

COMPARING OCEANWEATHER HINDCASTS WITH MEASUREMENTS FROM HURRICANES LILI, IVAN, KATRINA AND RITA



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Purpose and Scope

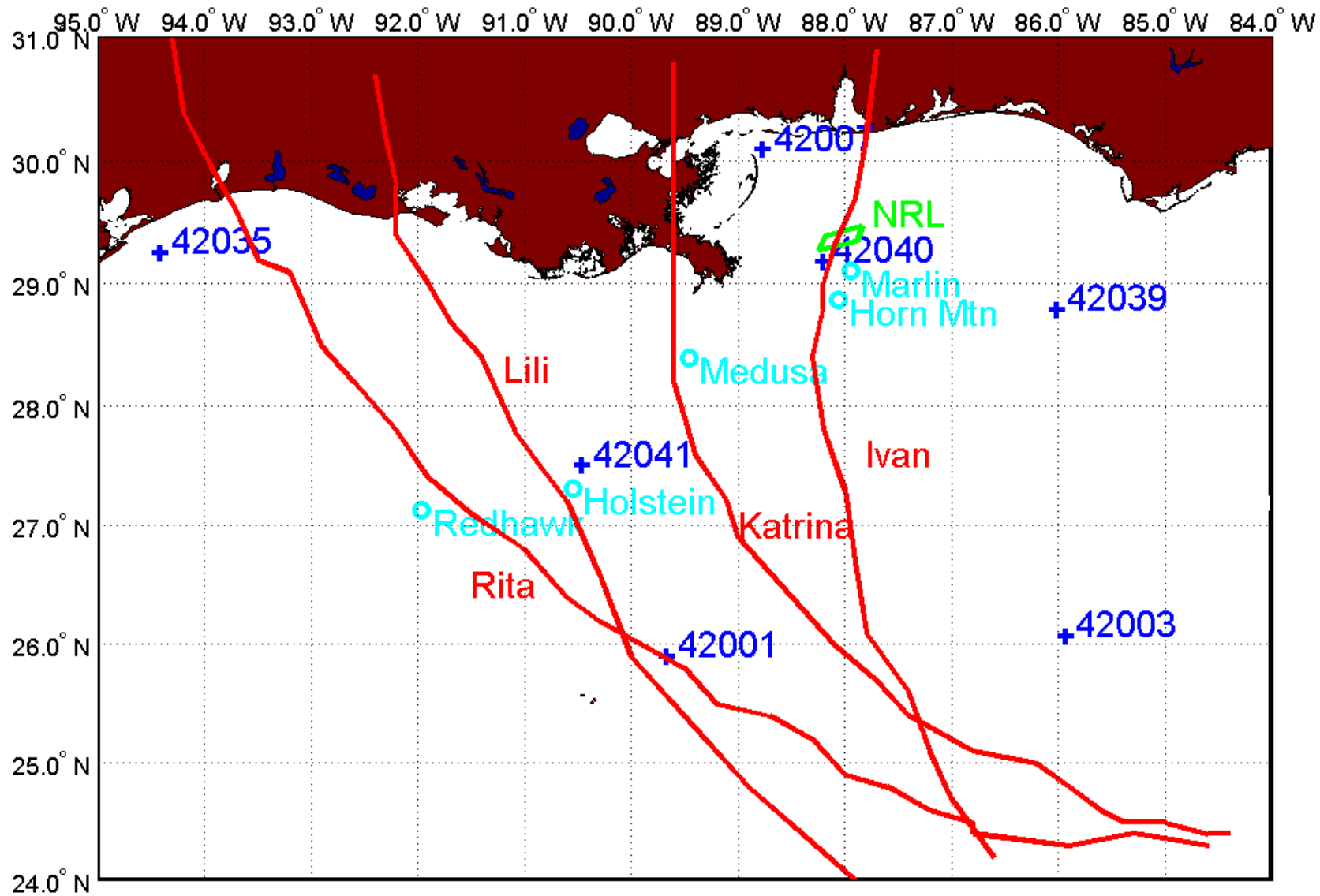
- Oceanweather's hindcasts are the basis for most offshore design specifications in the Gulf of Mexico.
- The devastating hurricanes of 2004 – 2005 have prompted a thorough review of those design specifications.
- The American Petroleum Institute (API) commissioned this study to assess the accuracy of Oceanweather's hindcasts of those storms.

Thanks to:

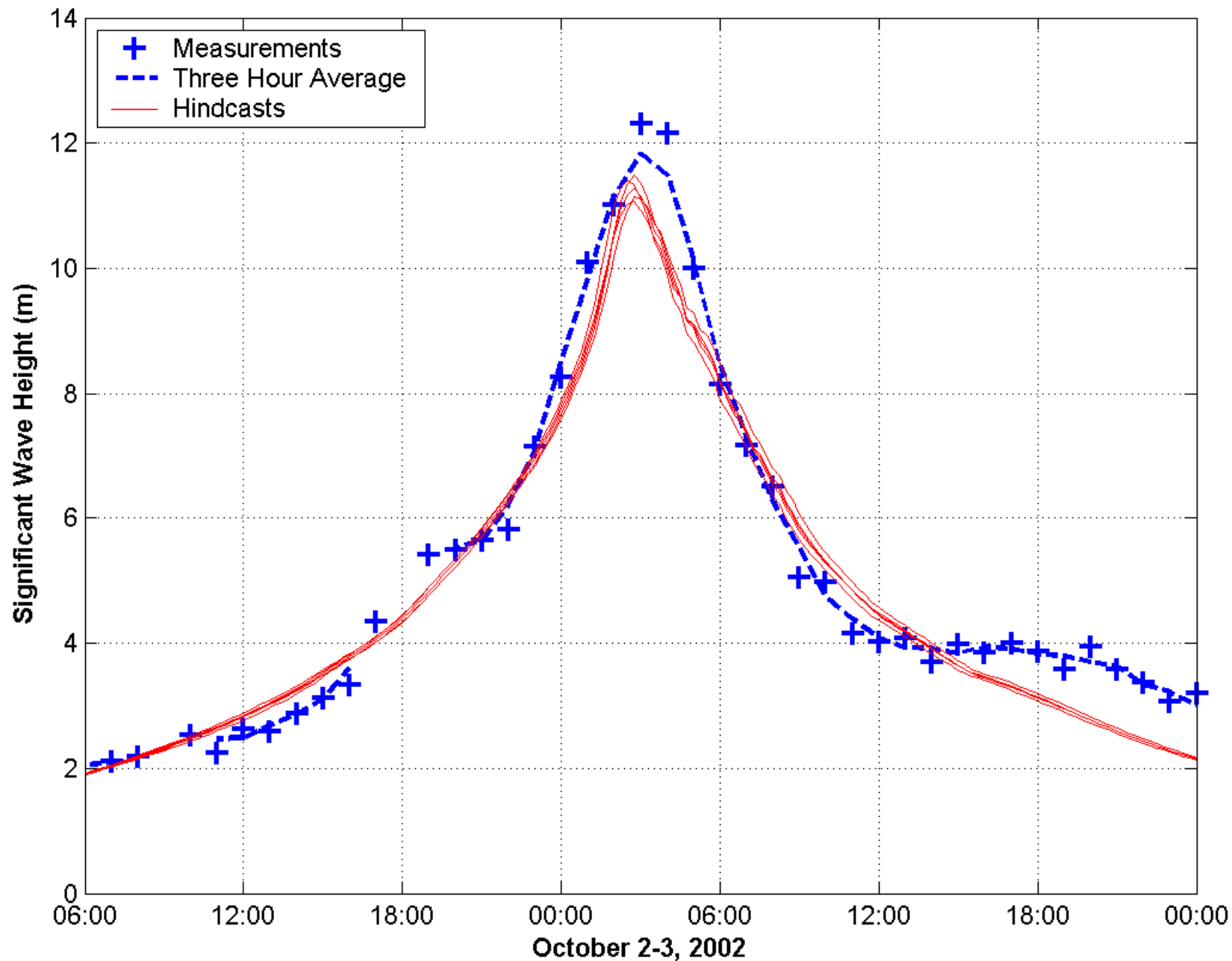
- The API for funding this study
- Richard Bouchard and his colleagues at the National Data Buoy Center for discussions of their data
- Bill Teague and D.W. Wang for providing the raw Naval Research Laboratory pressure measurements
- Anadarko, BP and Murphy for supplying wave measurements from oil industry platforms.

Conclusions

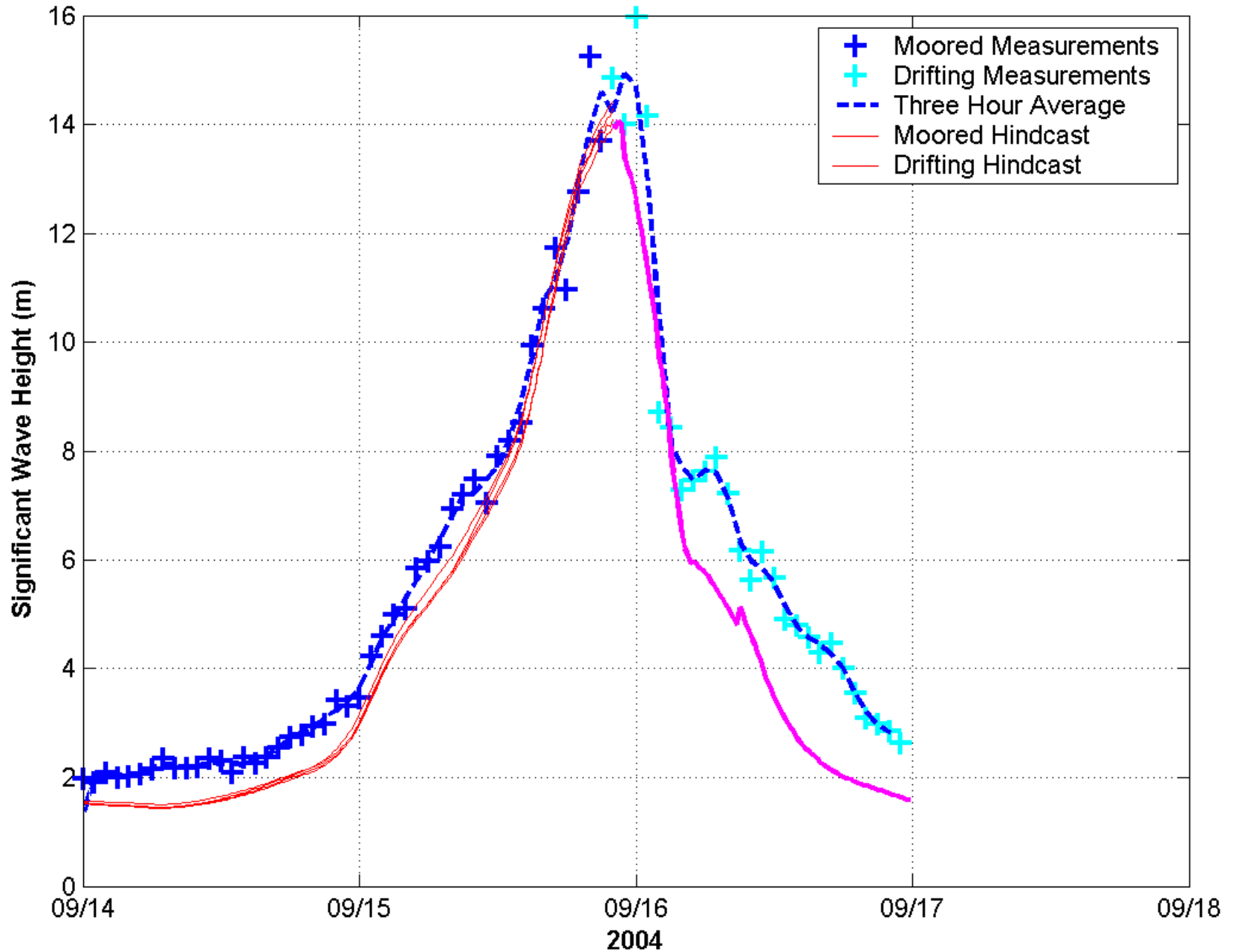
- The bias of the hindcasts is negligible and the scatter index is about 15%. Reliable extreme values can be predicted from them.
- But the two highest storm peaks were under-predicted. More effort is needed to understand wave generation in the most extreme conditions.
- Standard short term wave and crest height distributions agree well with the measurements.
- NDBC buoy measurements would be even more valuable if individual wave heights were recorded.



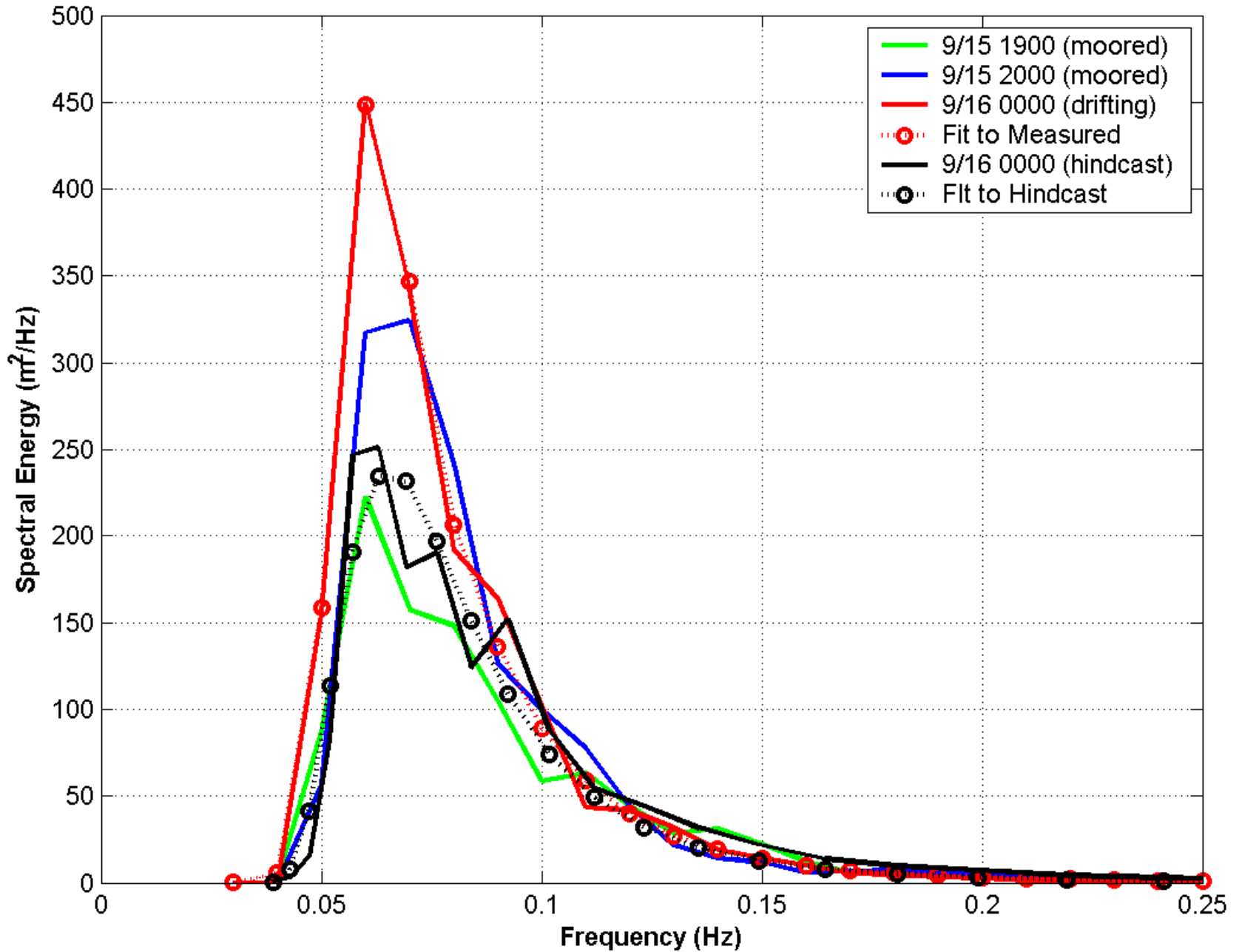
Hurricane Lili at NDBC 42041



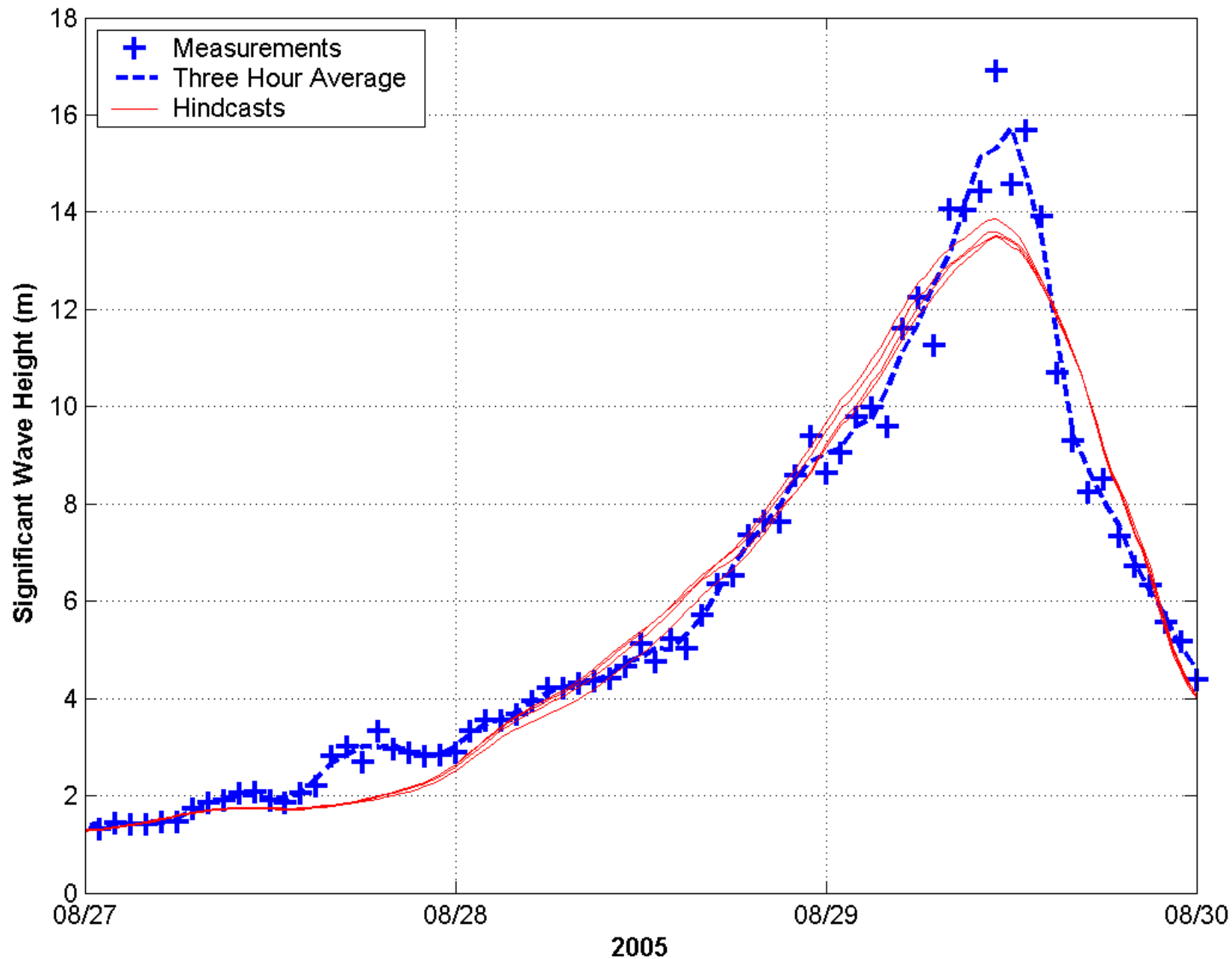
Hurricane Ivan at NDBC 42040



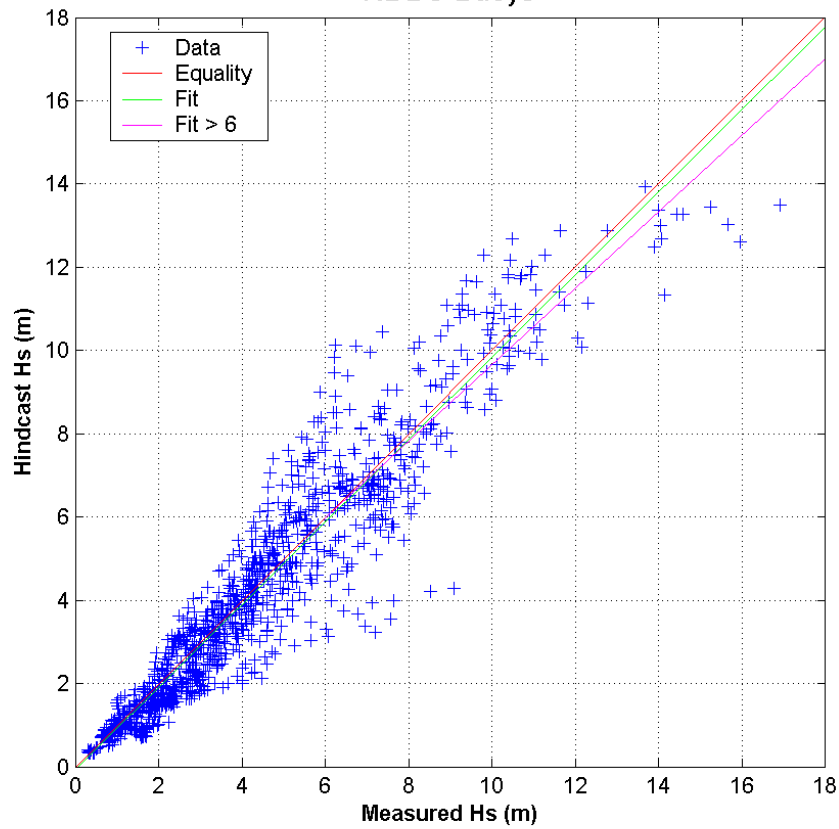
Hurricane Ivan at NDBC 42040



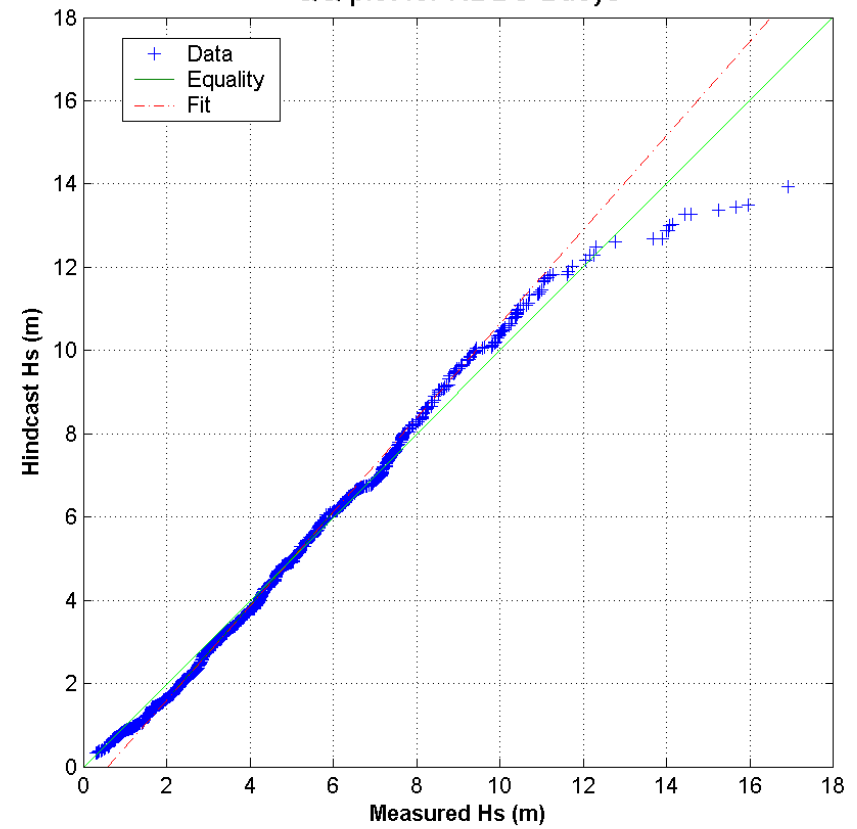
Hurricane Katrina at NDBC 42040



NDBC Buoys

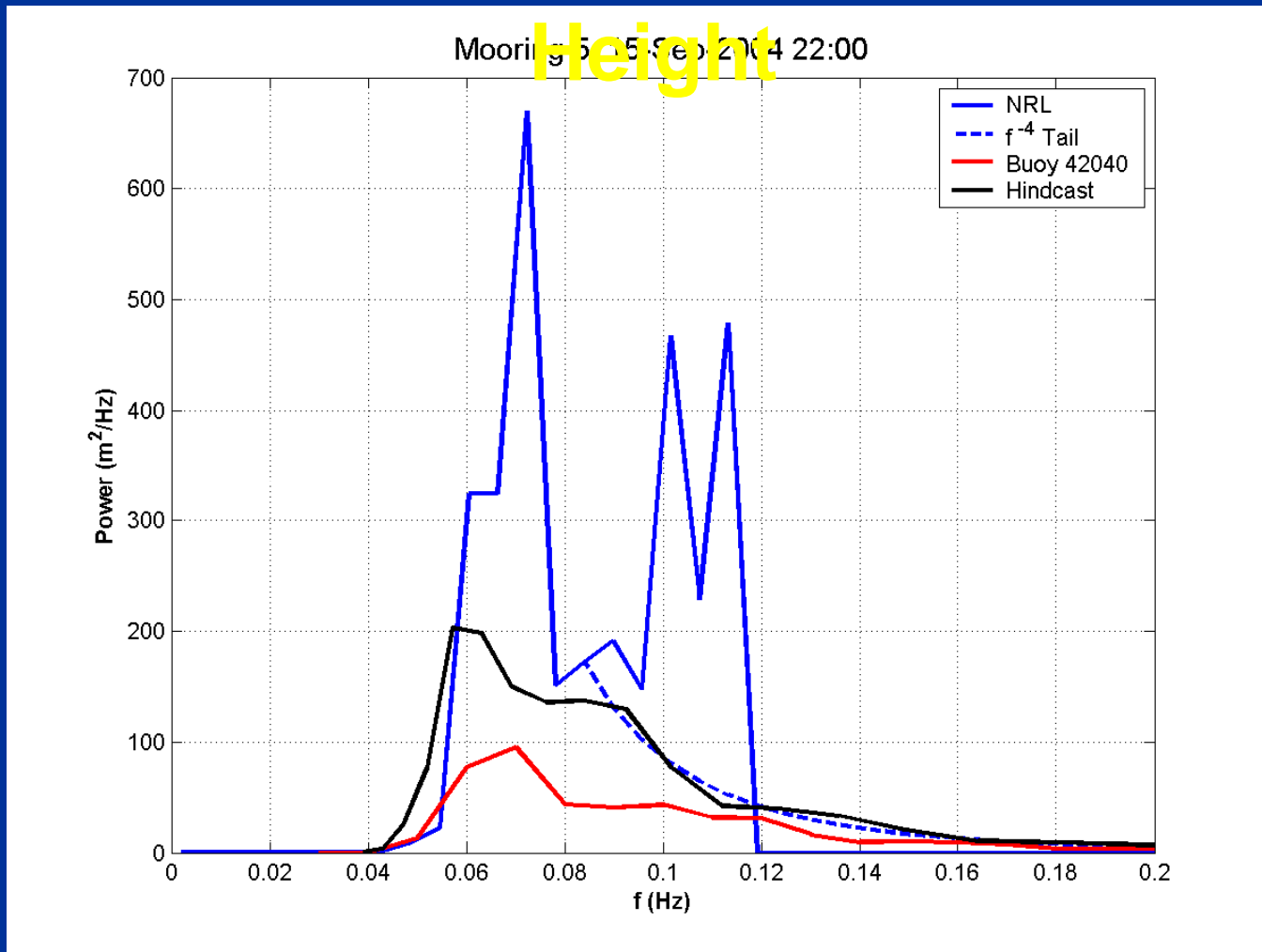


QQ plot for NDBC Buoys



For $H_s > 6$, Bias = -0.22, SI = 17%

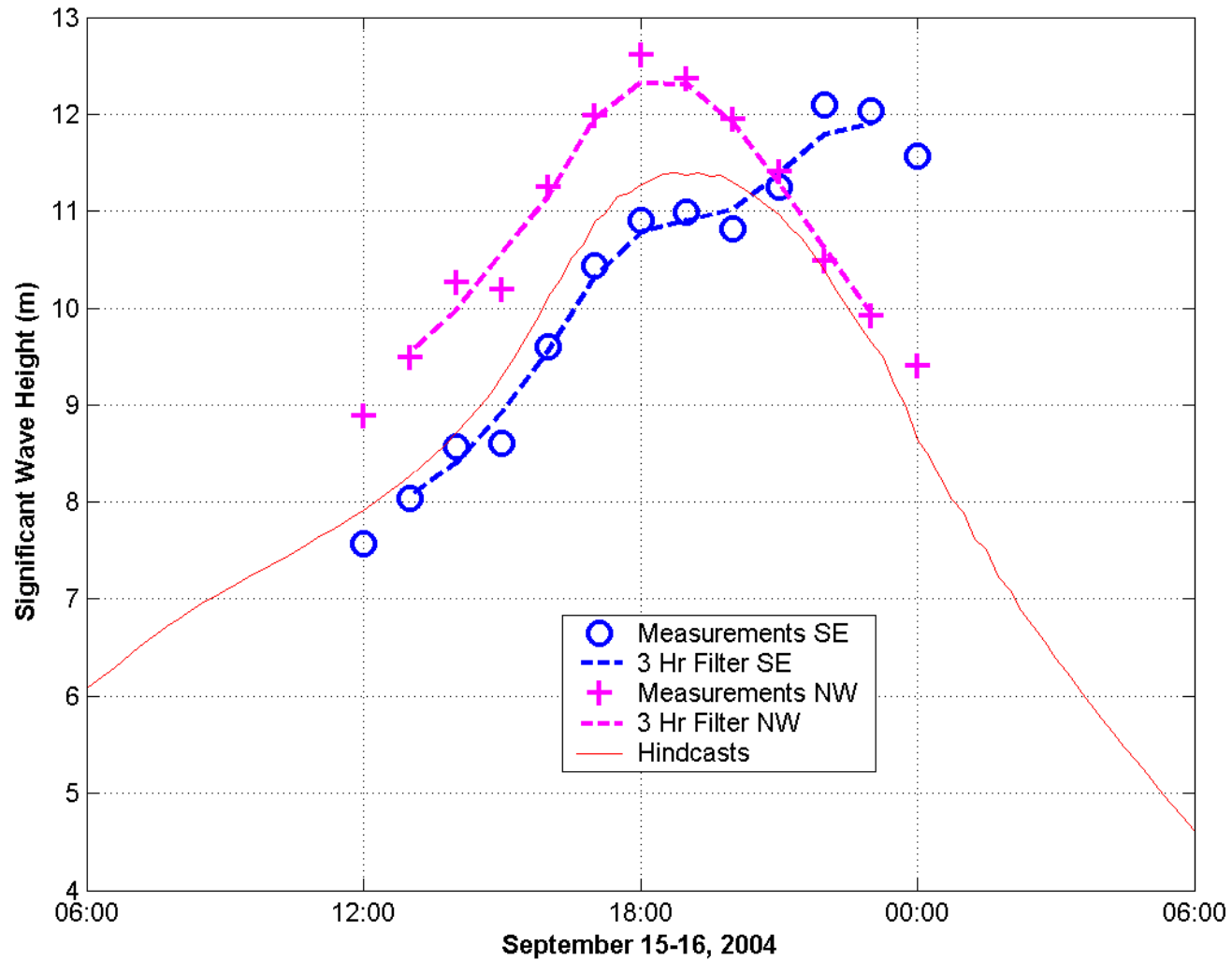
Conversion of NRL Pressure to Wave Height



Cutoff at 0.12 Hz $\Rightarrow H_S = 17.9$ m

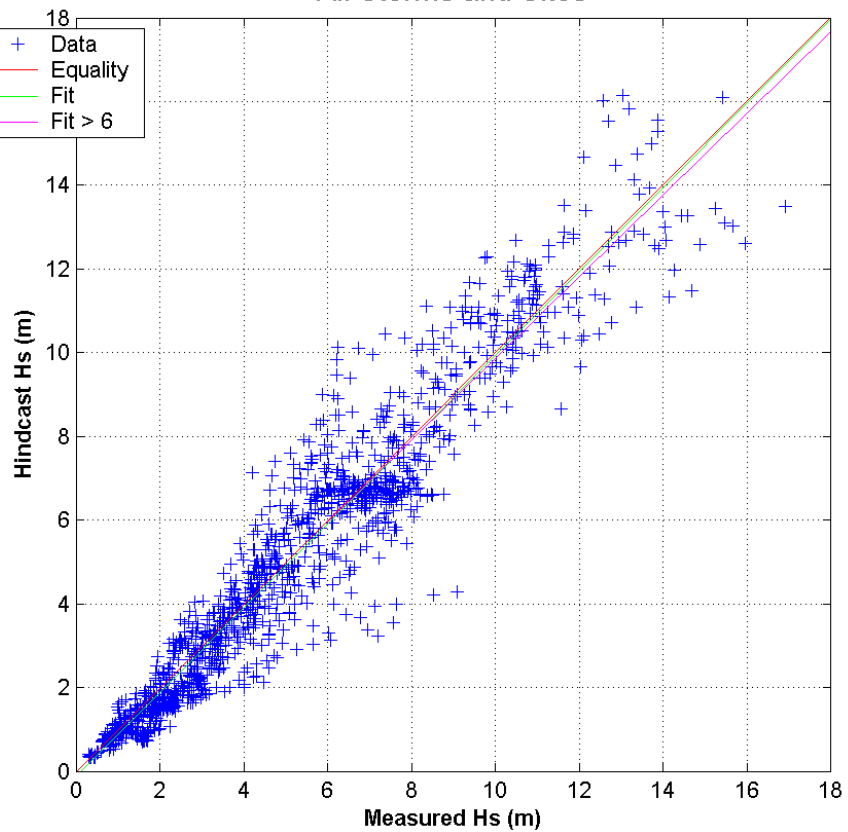
Cutoff at 0.085 Hz + f^{-4} $\Rightarrow 14.9$ m

Hurricane Ivan at Medusa

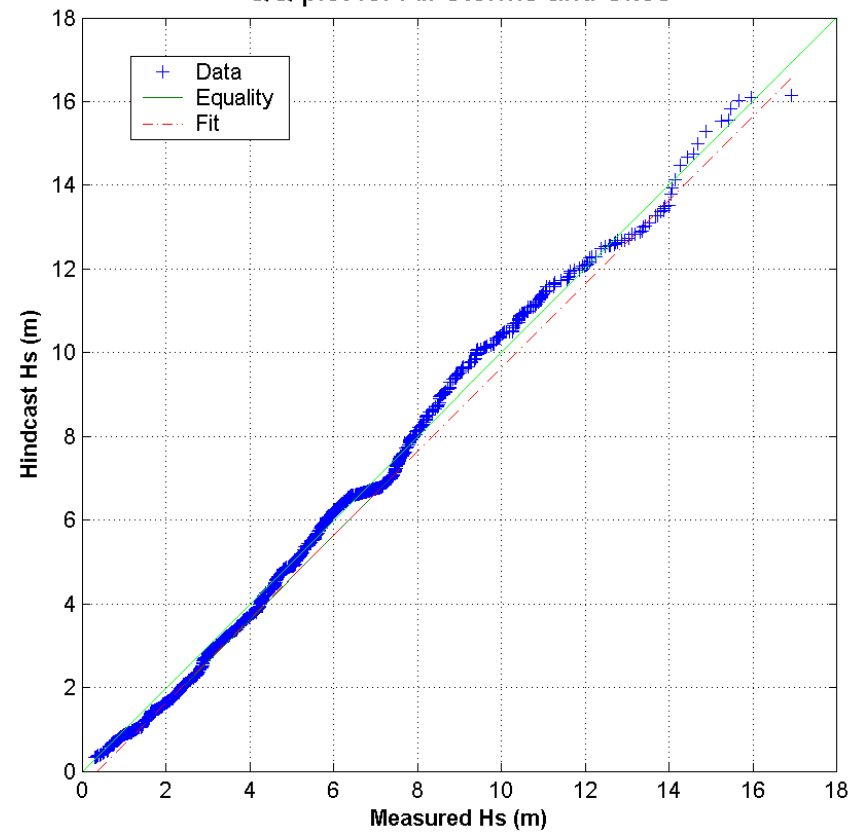


Wave heights at Medusa were affected by diffraction around the spar

All Storms and Sites

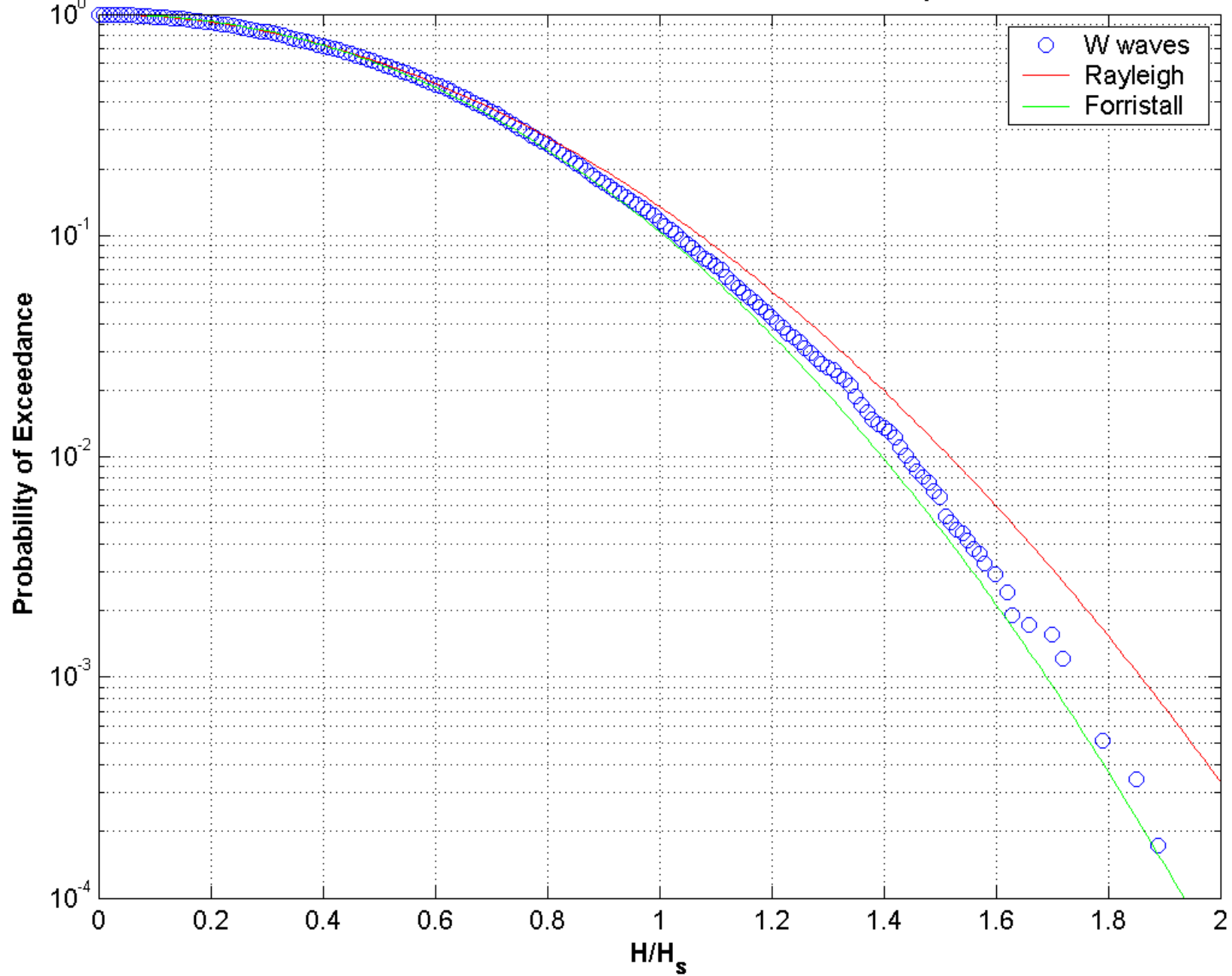


QQ plot for All Storms and Sites

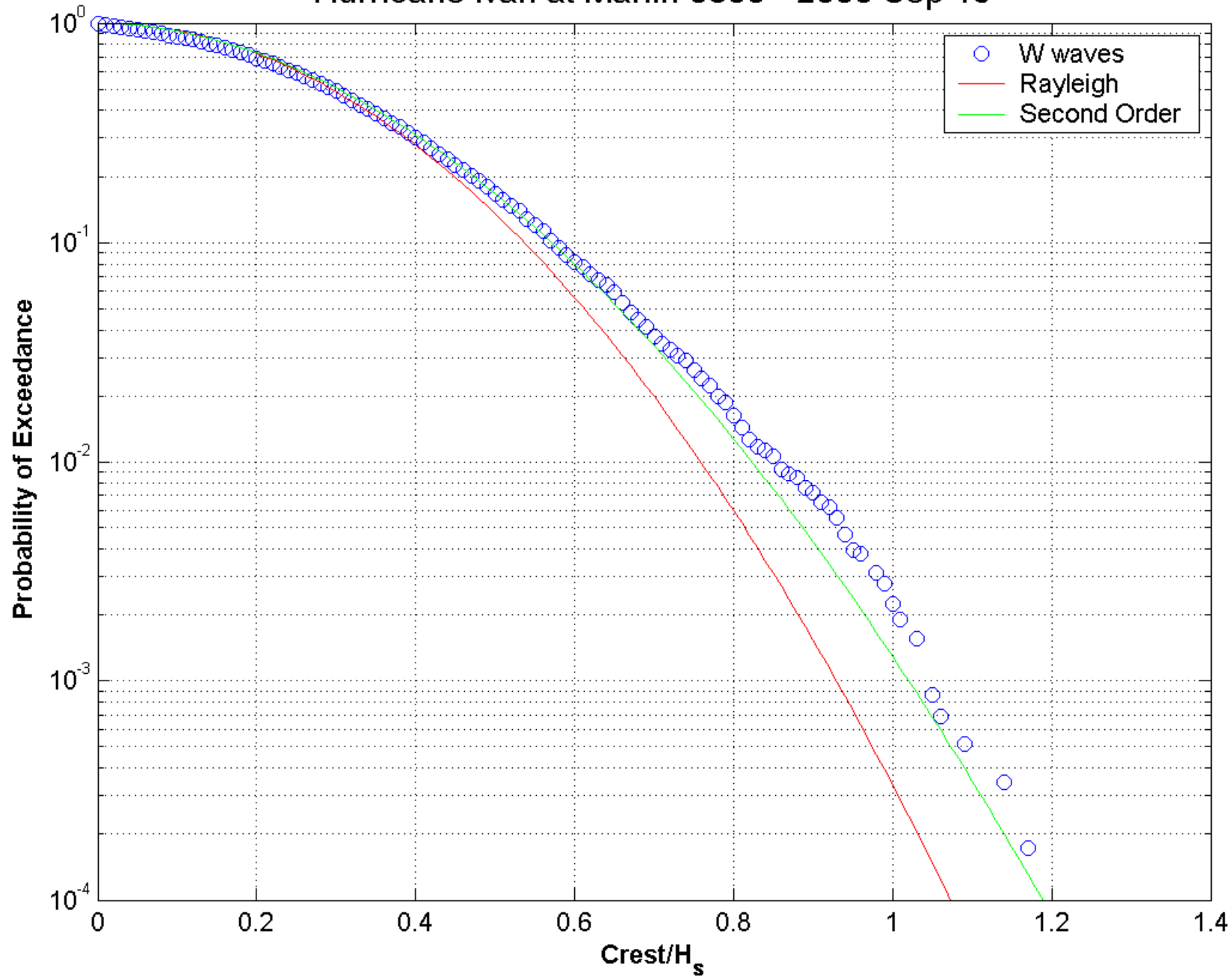


For $H_S > 6$, Bias = -0.11, SI = 15%

Hurricane Ivan at Marlin 0300-2000 Sep 15



Hurricane Ivan at Marlin 0300 - 2000 Sep 15



Conclusions

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- But the two highest storm peaks were under-predicted. More effort is needed to understand wave generation in the most extreme conditions.
- Standard short term wave and crest height distributions agree well with the measurements.
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