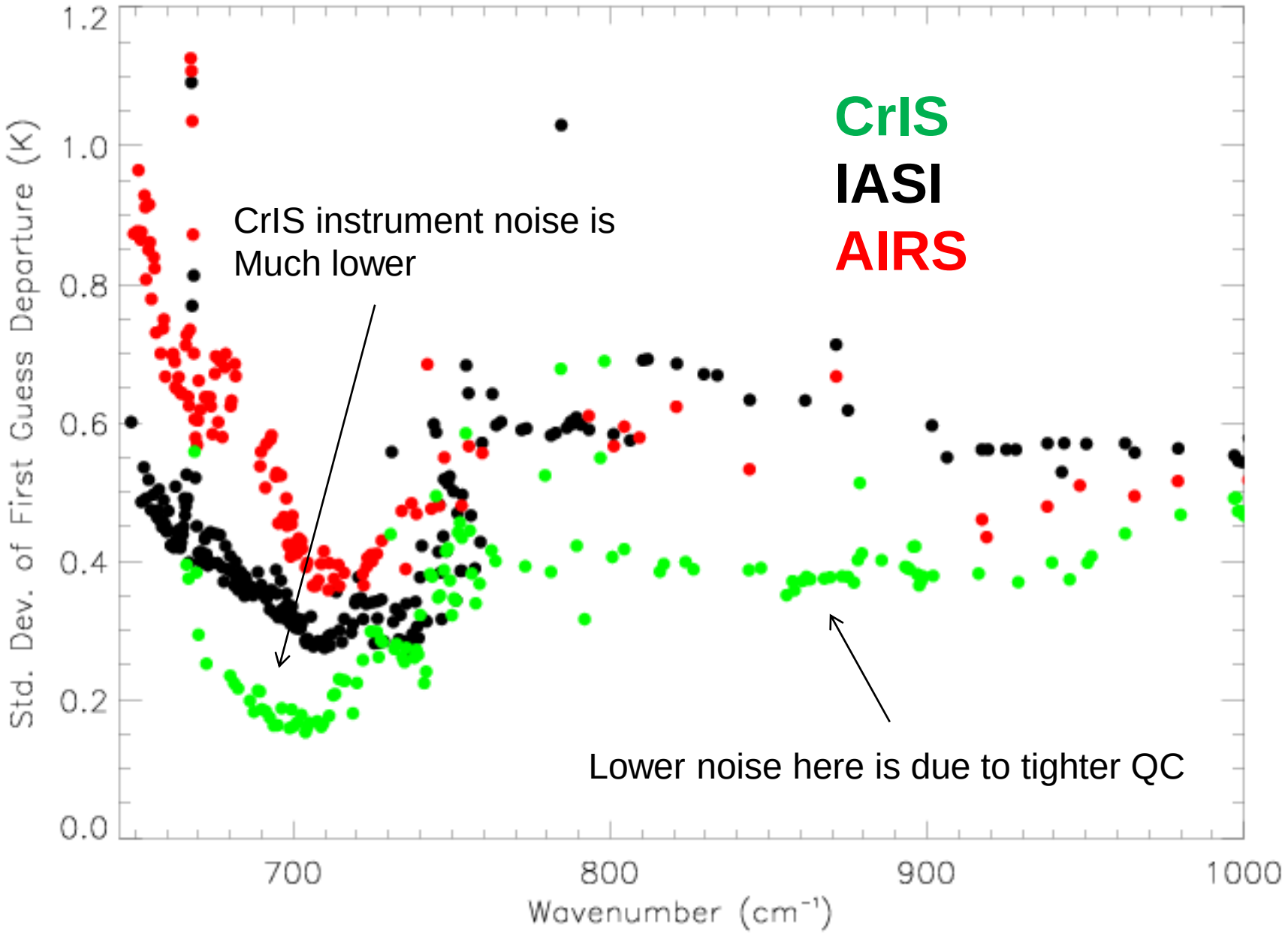
Assimilation of CrIS in the NCEP Global Model

Andrew Collard[1], John Derber[2], Russ Treadon[2],

[1] IMSG at NOAA/NCEP/EMC [2] NOAA/NCEP/EMC

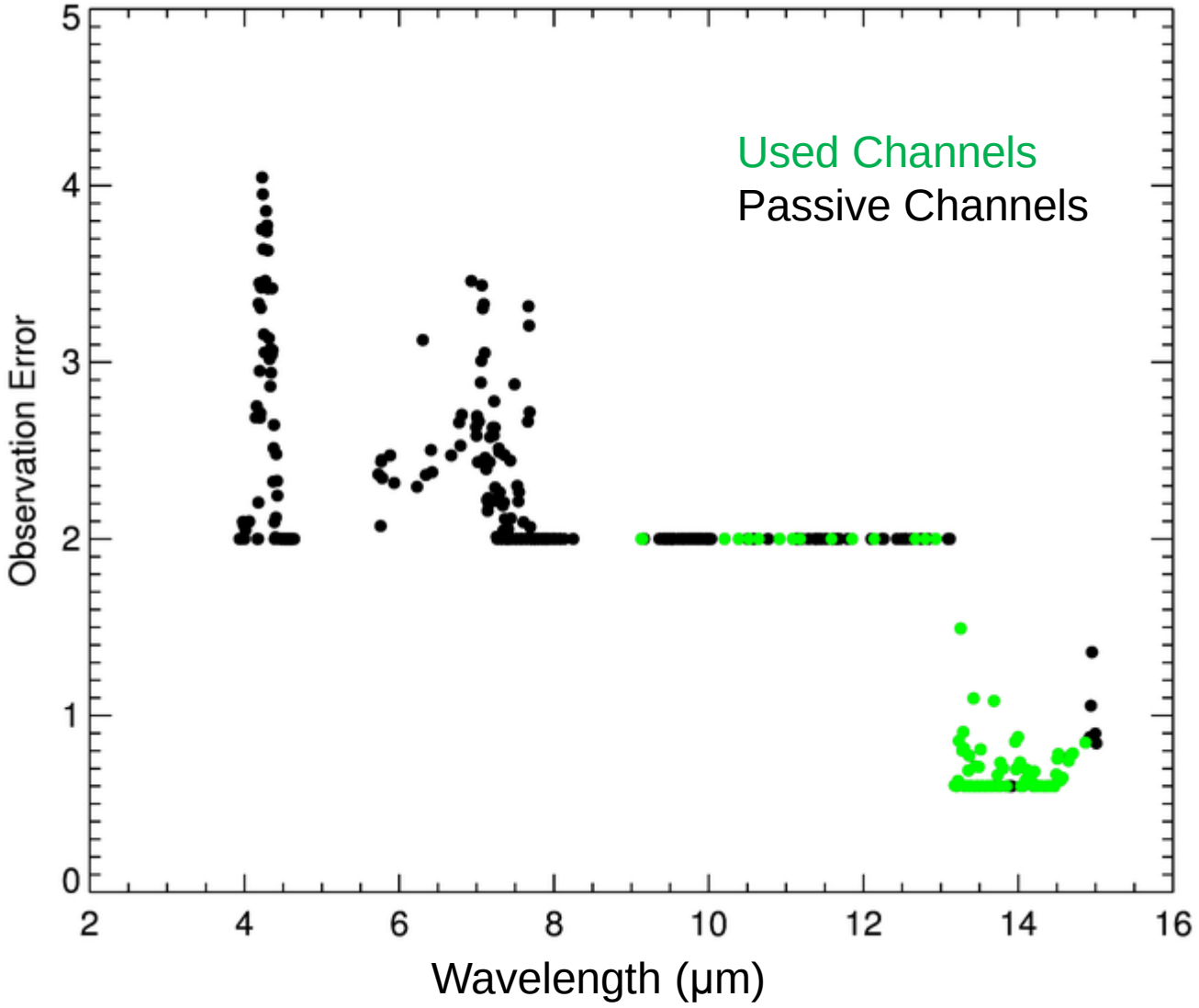
CrIS vs AIRS vs IASI



CrIS Data Assimilation Configuration

- We receive a subset of 399 channels (Gambacorta et al., 2013) in BUFR format.
- We assimilate those channels designated for temperature, cloud, CO_2 and surface that do not suffer from solar contamination. This totals 84 channels from 672.5cm^{-1} to 1095.0cm^{-1}.
  - This is similar to our IASI channel selection. We hope to extend to include water vapor channels in the next upgrade, although the additional impact is likely to be small.

Assumed Observation Error and Used Channels for CrIS

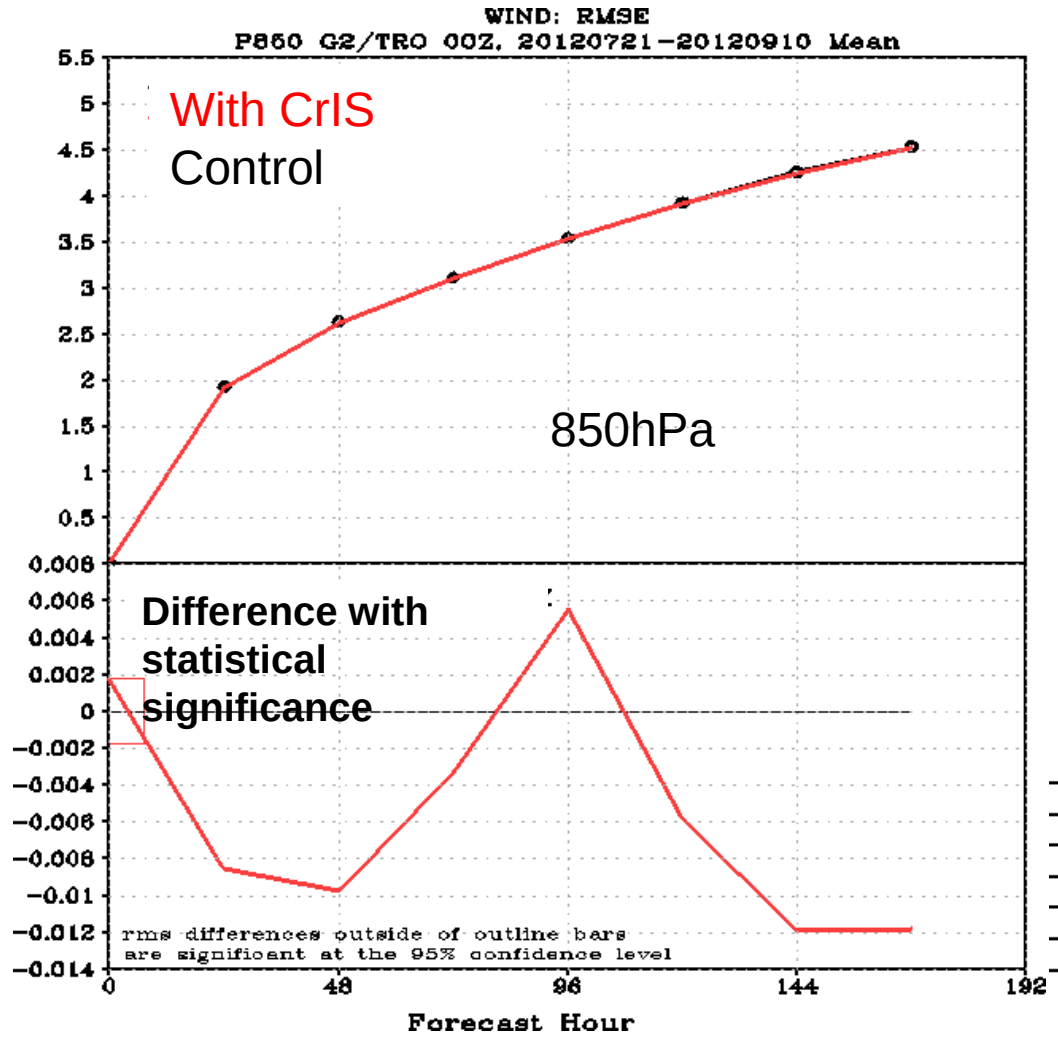


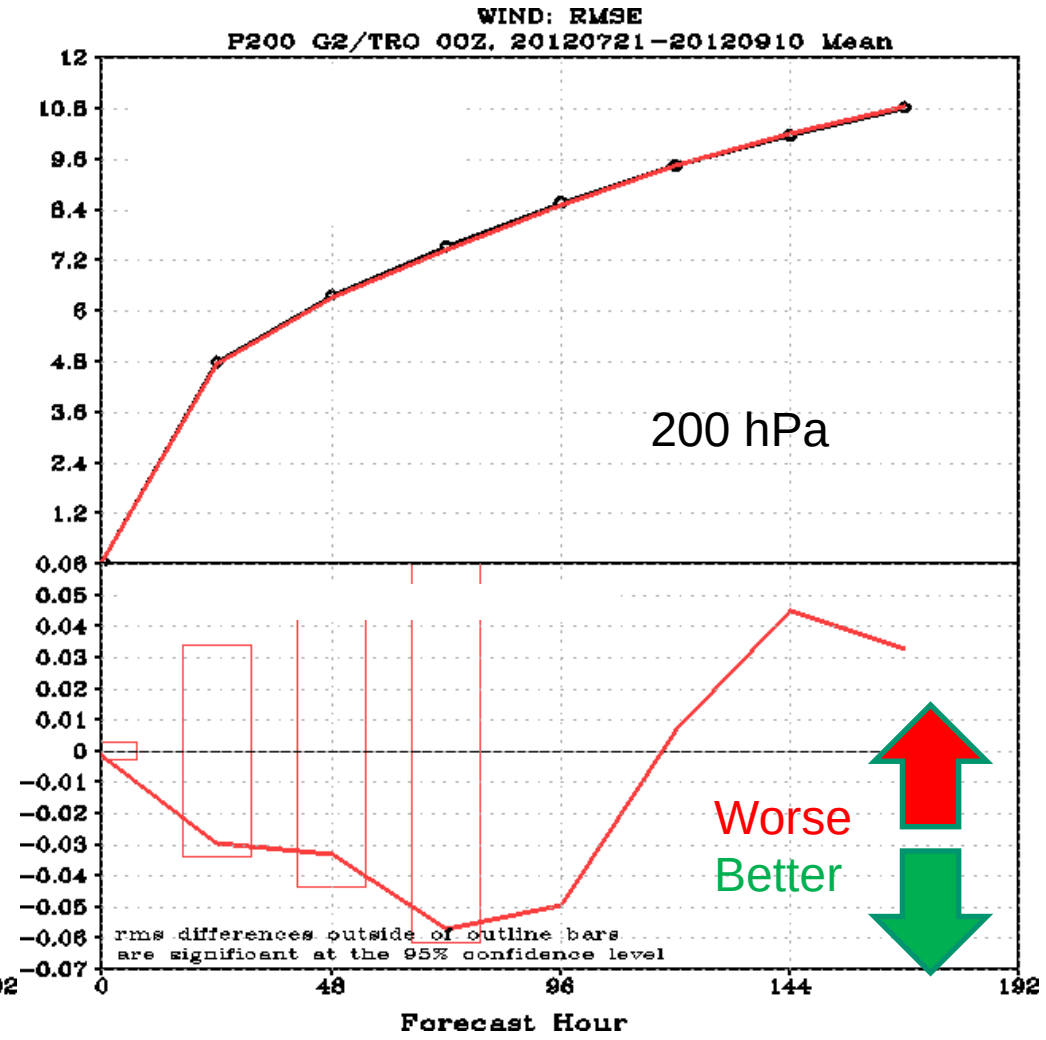
Forecast Impact

- The following slides show the impact of CrIS on the forecast scores using the full operational system. For data assimilation this is a Hybrid ENKF-3DVar system at T574 with all conventional and satellite data sources.

Impact on Tropical Wind RMS Forecast Errors

48 Cases
July 21 – Sept. 10 2012

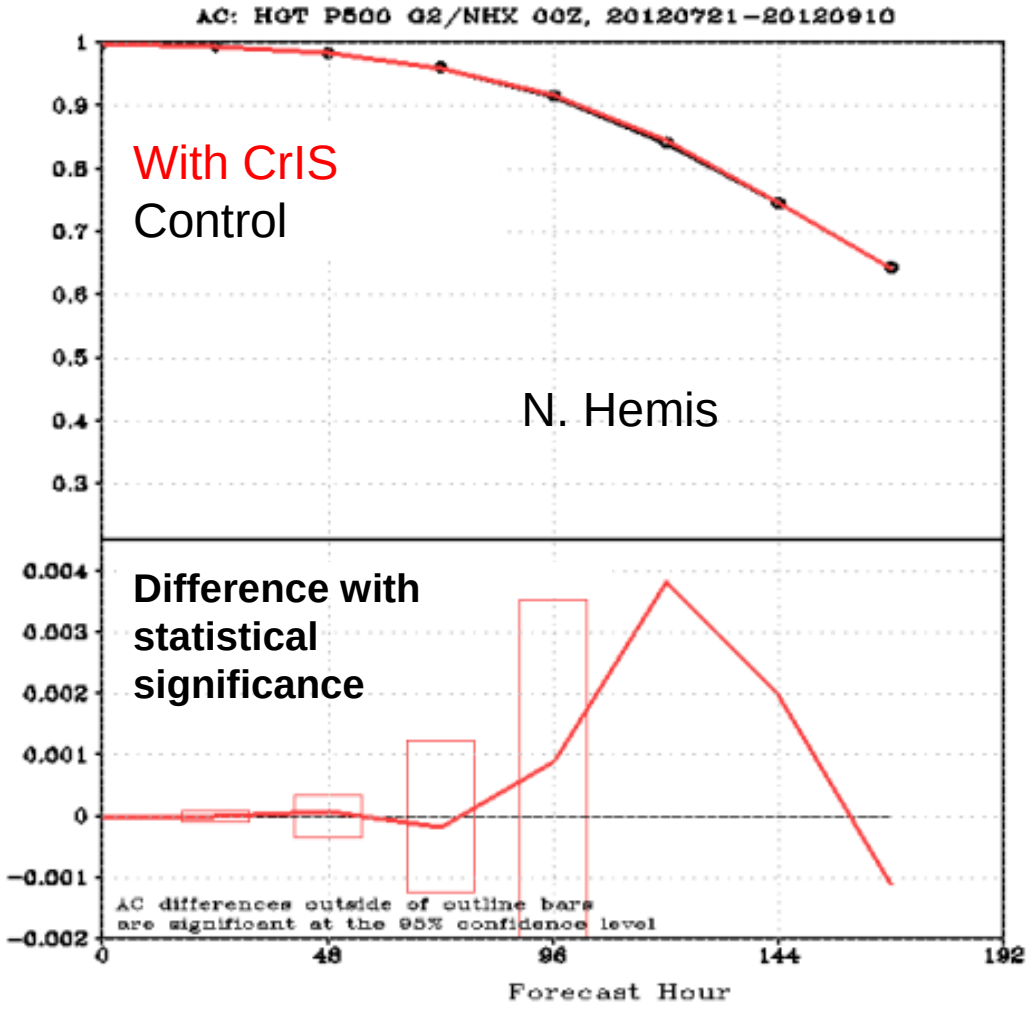


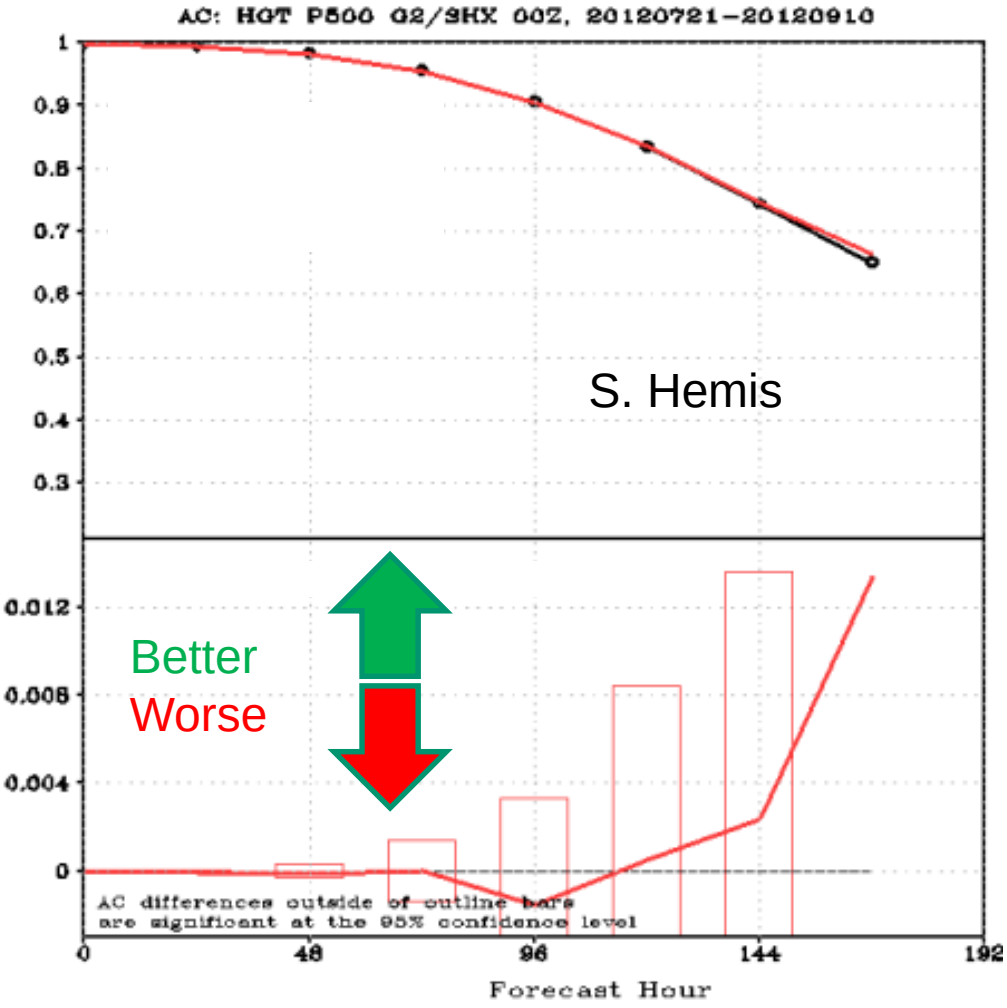


Impact of CrIS is statistically neutral

Impact on 500hPa Geopotential Height Forecast Anomaly Correlation Scores

48 Cases
July 21 – Sept. 10 2012





Impact of CrIS is statistically neutral

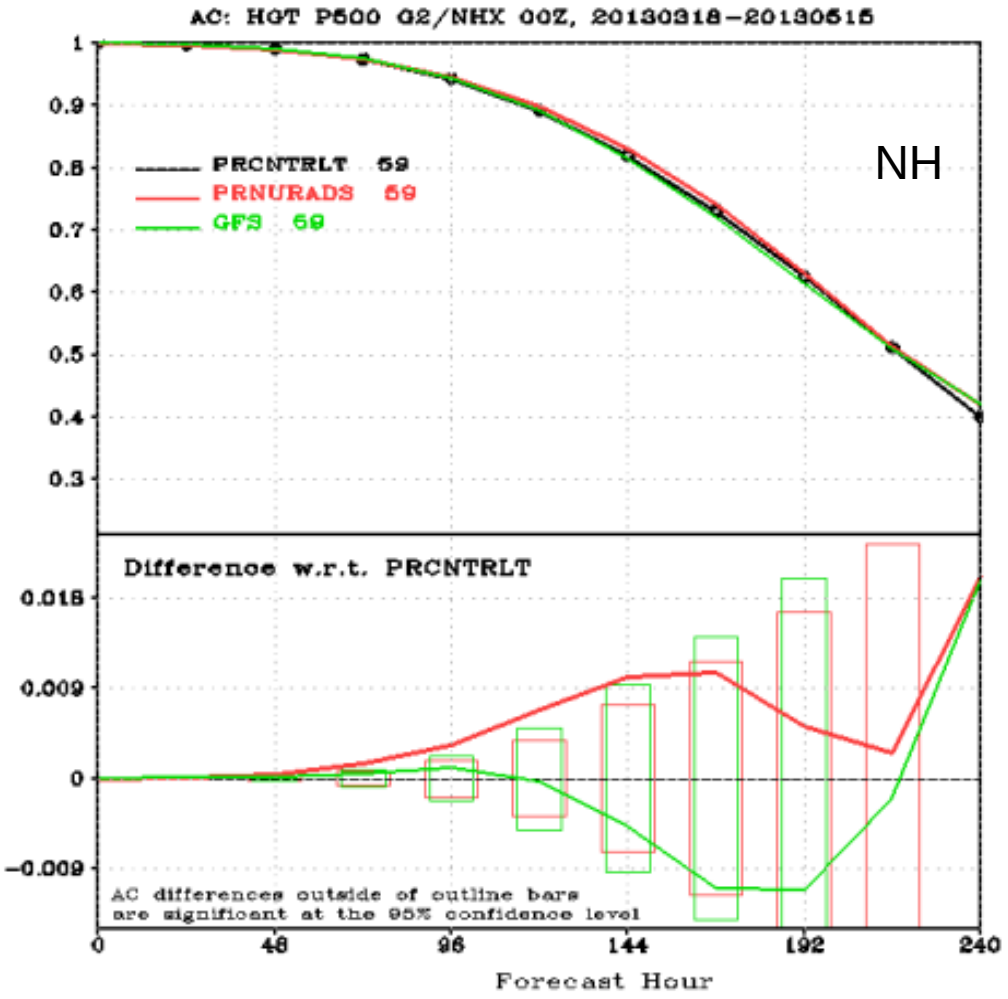
CrIS as part of operational upgrade

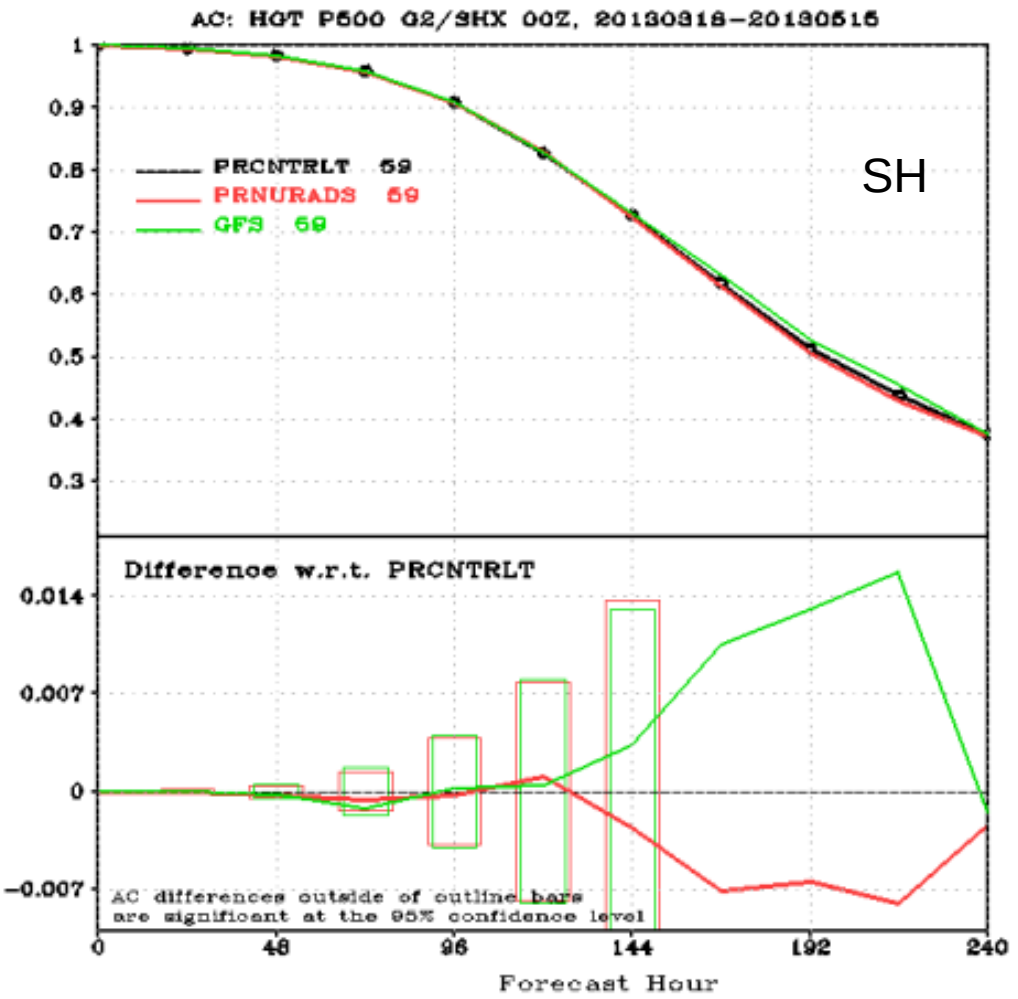
- CrIS was added to the suite of actively assimilated data as part of the first model upgrade after we moved to our new supercomputer.
- In addition to CrIS: AMSU-A, MHS and GRAS on MetOp-B and SEVIRI on Meteosat-10 were added.

Pre-Implementation Test Results

Control
New Data
(Ignore Green)

500 hPa Anomaly Correlation Scores

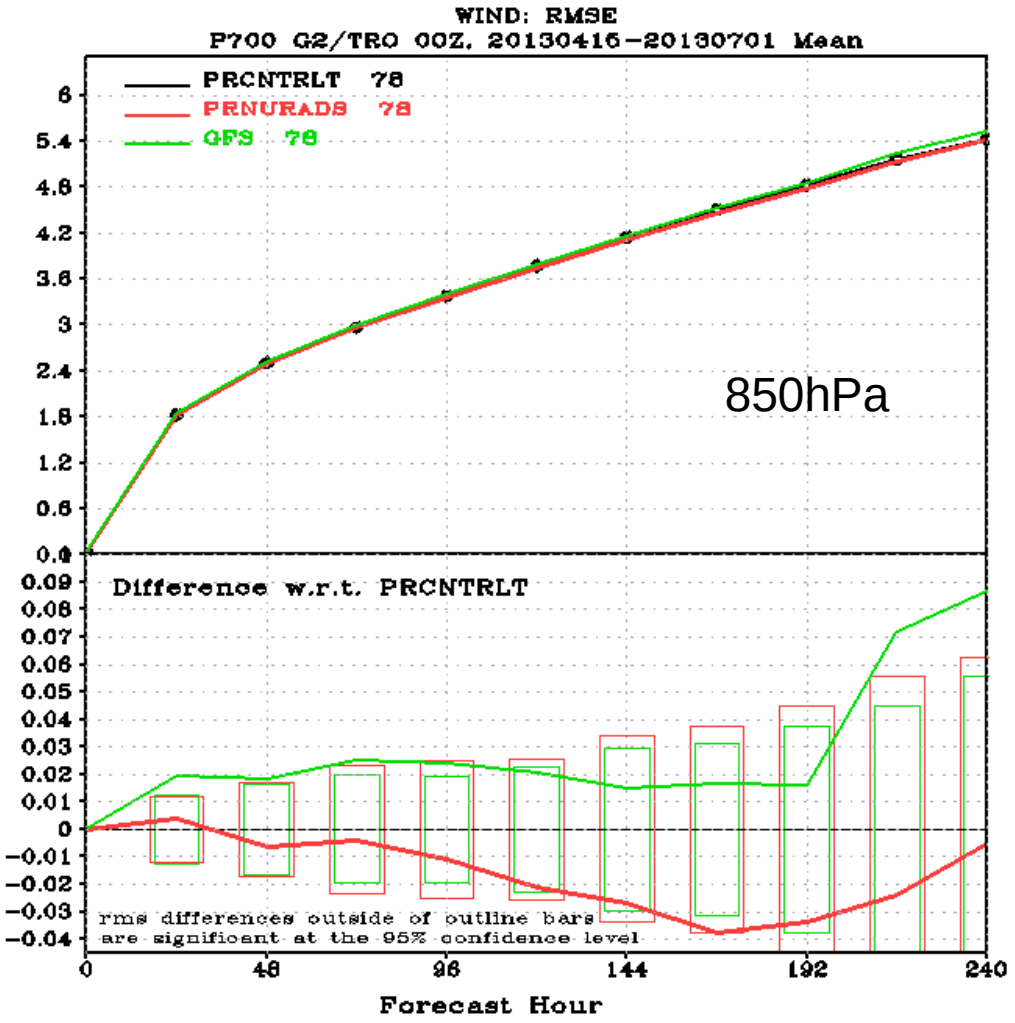


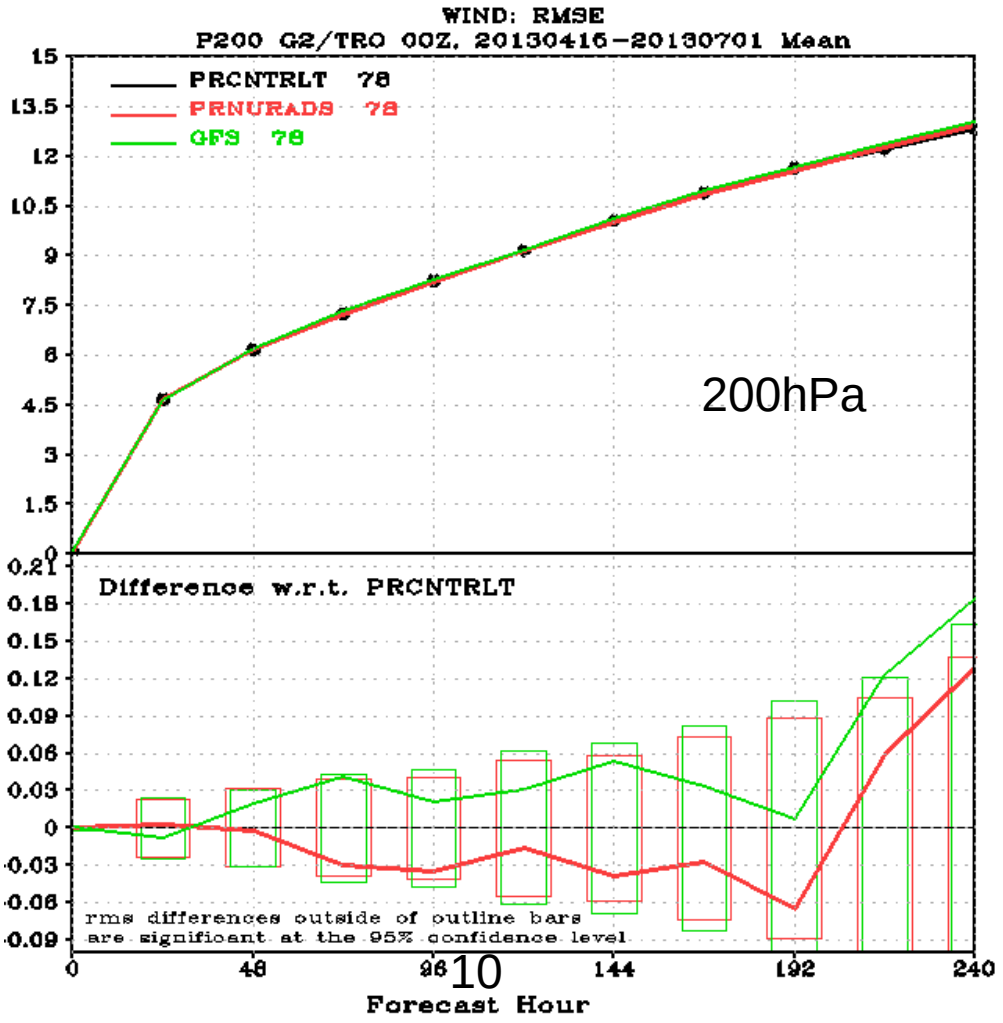


Pre-Implementation Test Results

Control
New Data
(Ignore Green)

850hPa and 200hPa Tropical Vector Wind RMS Scores





The future

- Add in water channels: depends on some more fundamental work on humidity DA we are persuing.
- Review quality control
- Look at use of cloudy scenes. Parallel projects on:
  - Variation cloud cleared radiances
  - Cloudy assimilation

Summary

- CrIS data is of high quality
- The impact of CrIS on forecast skill is neutral. This is expected as CrIS is added into a very mature system that already includes IASI and AIRS (AIRS being in a very similar orbit).
- CrIS data has been assimilated operationally since 20th August 2013.
- We are starting a number of projects to use CrIS (and infrared radiance data in general) more aggressively.