



Assimilation of Non-NOAA and Non-AF GPS Dropwindsonde Data into NOAA Numerical Models

Joint Hurricane Testbed Project update

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Project Description

addresses priority areas TPC/CPHC-1 (JTWC-1), TPC/CPHC-2 (JTWC-2), TPC/CPHC-5(JTWC-6), and EMC-1

- Goal: Test the assimilation of dropwindsonde data from NASA and NSF aircraft that regularly participate in field programs.
- OSE: produce GFS parallel runs that assimilate NASA and NSF dropwindsondes collected during the 2010 GRIP* and PREDICT** experiments
- Product: 2 sets of forecasts cycled every 6 hours spanning the duration of the 2 experiments and diagnostics of data impact on TC track forecasts
- Diagnostics: Comparison of track forecasts with operational GFS and NHC best track. Apply NCEP/EMC standard verifications for testing the impact of new data types in their data assimilation.

*NASA Genesis and Rapid Intensification Processes

**NOAA/NSF/NCAR Pre-Depression Investigation of Cloud systems in the Tropics

Current Progress

- New code to permit assimilation of NASA/NSF dropwindsondes developed and implemented Feb. 9 (thanks to Yanrong Ling and Kate Howard from NCEP/EMC)
- First set of forecasts with NASA and NSF drops completed and second set initialized as of March 3.
- 6 month progress report submitted Feb. 15.
- 40, 8 day GFS forecasts from 0Z 6Z 12Z and 18Z model initialization from August 15, through 25, 2010
- Raw data transferred to mass storage system
- Preliminary diagnostics produced for all active Tropical Cyclones
- Evaluation of Pacific TCs as well as Atlantic (Aberson ,2011)

GFS Parallel Forecast 1

Date	Experiment	#of Drops	Cycles
20100815	PREDICT	9	0Z
20100817	PREDICT	20	12Z
20100818	PREDICT + GRIP	25 + 9	12Z, 18Z
20100821	PREDICT	17	12Z
20100823	PREDICT	12	12Z
20100824	GRIP	23	12Z, 18Z

Active Tropical Cyclones from August 15 through August 24, 2010

Atlantic

TD 5 (8/10 – 8/18)
Danielle (8/21 – 8/30)
Earl (8/25 – 9/04)

W. Pacific

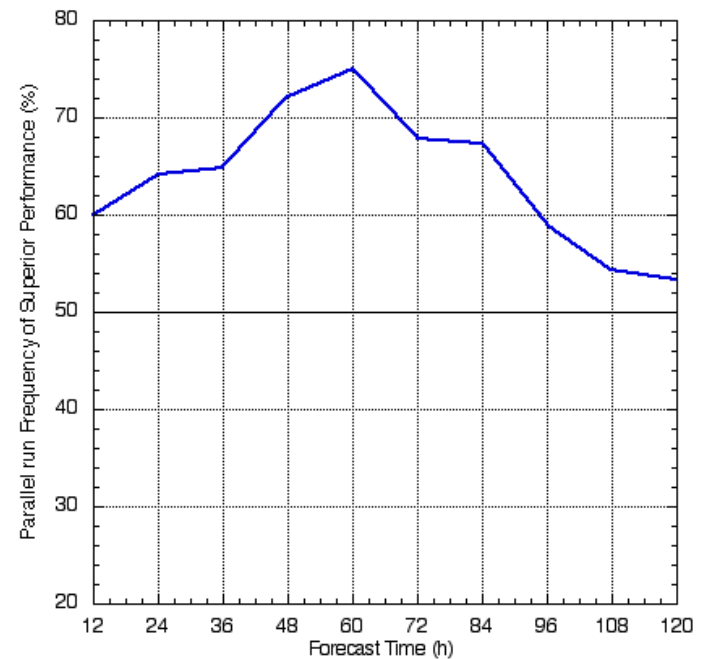
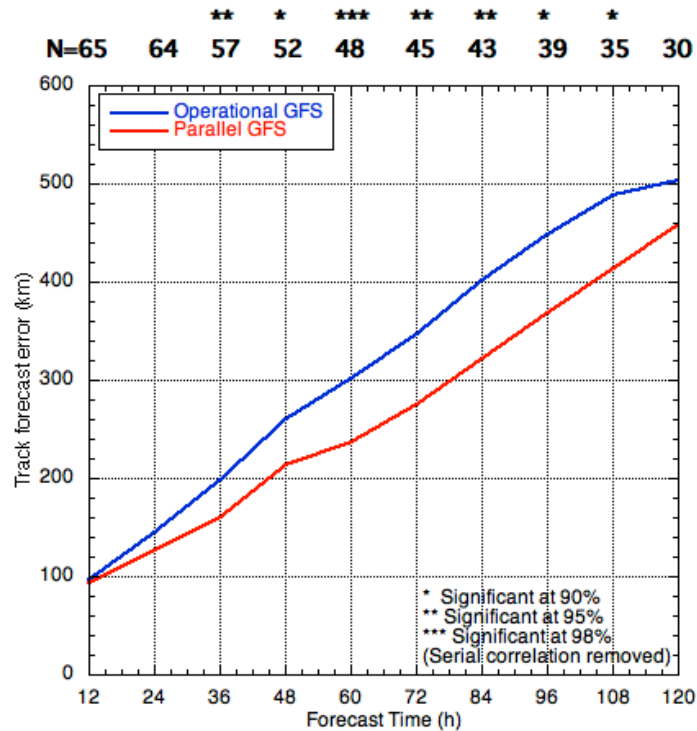
Mindulle (8/21 – 8/25)

E. Pacific

TD 8 (8/20 – 8/23)
Frank(8/21 – 8/29)

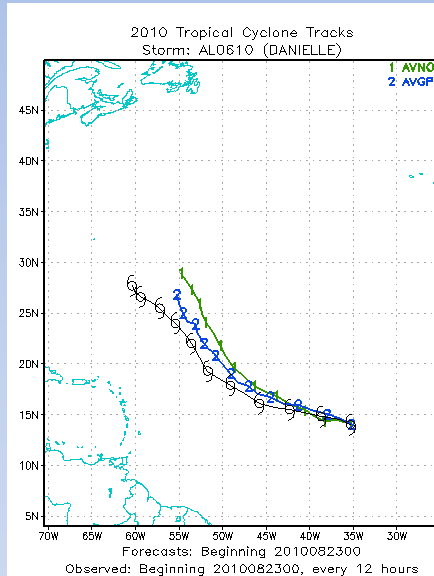
Preliminary Results

Track error and Frequency of Superior performance for the 40 TC cases between 8/15 and 8/25 2010

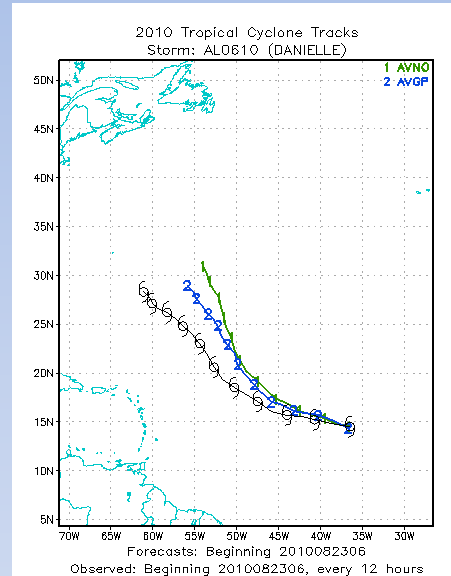


- Initial results indicate overall positive impact of additional dropwindsonde data out to 5 days.
- The forecasts that include the NASA and NSF data are superior to those that do not more than 50% of the time.

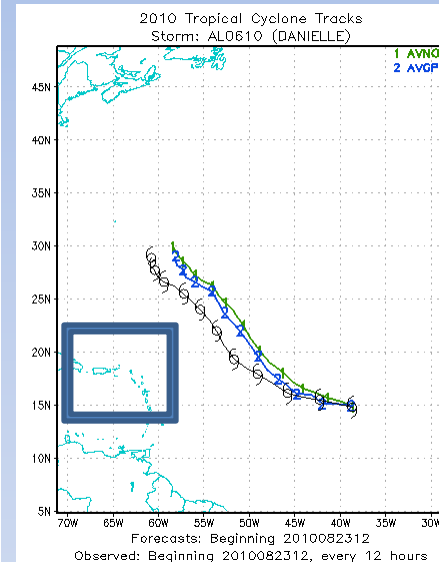
Hurricane Danielle August 23, 2010



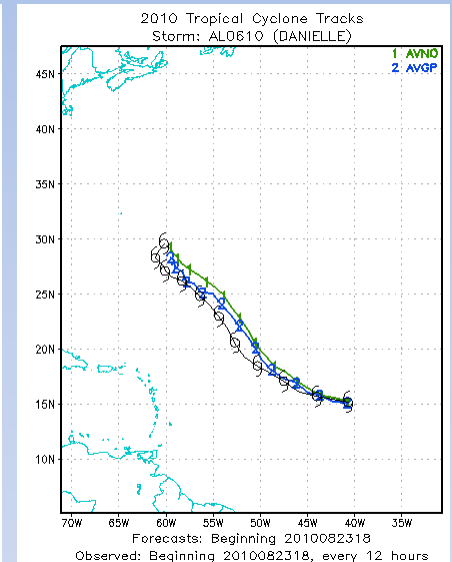
0Z



6Z



12Z



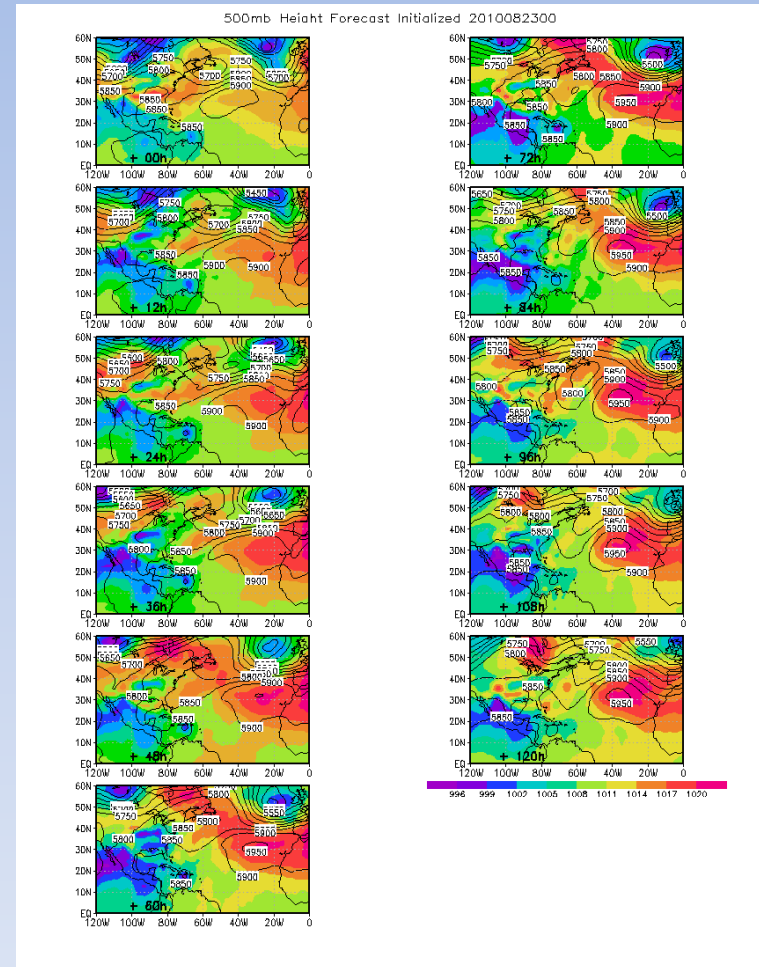
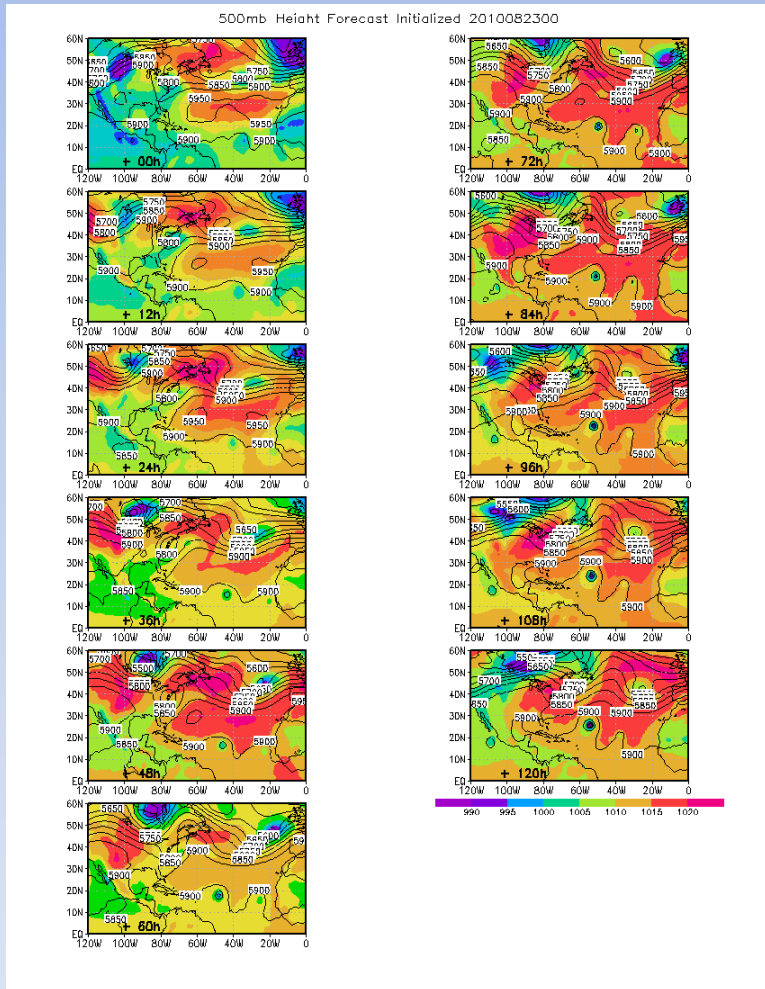
18Z

AVNO = control AVGP = NASA/NSF drops assimilated

3-5 day cross track forecast improved by addition of drops up to and including 8/21 12Z

Positive impact from drops assimilated 8/23 12Z for entire forecast.

5 day Forecasts MSLP and 500 mb height



with GRIP and PreDICT data assimilation

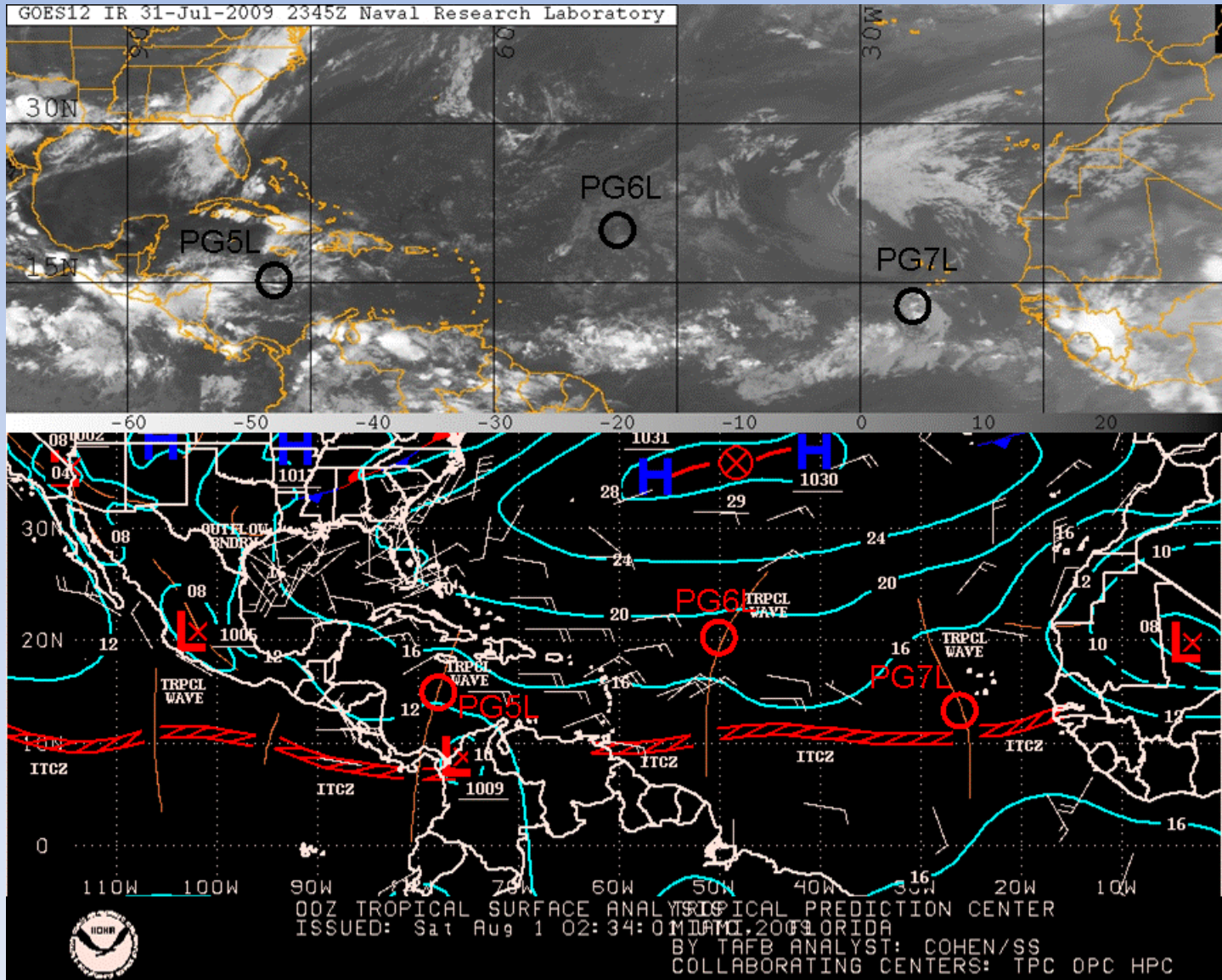
Operational

Status of Pending Work

- Second parallel run initialized and expected to be completed before Vapor is decommissioned
- Diagnostics from the first set of forecasts to be completed by April 1, 2012.
- PI currently working with NCEP EMC to determine their verification requirements for new data and to implement GFS standard verification code.
- PI corresponding with T. Marchok to see whether it might be feasible to apply his tracking technique for the non-developing systems.

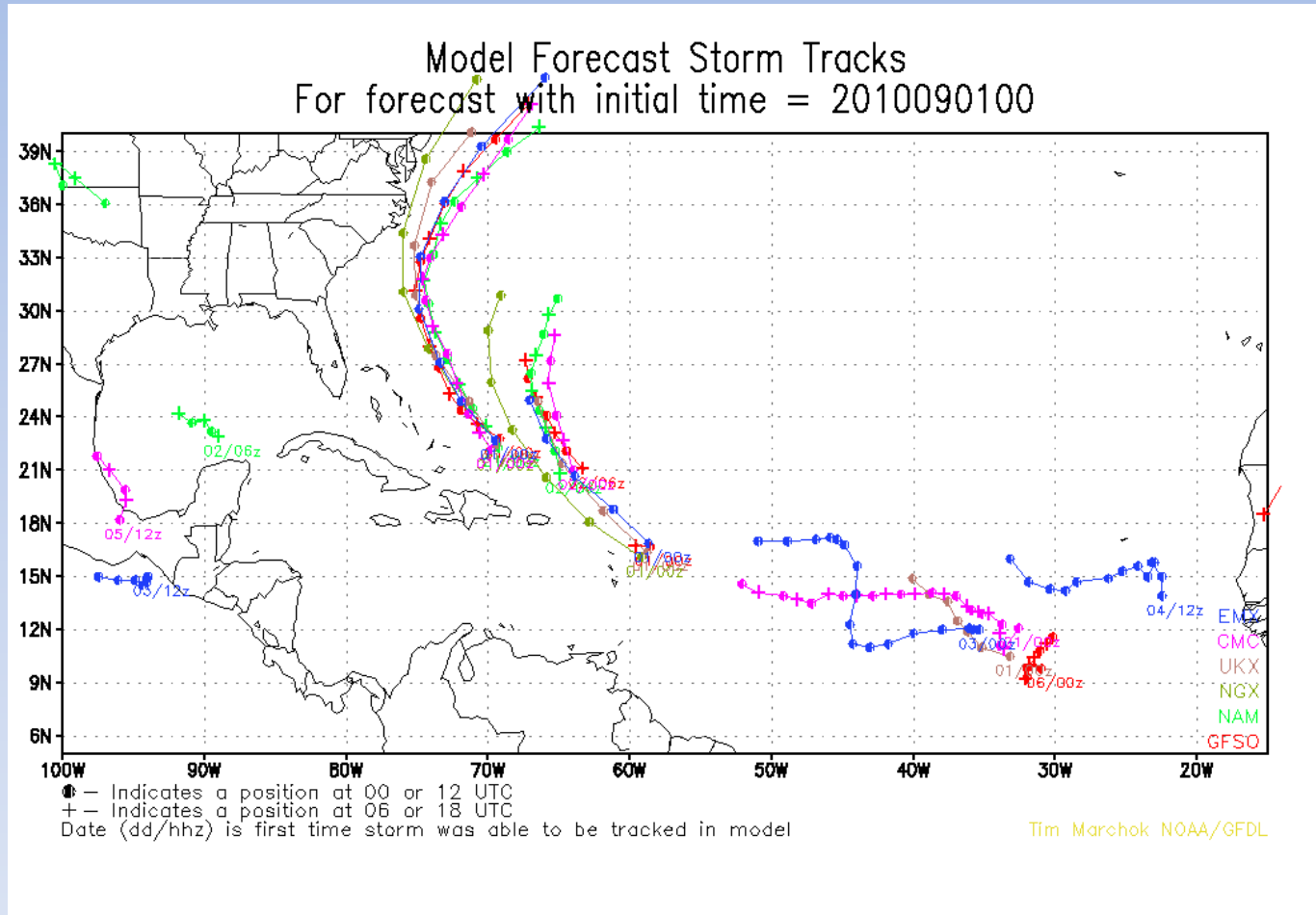
“Pouch” Tracking

(Dunkerton, Montgomery and Wang 2008)



Tracker Product

<http://www.emc.ncep.noaa.gov/gmb/tpm/emchurr/tcgen/>



GRIP and PreDICT dropwindsondes assimilated by ECMWF, UKMET and Canadian models

Timeline for Completion of Proposed Work

- Project is progressing on schedule
- The proposed scope of work is expected to be completed within 1 year of the award date.
- Completion is dependent on the availability of the NCEP EMC Vapor computing system

*This NOAA Joint Hurricane Testbed project was funded by the US Weather Research Program in NOAA/OAR's Office of Weather and Air Quality."