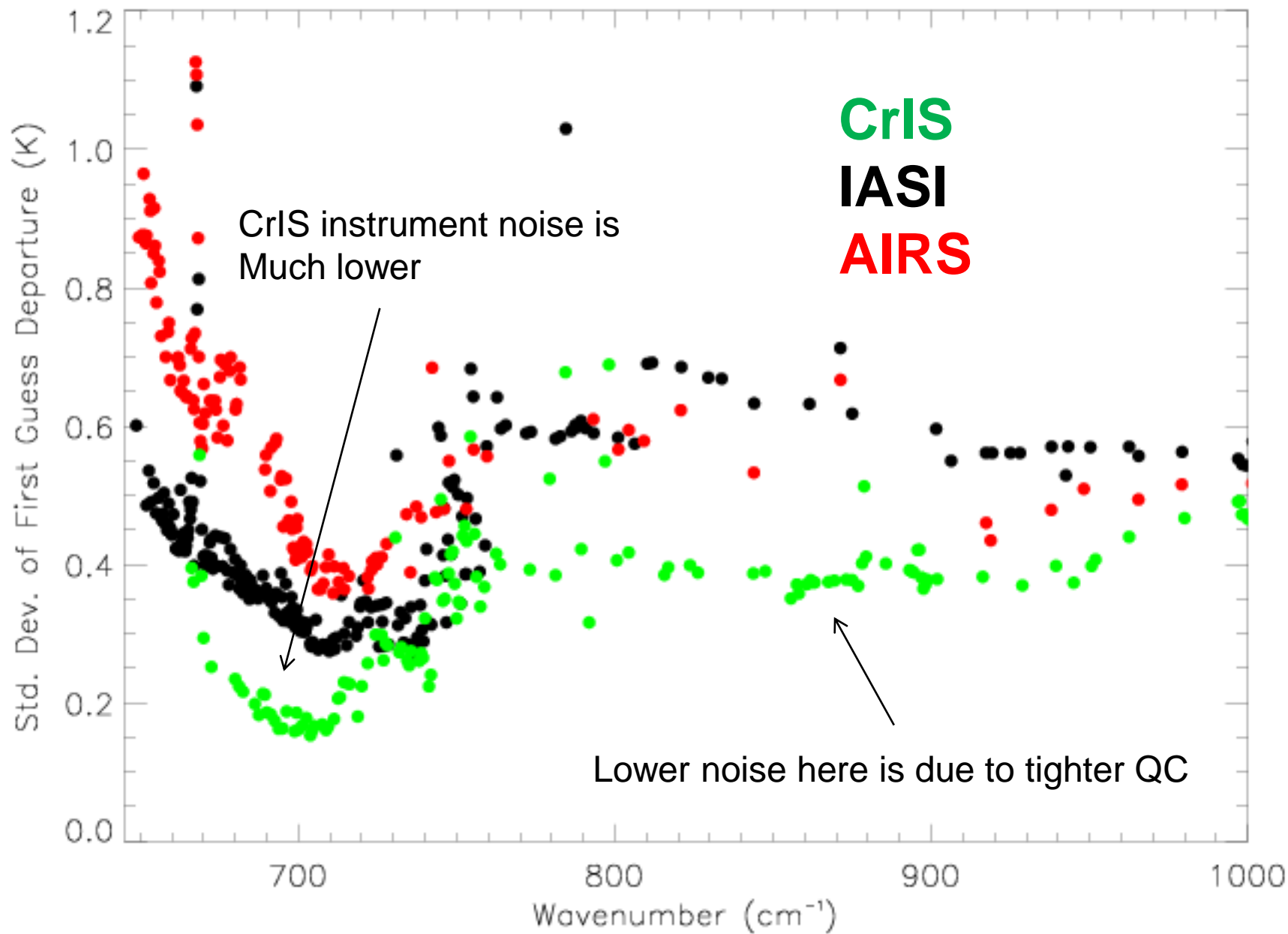# Assimilation of CrIS in the NCEP Global Model

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[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.
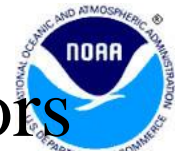
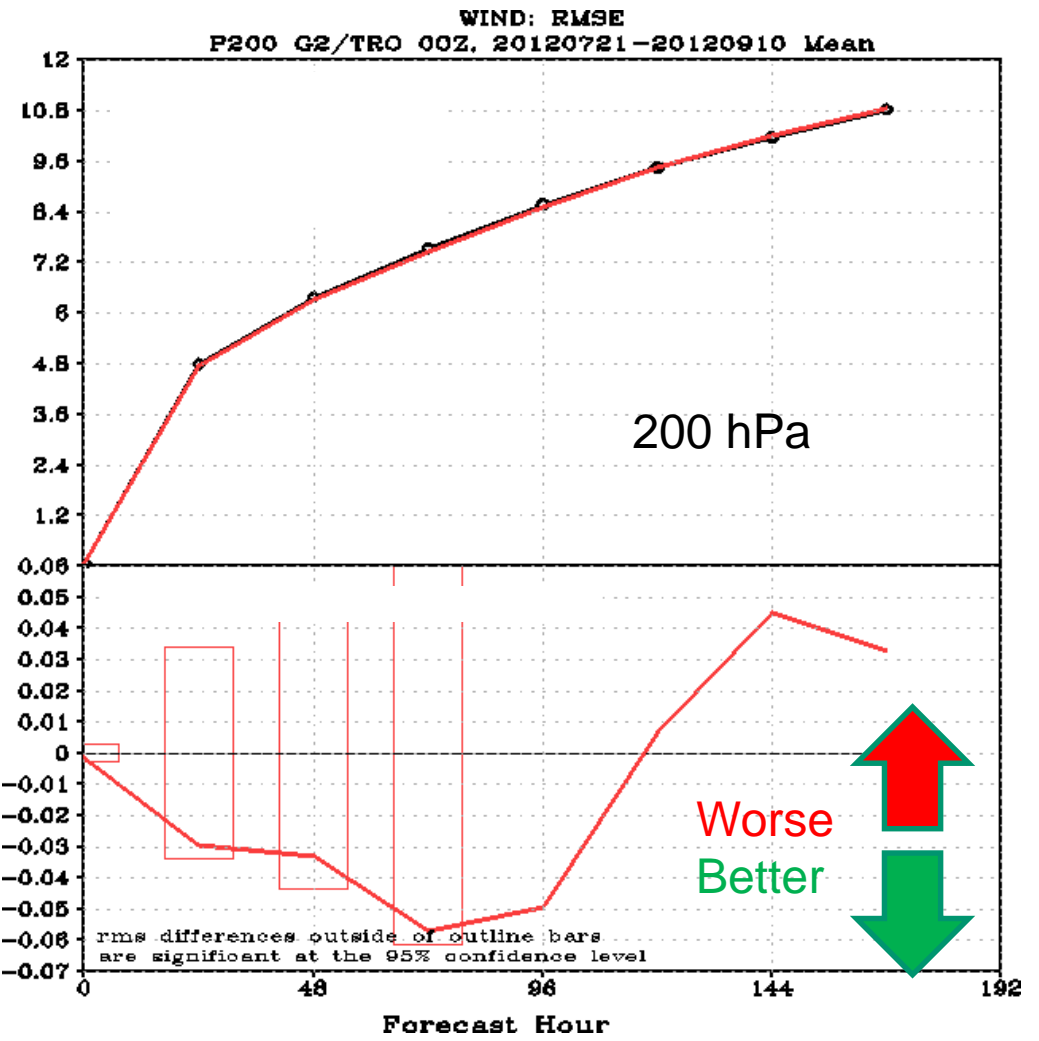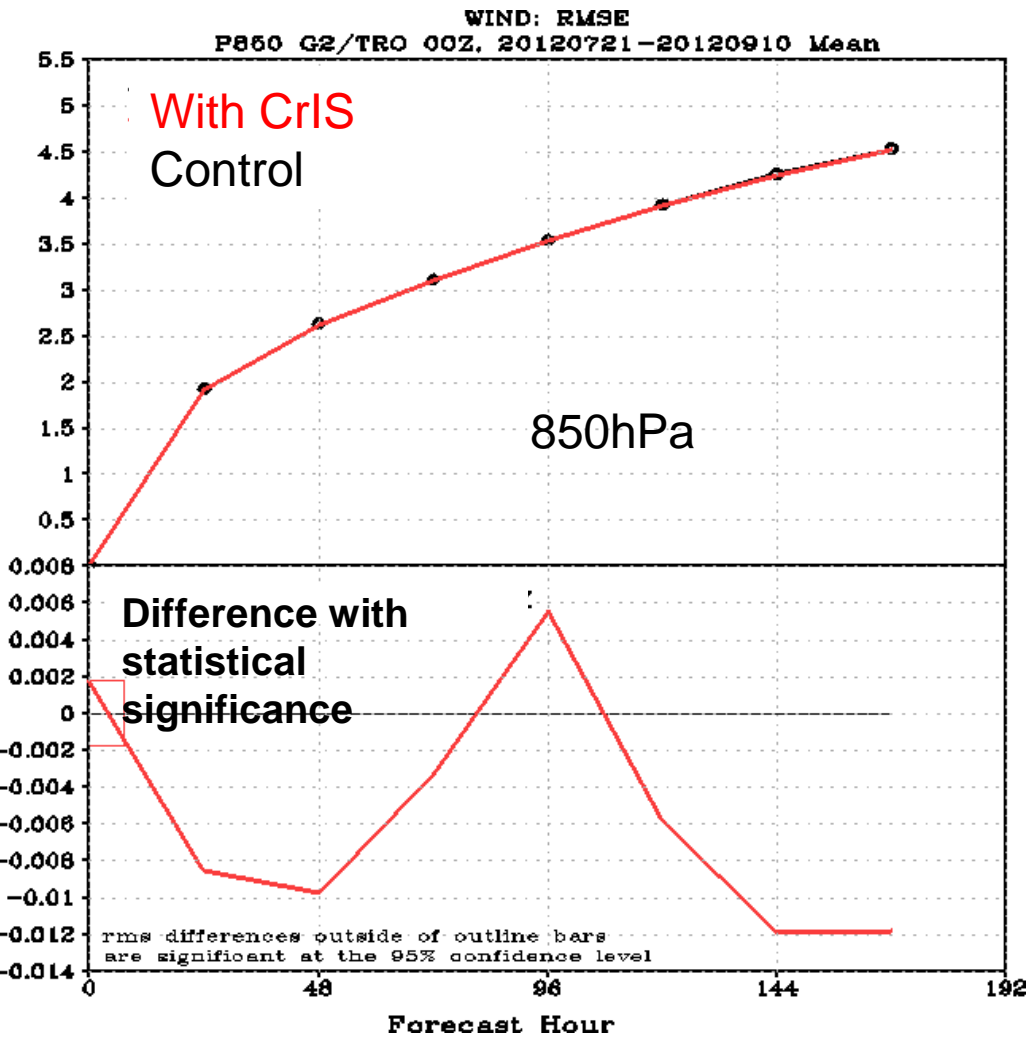# Assumed Observation Error and Used Channels for CrIS
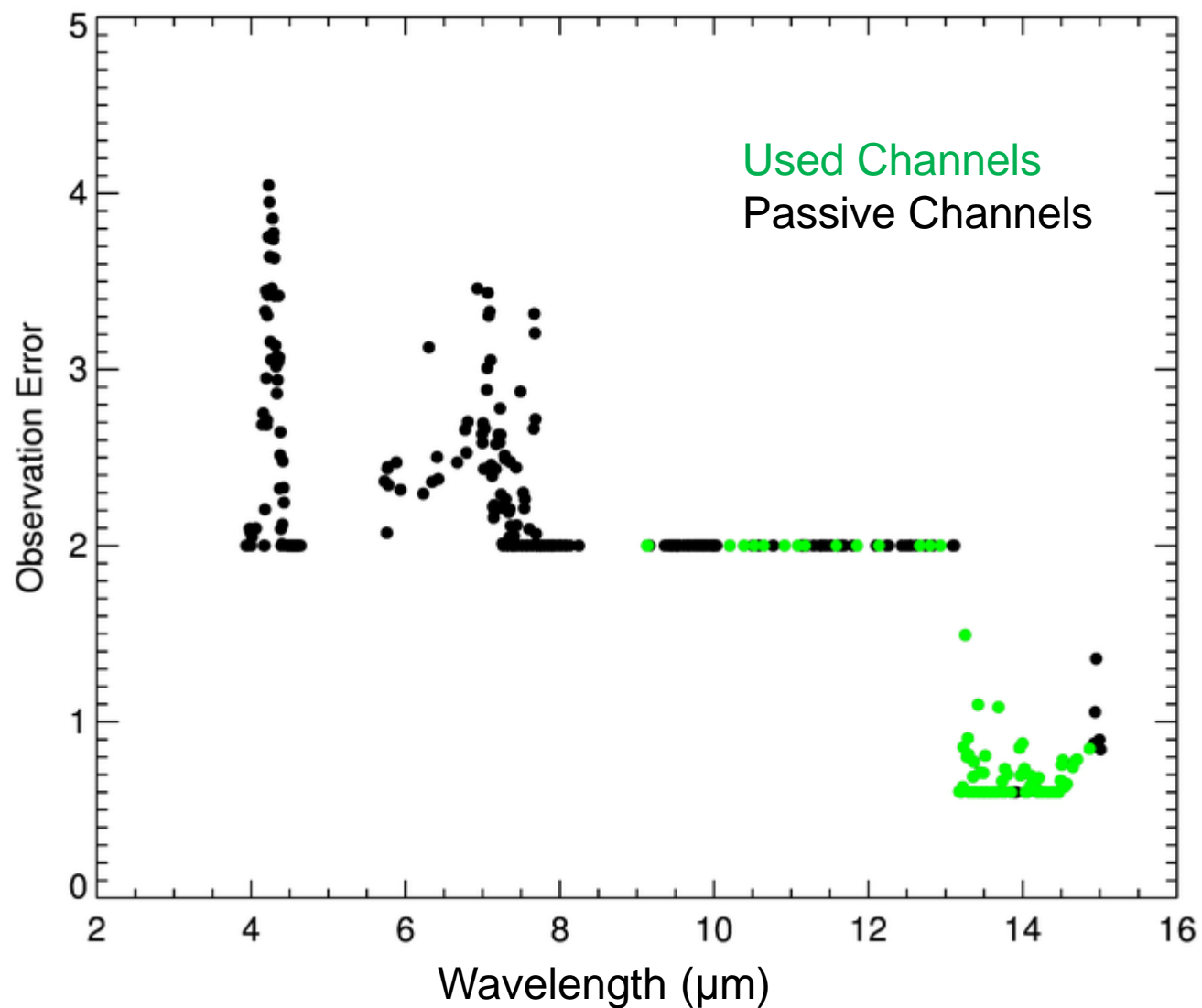
Forecast Impact

- 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

WIND: RMSE
P850 G2/TRO 00Z, 20120721-20120910 Mean

With CrIS
Control

850hPa

Difference with statistical significance

rms differences outside of outline bars are significant at the 95% confidence level

WIND: RMSE
P200 G2/TRO 00Z, 20120721-20120910 Mean

200 hPa

rms differences outside of outline bars are significant at the 95% confidence level
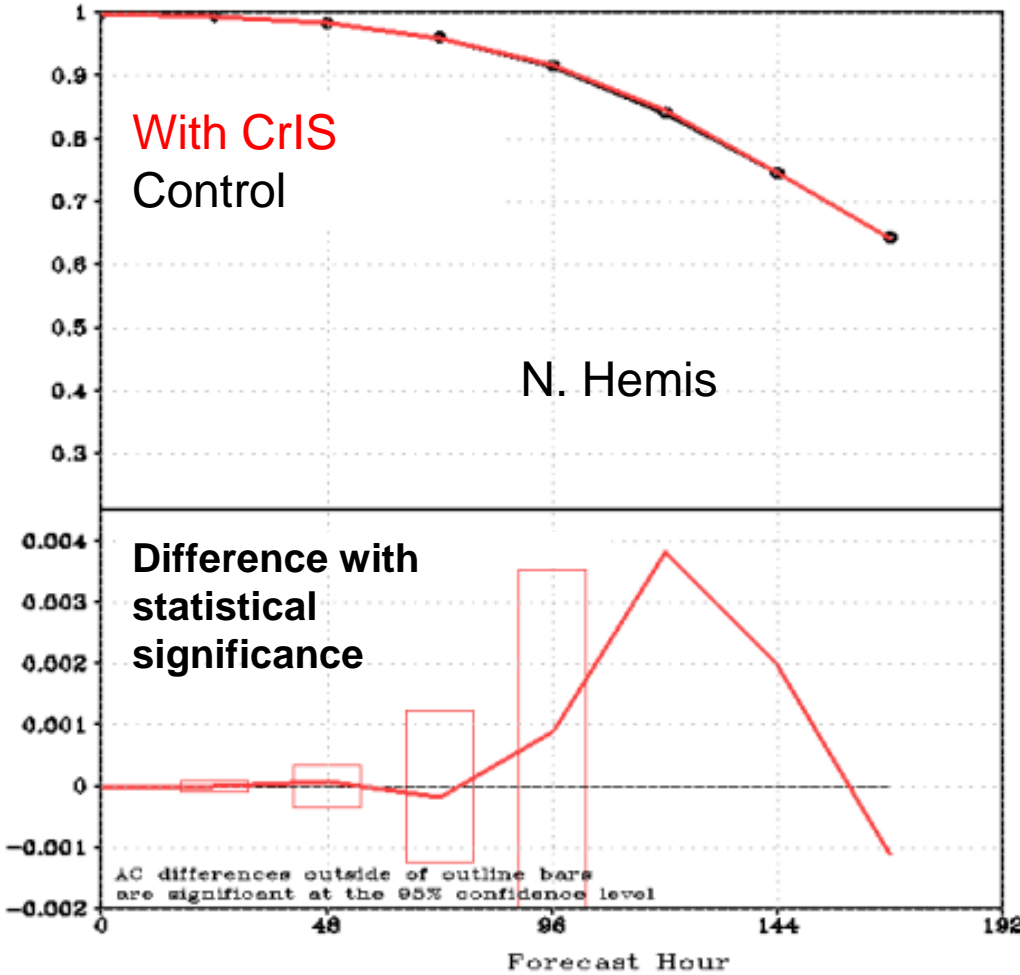
Worse
Better

Impact of CrIS is statistically neutral

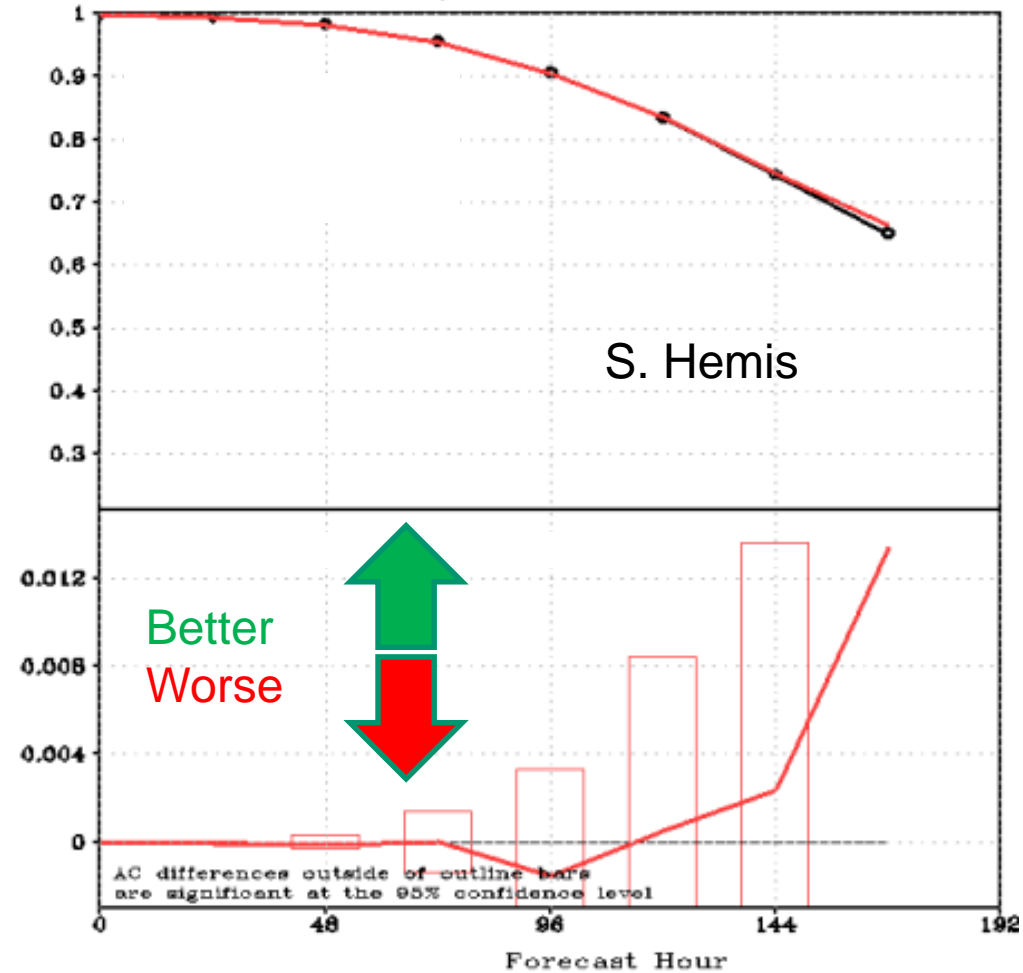# Impact on 500hPa Geopotential Height Forecast Anomaly Correlation Scores
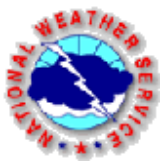
48 Cases
July 21 – Sept. 10 2012

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.
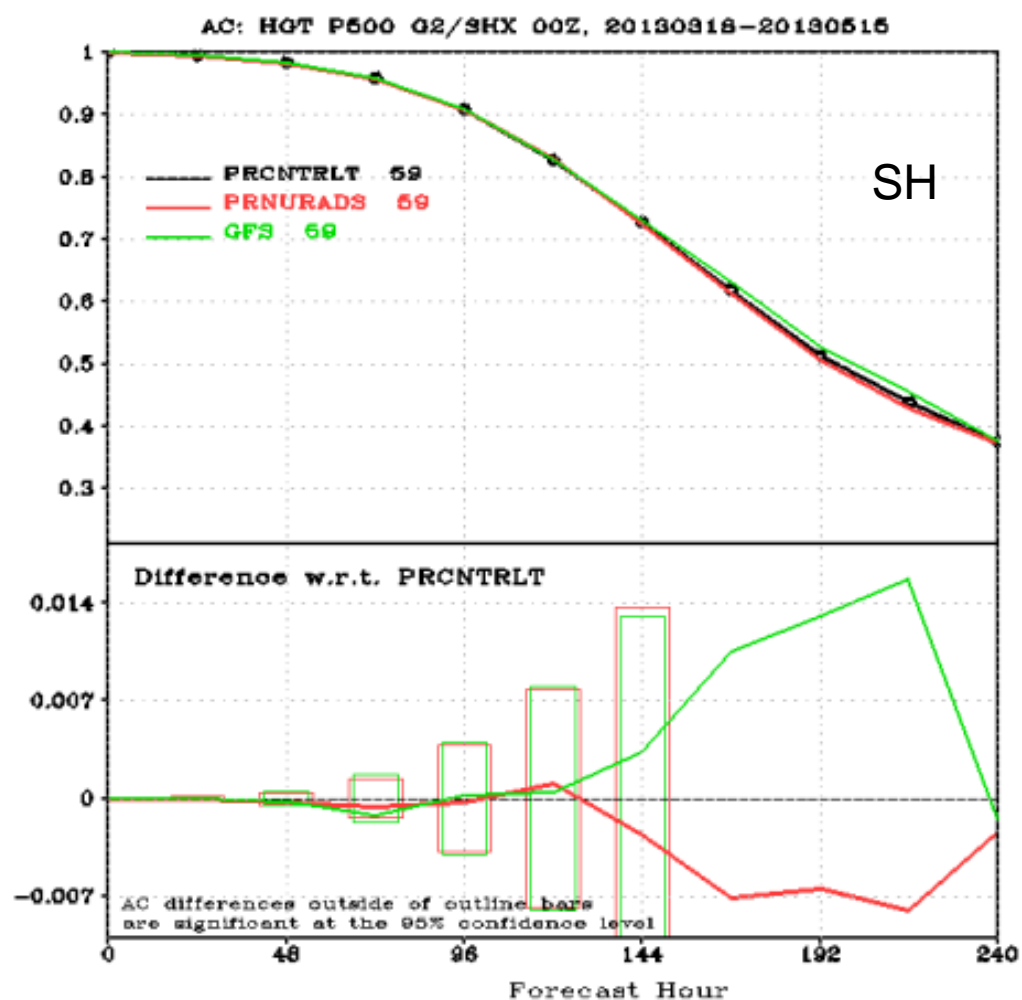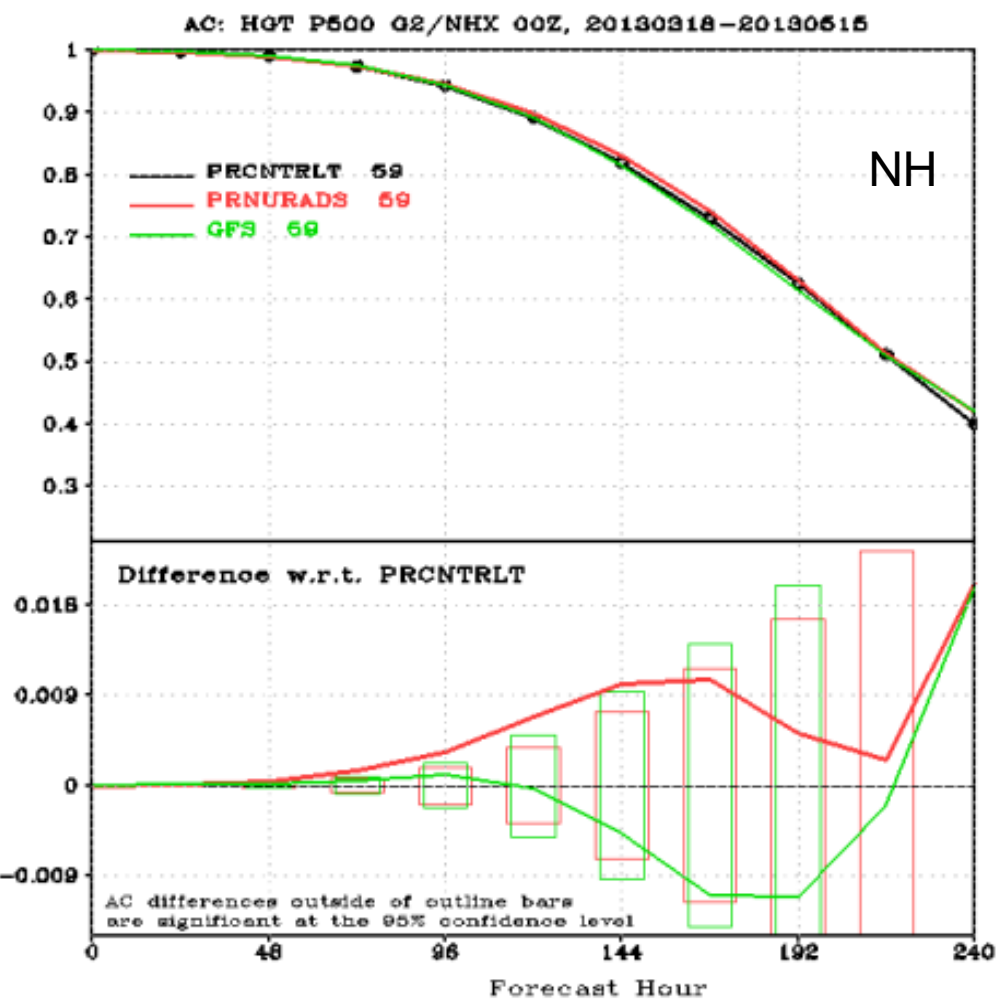
Pre-Implementation Test Results

Control
New Data
(Ignore Green)

500 hPa Anomaly Correlation Scores
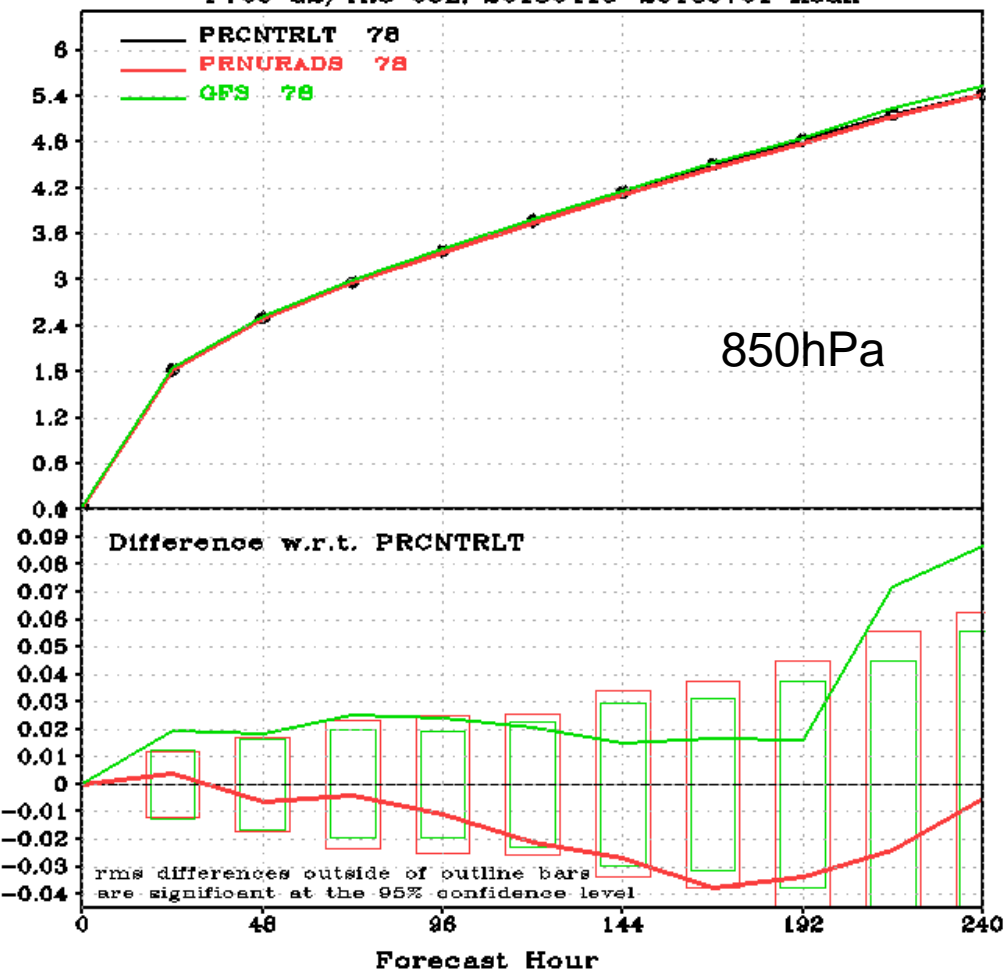
Pre-Implementation Test Results
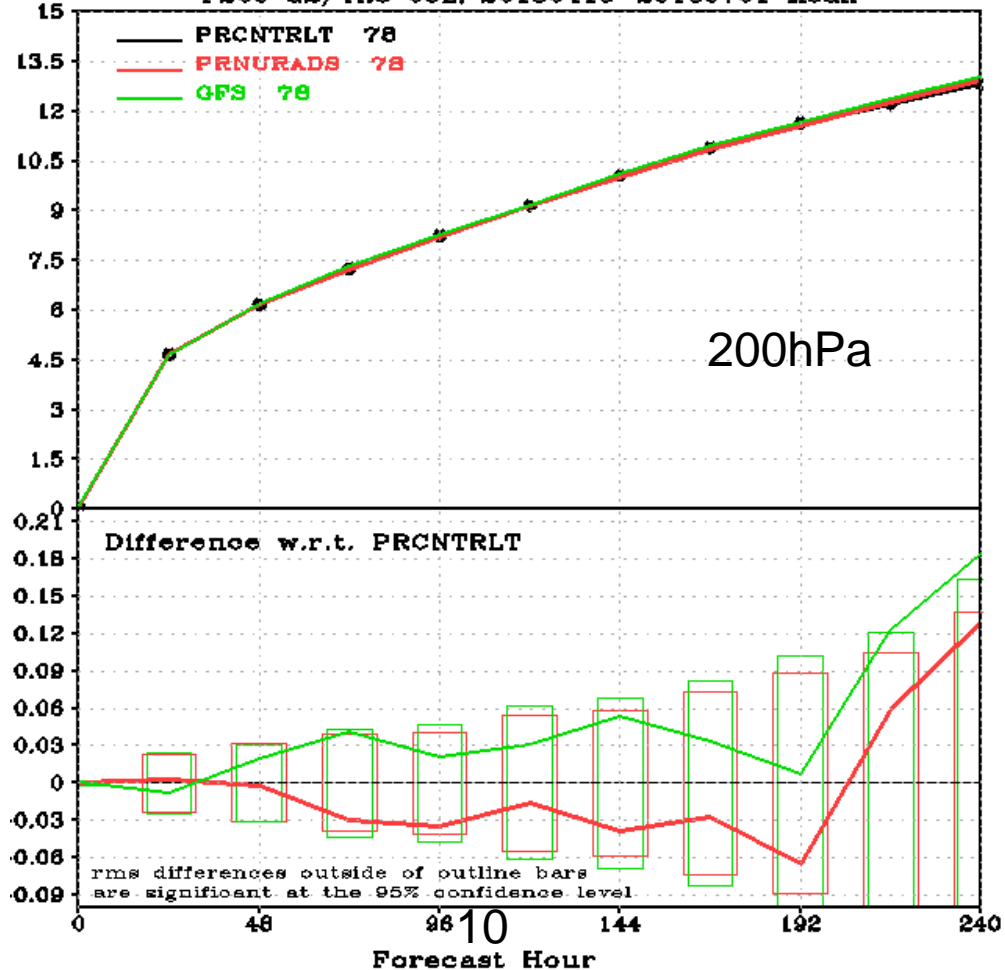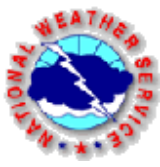
Control
New Data
(Ignore Green)

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.