Latest Developments in NOAA’s Hurricane Research - HFIP

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**Vision**

- Organize hurricane community to dramatically improve numerical forecast guidance to NHC in 5-10 years

**Goals**

- **Improve** forecast accuracy for track & intensity by 20% in 5 years, 50% in 10 years
- **Extend** forecast guidance to 7 days with skill comparable to current 5 day forecasts
- **Increase** probability of predicting Rapid intensification at Day 1 to 90% and 60% at Day 5

http://www.hfip.org/
HFIP Successes to date: GFS Track Forecast Improvements

(% Improvement over HFIP baseline)

LANT GFS v ECMWF % improve over HFIP baseline d+7 track error
pre-HFIP period 2006-2008

HFIP year 4 2012

NCEP GFS [27km/44] IC/NCEP Hybrid
ECMWF FS [6km, T1299/16km/L61] NCEP 1deg grid

2006-2008

GFS

ECMWF

2012
HFIP Successes to date: HWRF Intensity Forecast Improvements

Improving 15-20% per year since 2011
2013 version is approaching 5 year goal

Only 14 cases at 120 hours verified for 2013
HFIP Successes to date:
Other Areas

- Demonstrated HWRF ensemble - shows great promise
- JTWC evaluating HWRF guidance in WPAC, NIO, SIO using HFIP Demonstration System on Jets – very successful
- Demonstrated prototype product for genesis using HFIP global ensembles – brief NWS leadership during demo
- Demonstrated next generation storm surge model - forecast for Sandy 36 h before landfall showed surprising skill for NYC and NJ coast.
- Demonstrated performance gain of increased operational resolution in Hybrid DA
- Grants to Academia
- Scientific Review Committee established
HFIP Lesson Learned

• Make better use of inner core observations to evaluate more than track and intensity:
  • Structure – drives damage and coastal inundation (surge)
  • Rainfall – drives inland inundation (floods)
• Make better use of inner core observations (in-situ & satellite) to initialize models
• Develop strategies to use ensembles to address uncertainty in intensity, structure, surge, and rain
• Future model architecture must include environmental changes on times scales to 10 days (best represented in global model), and to resolve rapidly changing inner core structure (best handled by moving nests)
HFIP Priorities 2014-2016

Operational Impact
• Continue demonstration of real-time Experimental Numerical Forecast System on HFIP Boulder Jet System during hurricane season
• Determine benefit of reconnaissance data & Doppler Radar (TDR)
• Demonstrate multi- & single-model ensembles for Track & Intensity

Research & Development
• Improve use of TDR flights operationally
• Improve use of Satellite data in TC DA (Sandy Supplemental - QOSAP)
• Develop HWRF GSI hybrid DA - Focus on high resolution inner domains
• Develop Global Physics for higher resolution (Sandy Supplemental HIWPP)
• Continue to improve HWRF Physics (Sandy Supplemental - OAR)

Technical Advancements
• Convert HWRF to NMMB (under NEMS) & transition to operations (HIWPP)
Questions?