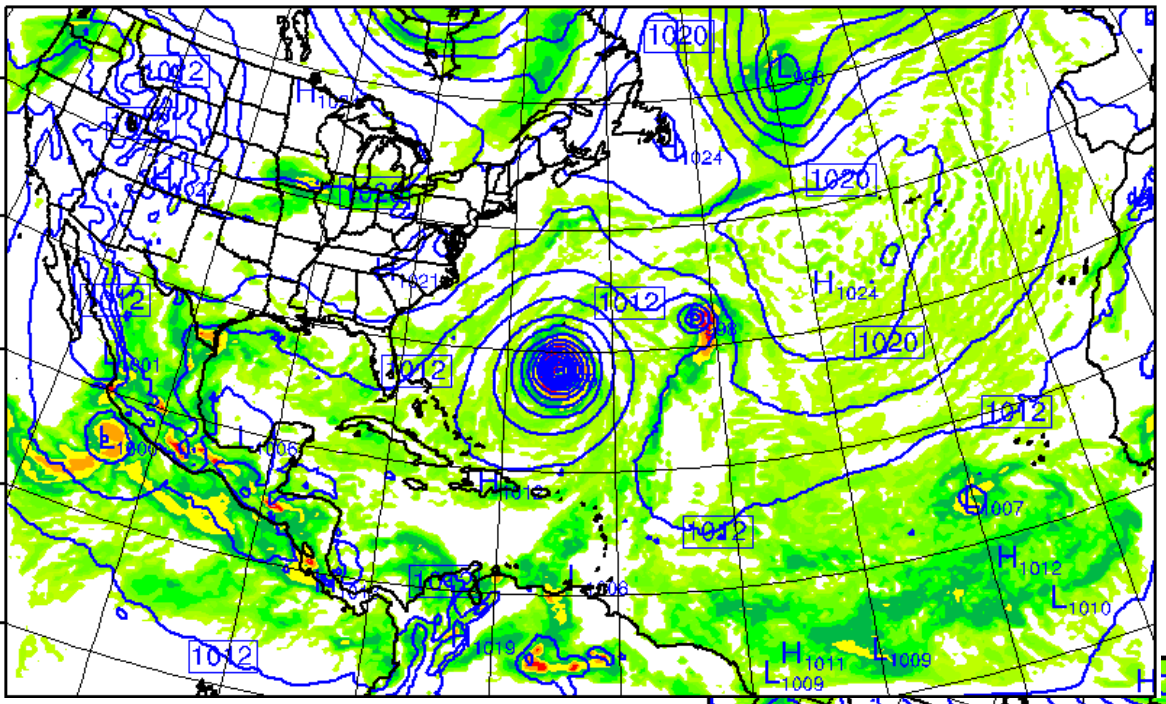
120 h fcst from 092312



Sea Level Pressure (hPa)
Precipitation in 6-hrs (mm)

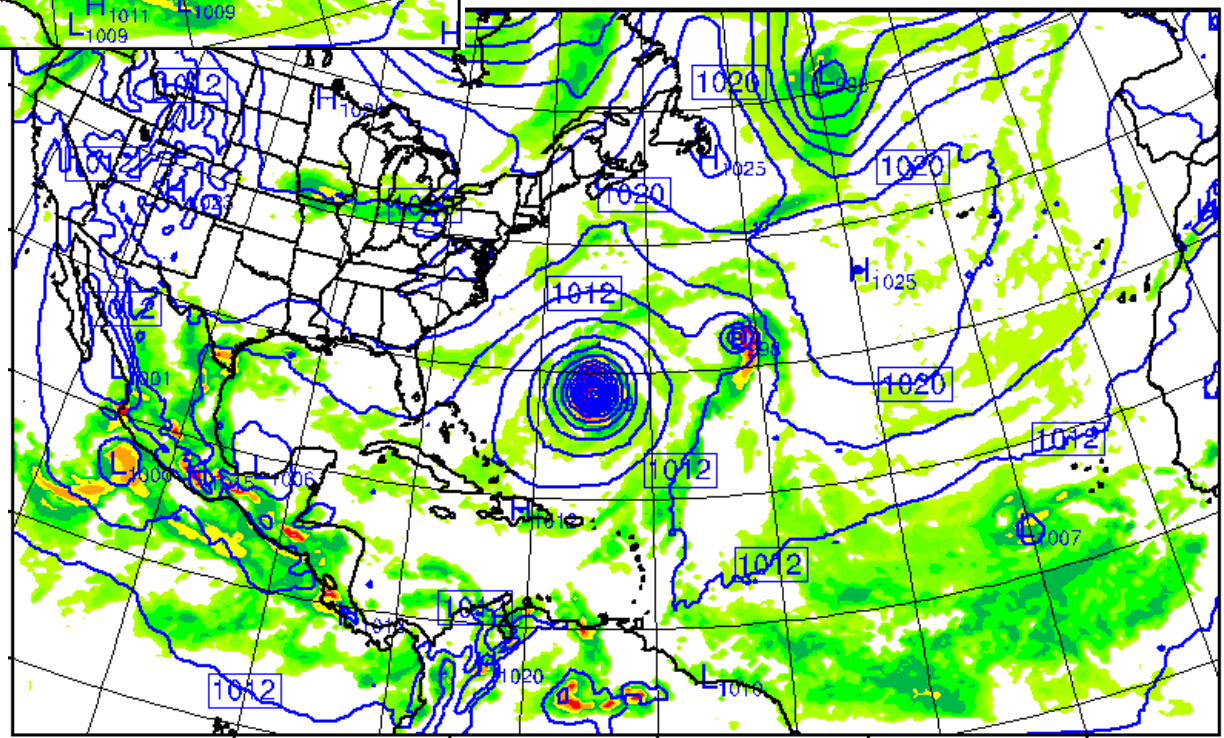
KF Trigger: Igor

6 h fcst from 091900



old

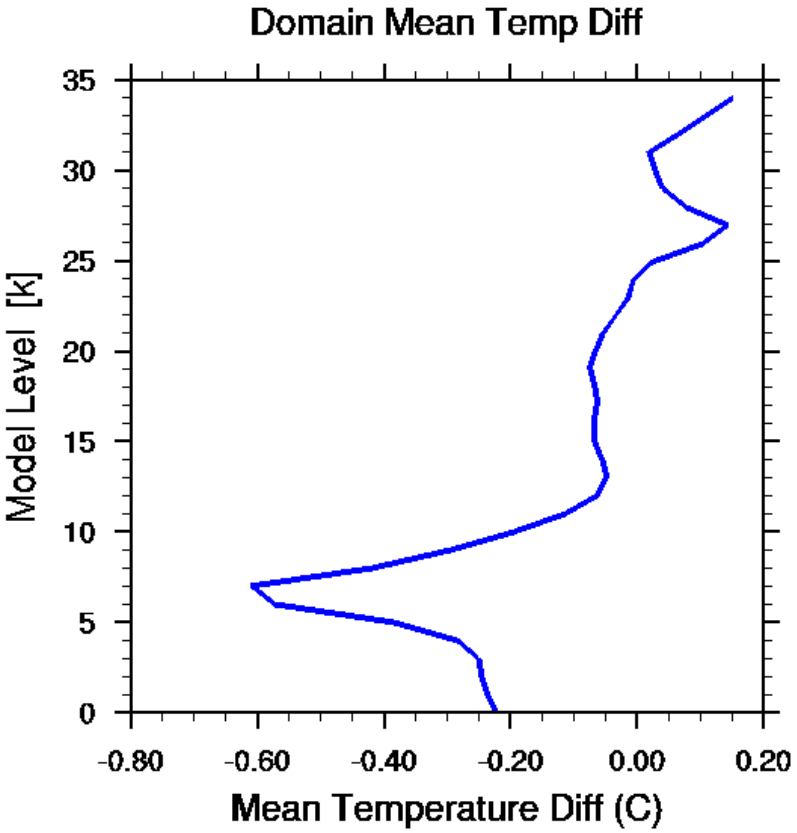
new

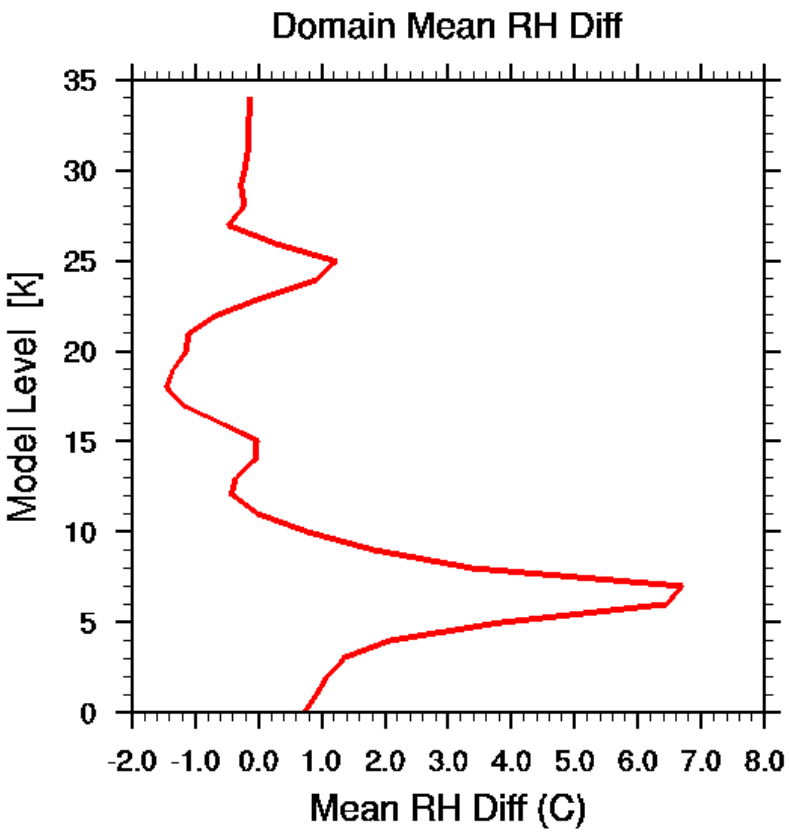


Less wide spread rainfall in the new run

KF Trigger: Igor

Domain-averaged T and RH difference between new and old KF-trigger at 120 h fcst from 091900: cooler and more moist. The change results in slightly higher surface pressure, and less total rainfall

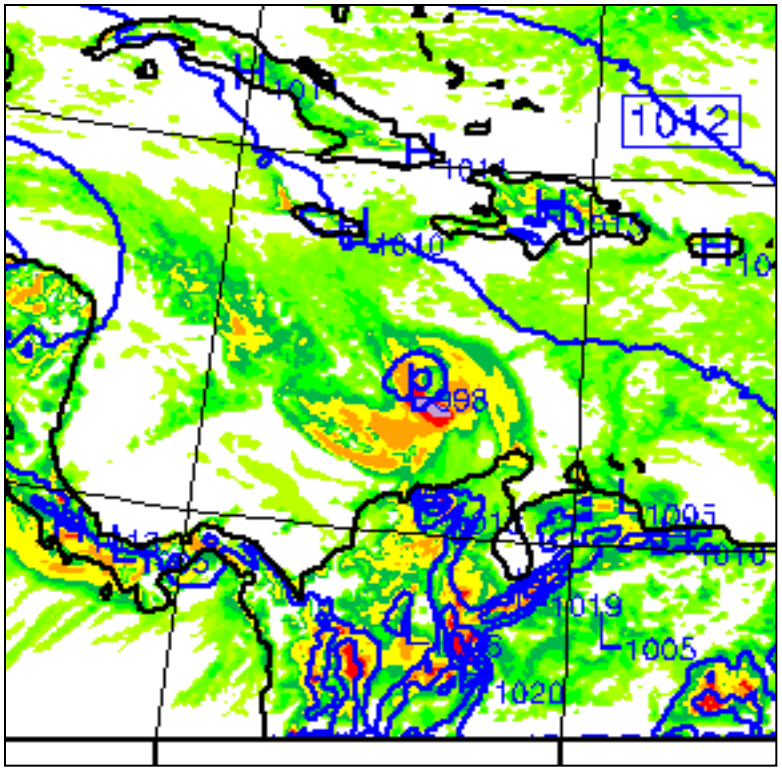




New KF Trigger Test: Matthew

-- improved in this case

Old 60 h fcst from 092312



New 60 h fcst from 092312