Monitoring and Assimilation of IASI Radiances at ECMWF

Andrew Collard and Tony McNally

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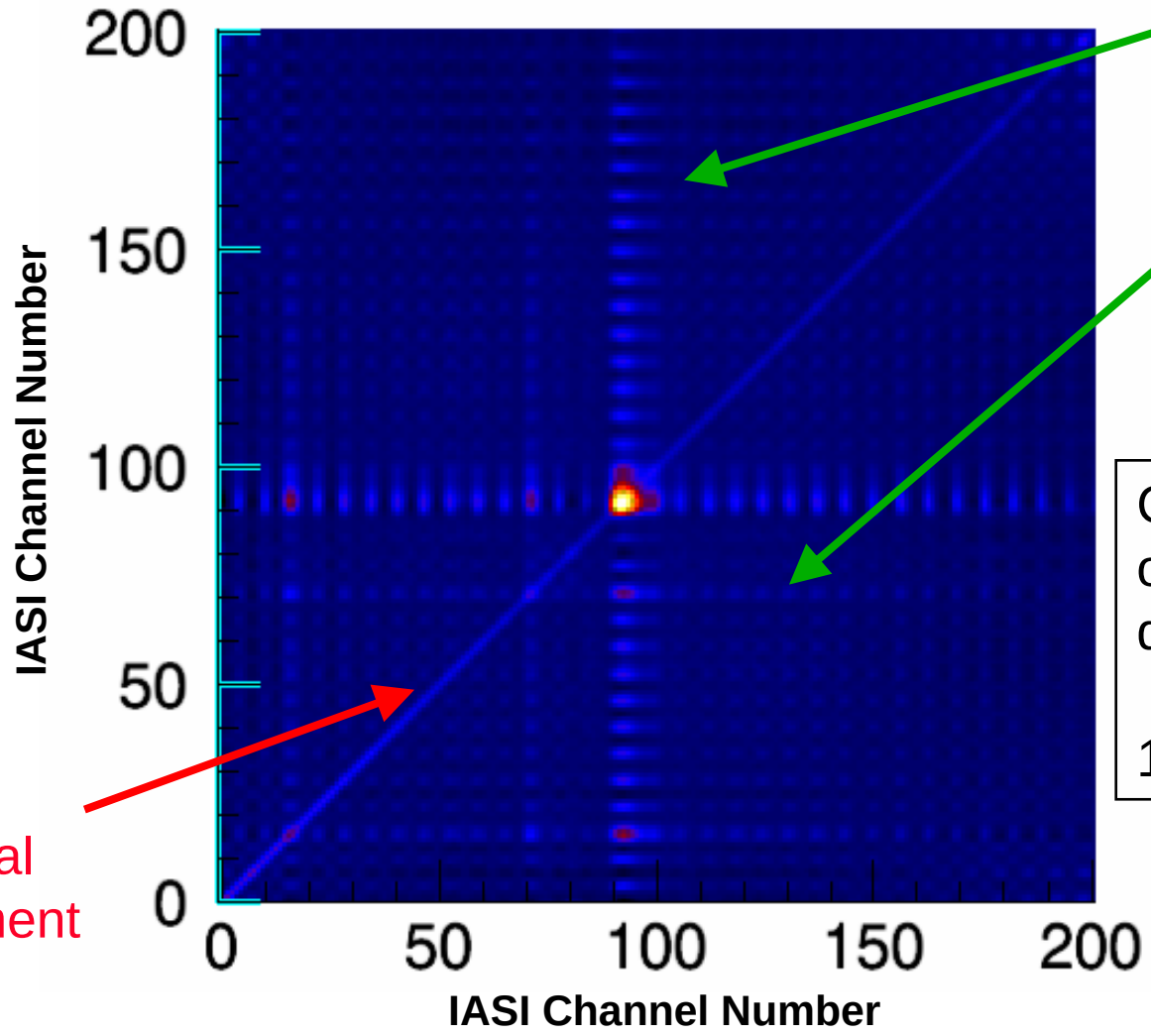
Overview

- Operational Assimilation Configuration and Forecast Impacts
- Review of the information in the IASI spectrum
- Water
- Conclusions and Next Steps

First,
a quick look at IASI correlated errors....

IASI Spectral Correlation



Correlations from forecast model

Covariance of first-guess departures

1st 200 channels

Nearly diagonal instrument noise

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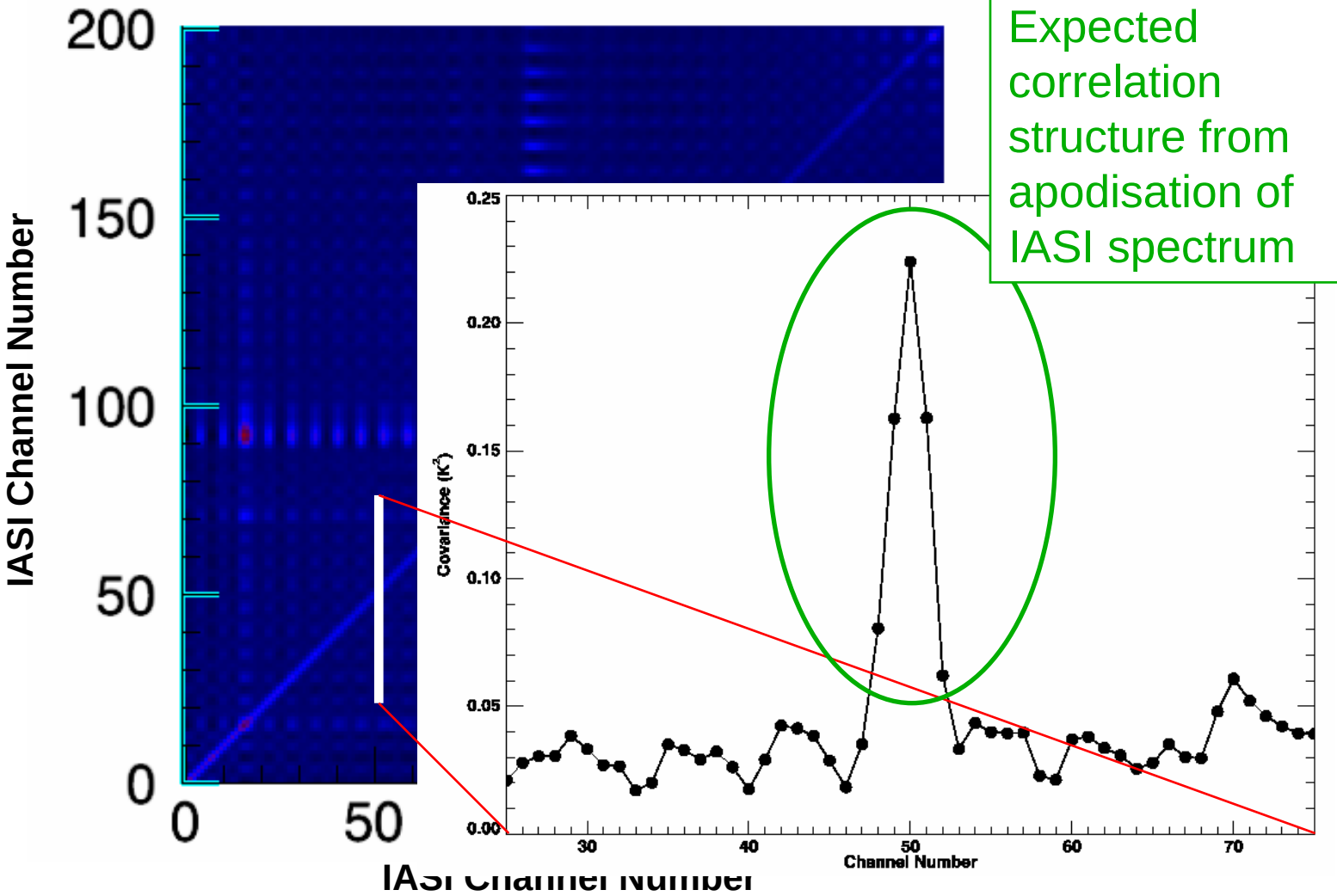
IASI Spectral Correlation



Expected correlation structure from apodisation of IASI spectrum

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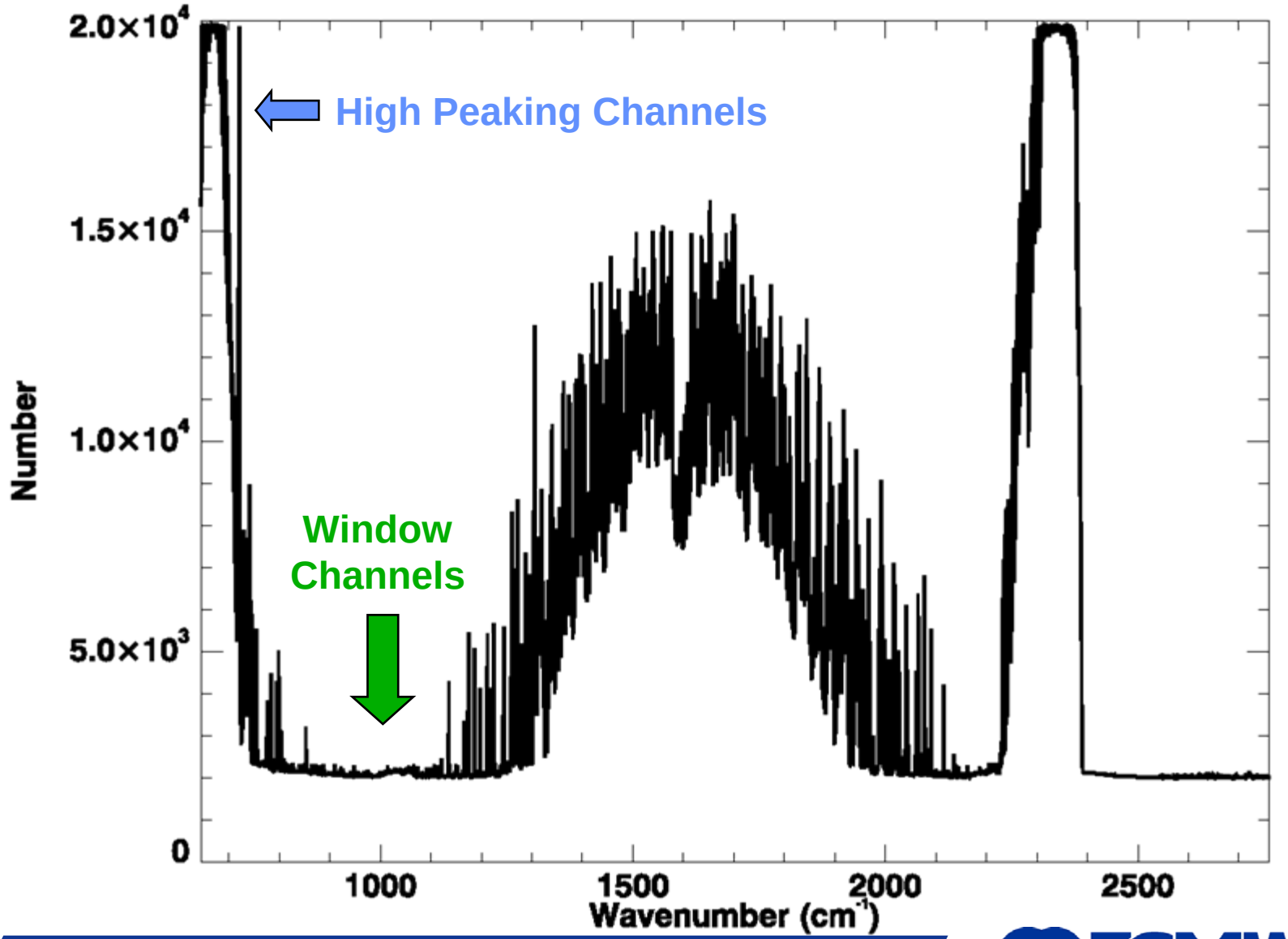
Assimilation Configuration

Current Operational Configuration for IASI

- Operational at ECMWF since 12th June 2007
- 8461 Channels Received in NRT (c.f. AIRS: 324)
- All FOVS received; Only 1-in-4 used (FOV 1) (AIRS: 1-in-9)
- 366 Channels Routinely Monitored (AIRS: 324)
- Up to 168 channels may be assimilated in CO_2 band only (AIRS: 155 in CO_2 and H_2O bands)
- Variational Bias Correction
- Clear *Channels* Assimilated

Number of Clear Channels



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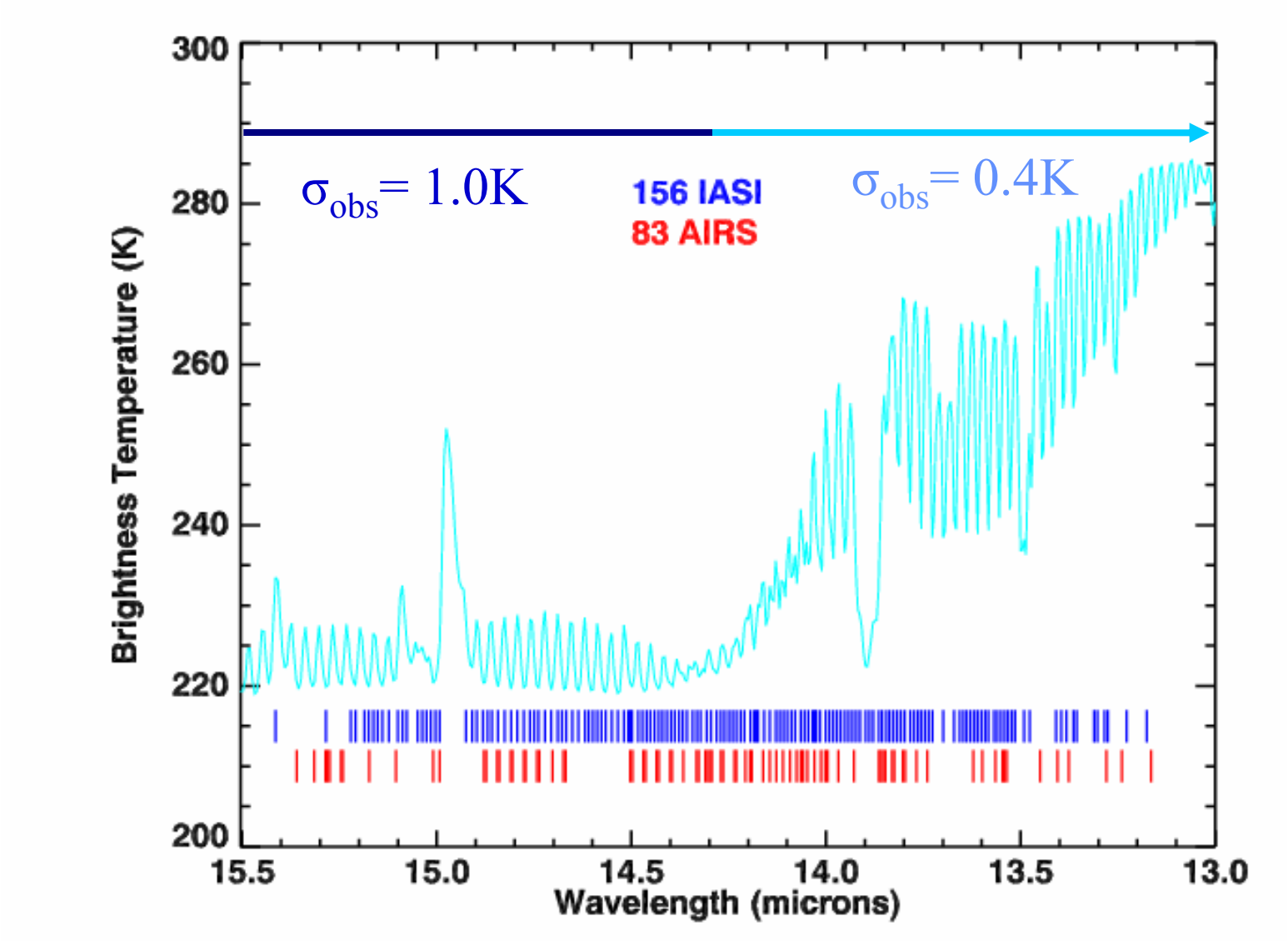
Comparison of Actively Assimilated Channels



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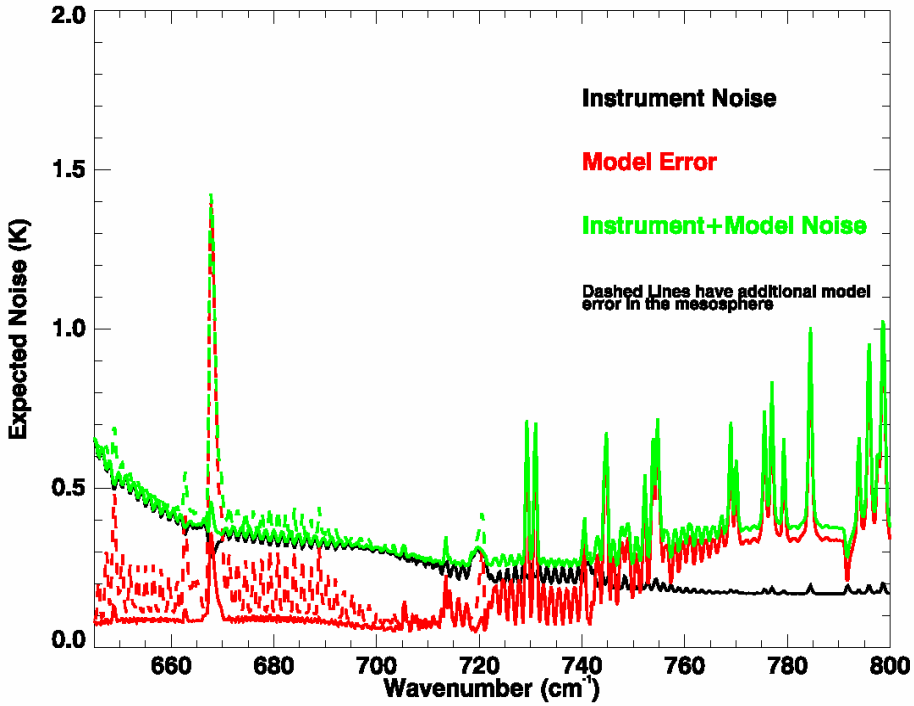
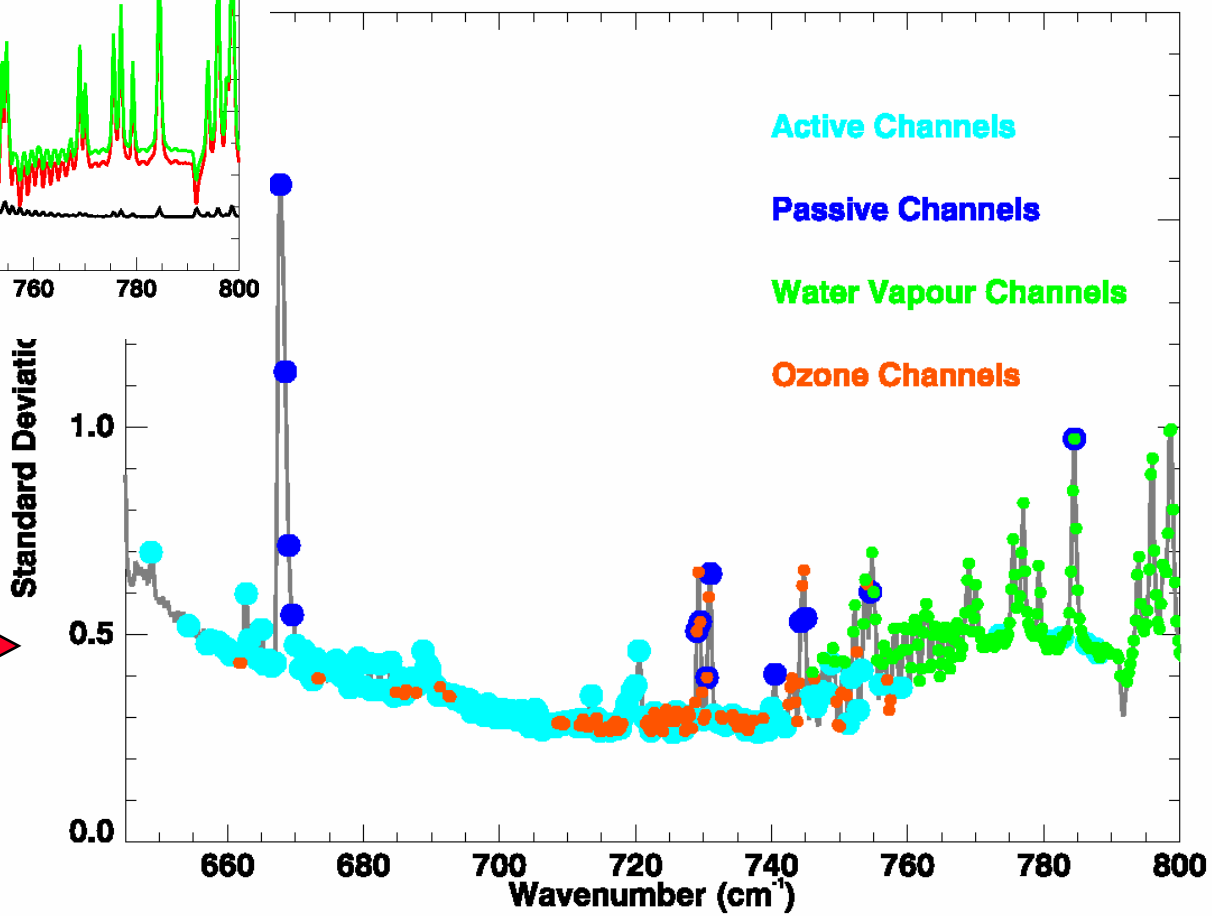
First –Guess Departure Standard Deviations in 15μm CO_2 Band



Calculated Std. Dev.

Observed Std. Dev.



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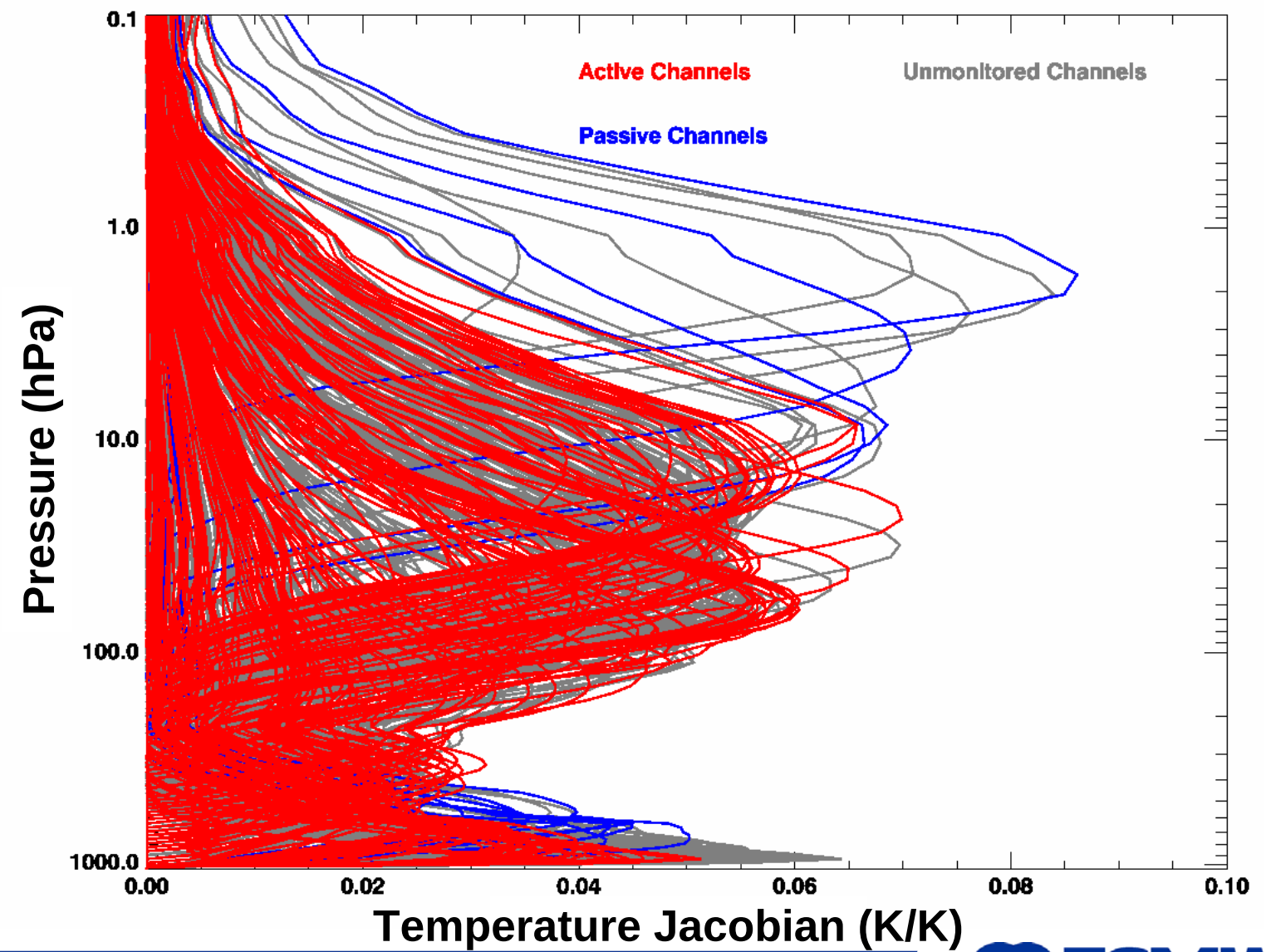
Jacobians of 15μm CO_2 Band



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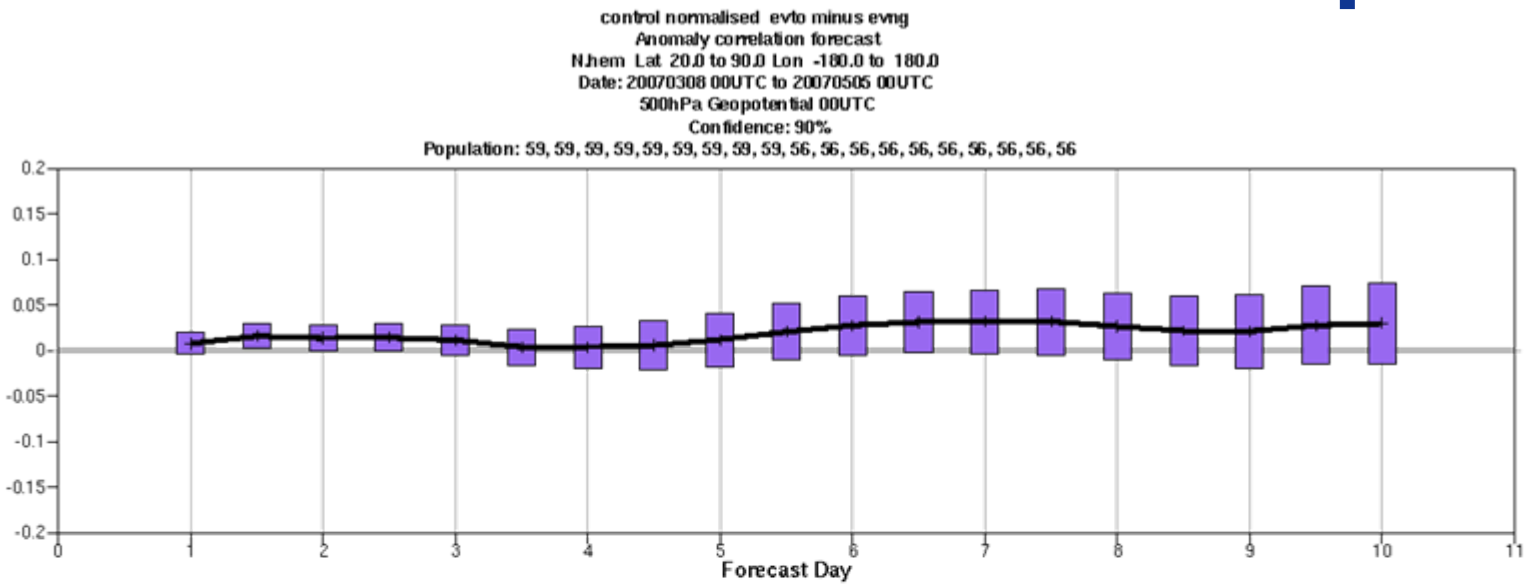
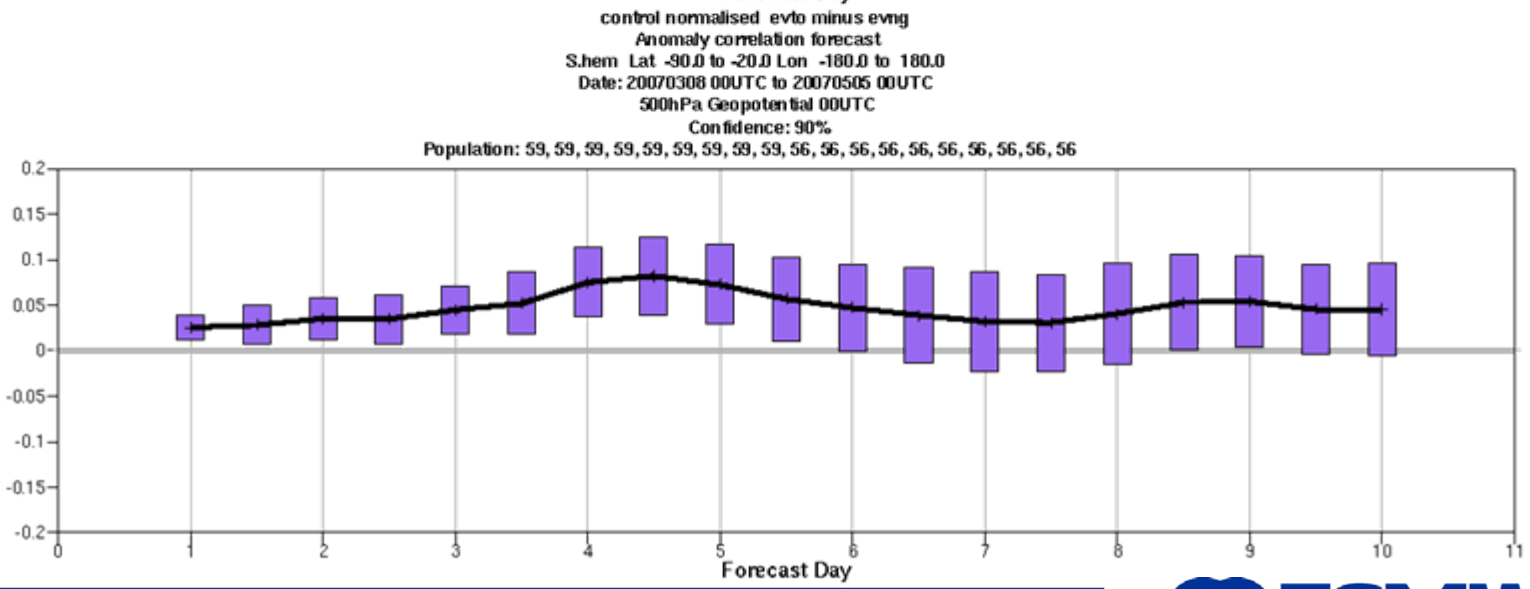
IASI Forecast Scores: 500hPa Geopot. AC



NH

IASI Better



SH

IASI Worse

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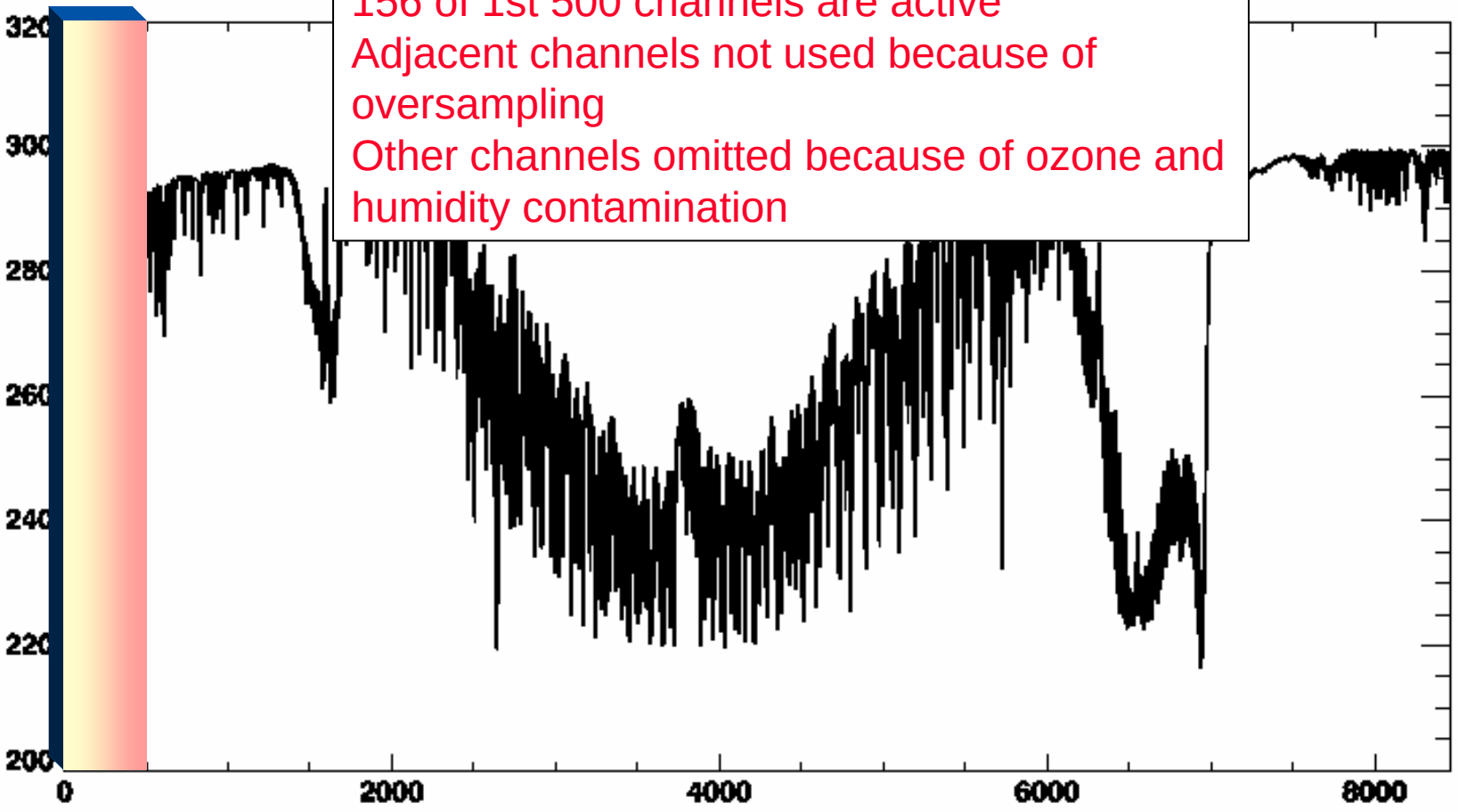
168 channels assimilated … 8293 to go

Using the IASI Spectrum
Longwave CO_2 Band



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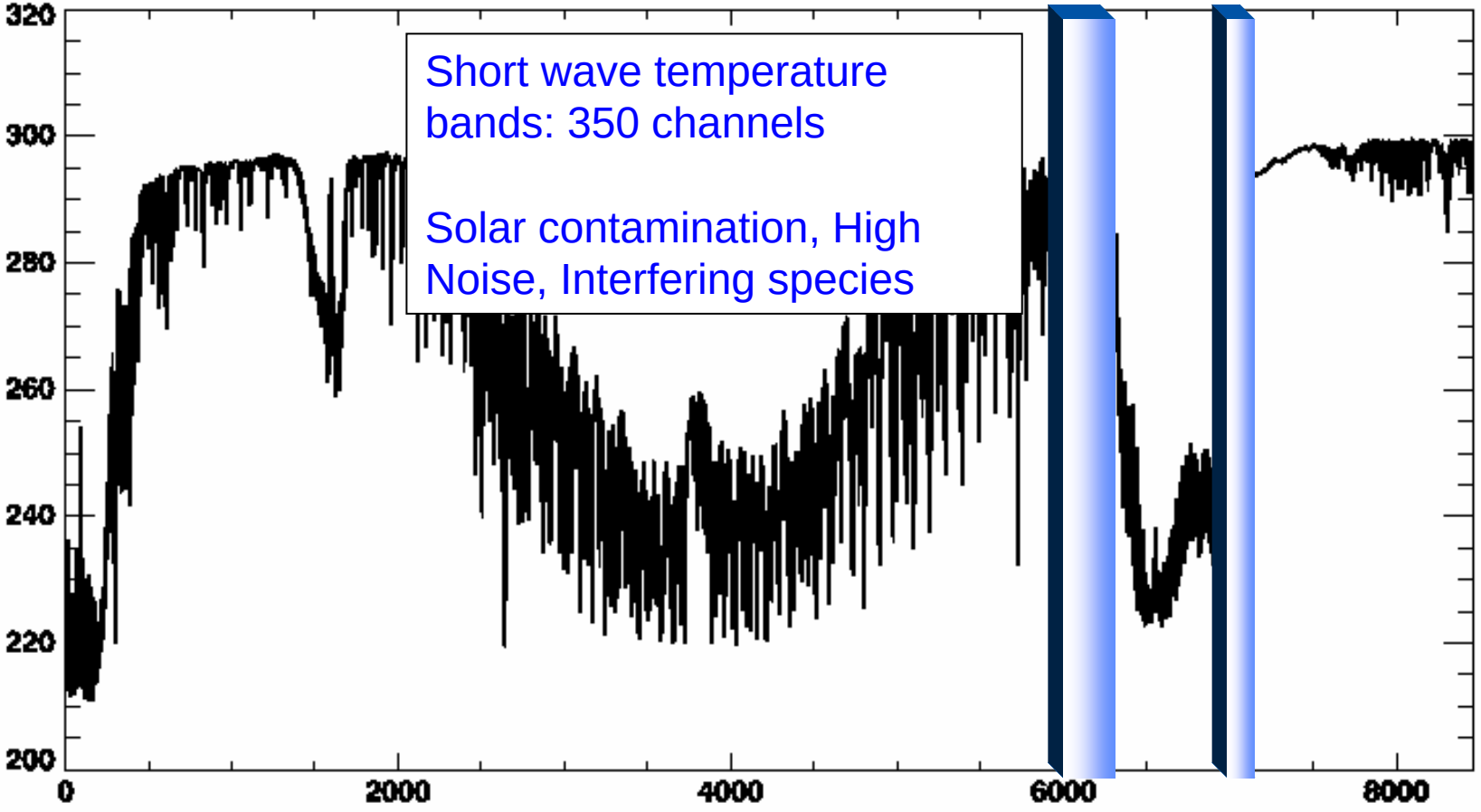
Using the IASI Spectrum
Shortwave CO_2 Band



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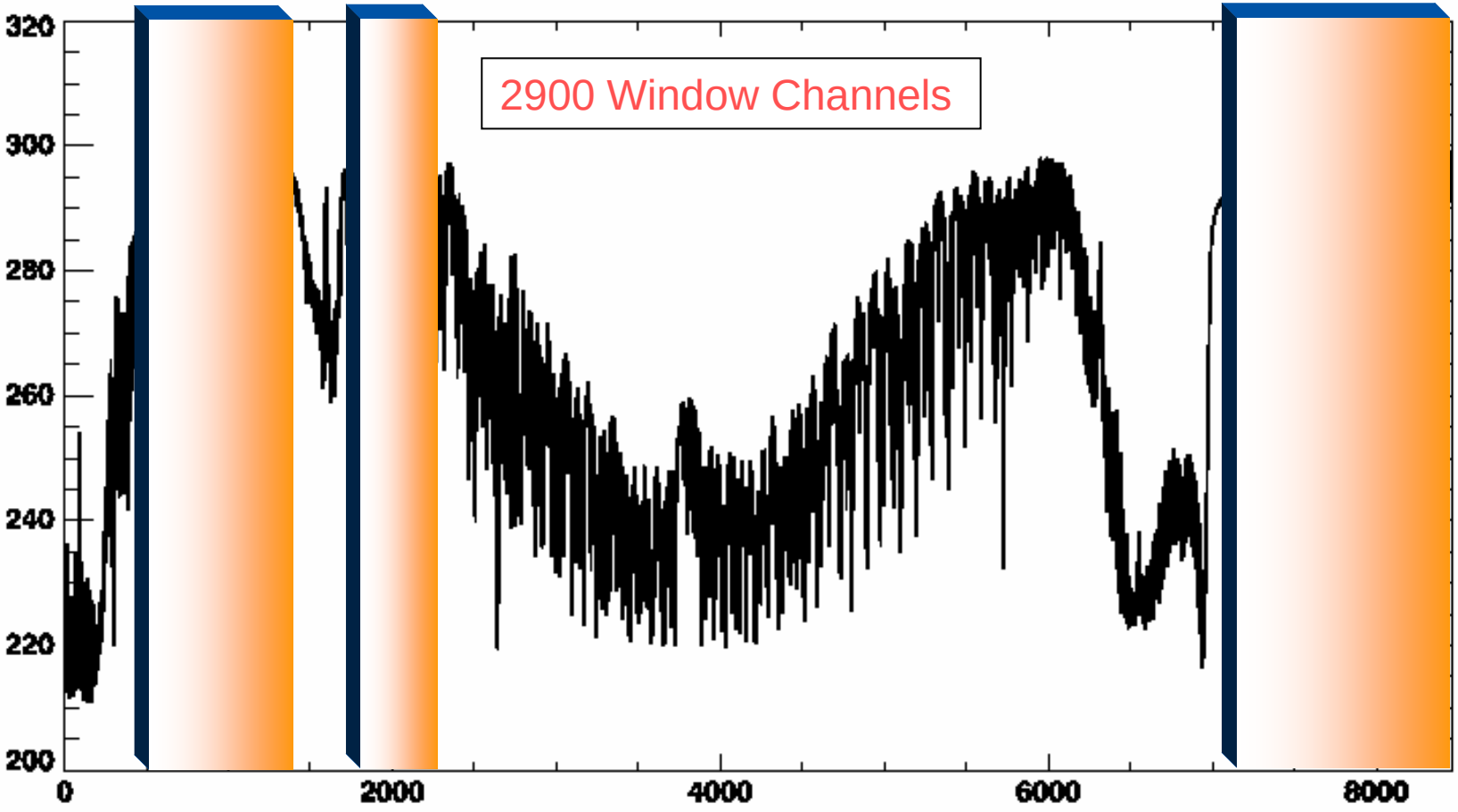
Using the IASI Spectrum
Channels Primarily Sensitive to the Surface



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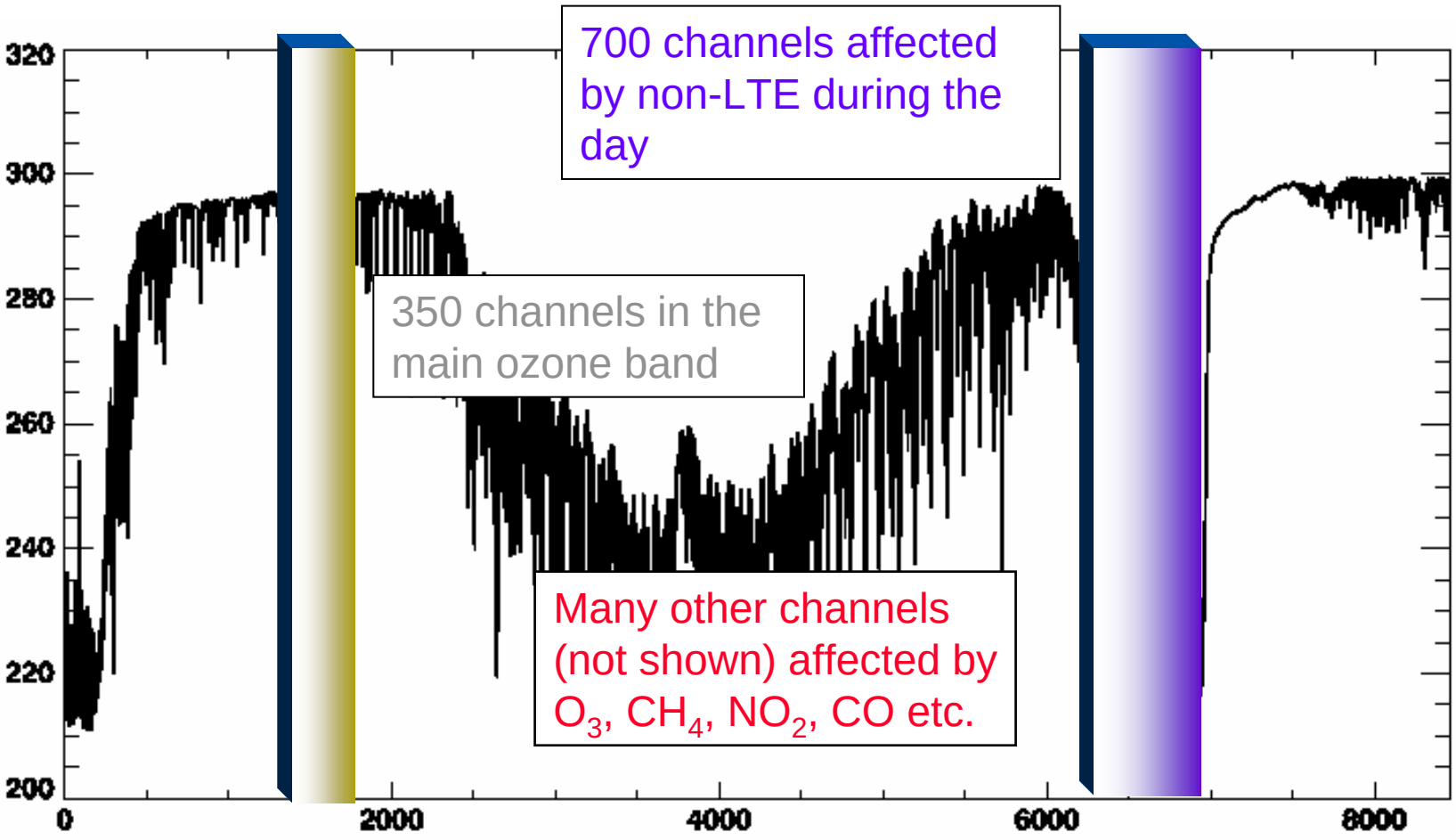
Using the IASI Spectrum
Trace Gases and RT Challenges



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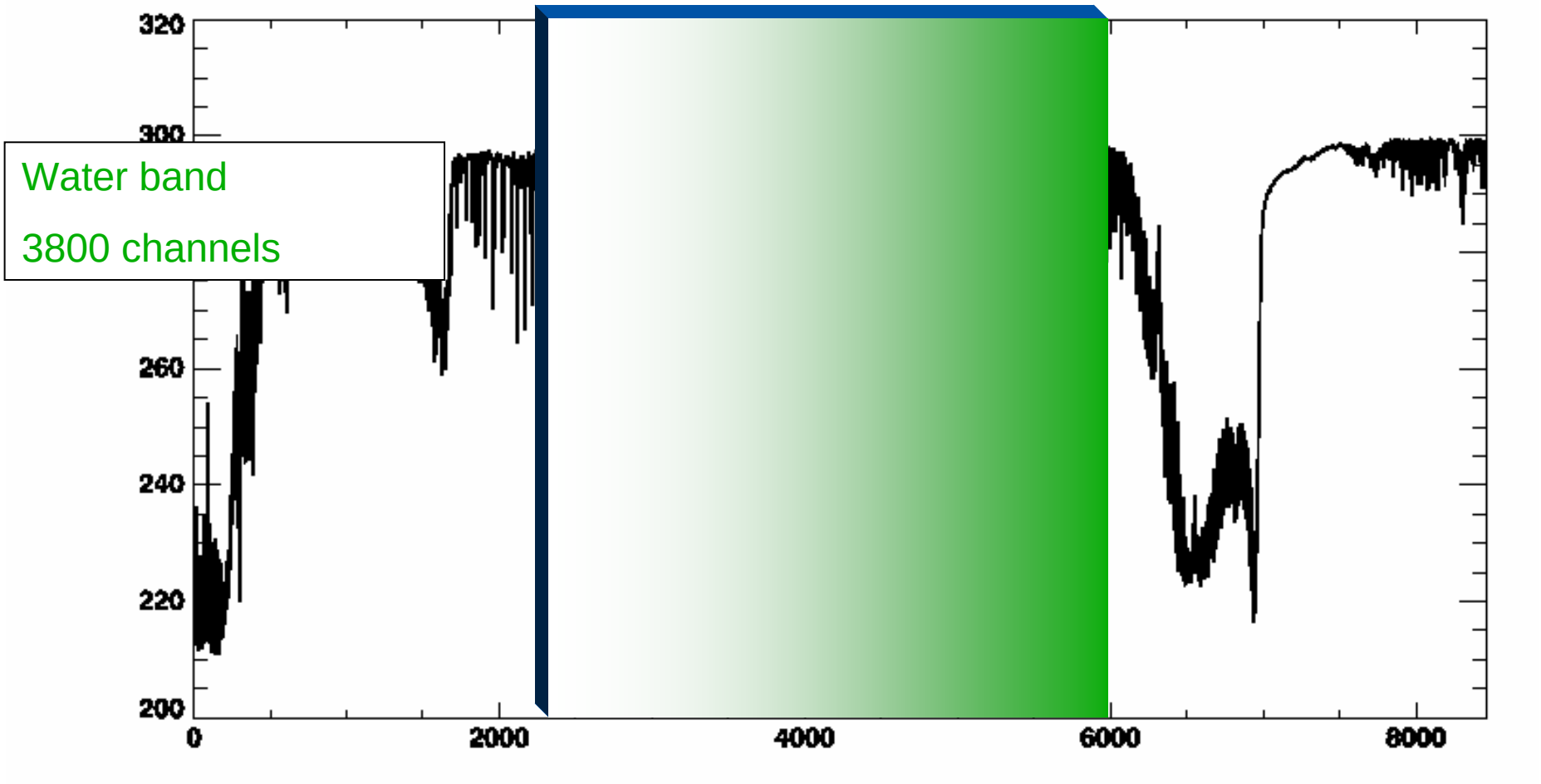
Using the IASI Spectrum
The 6.3µm Water Band



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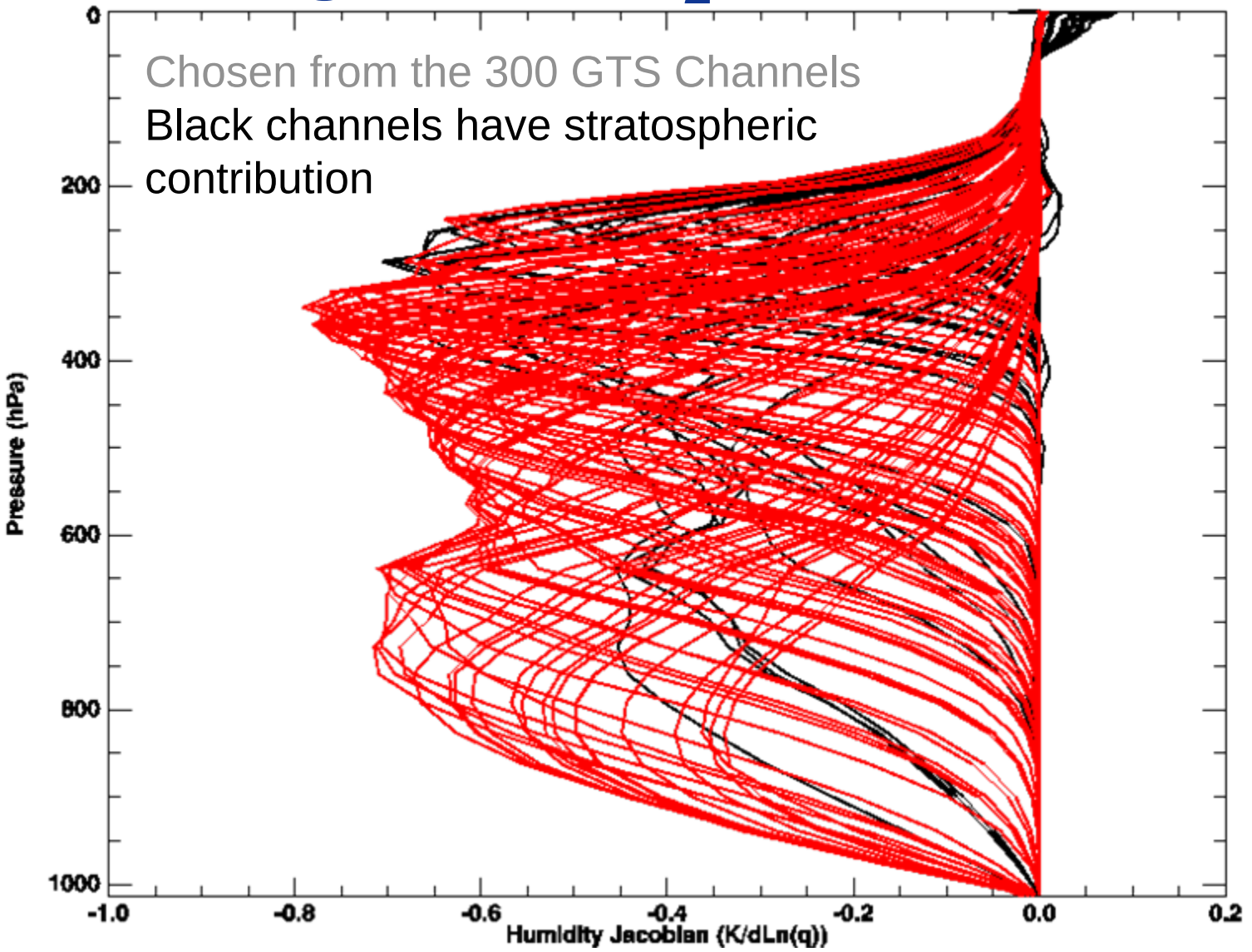
Water

Choosing 84 IASI H_2O Channels



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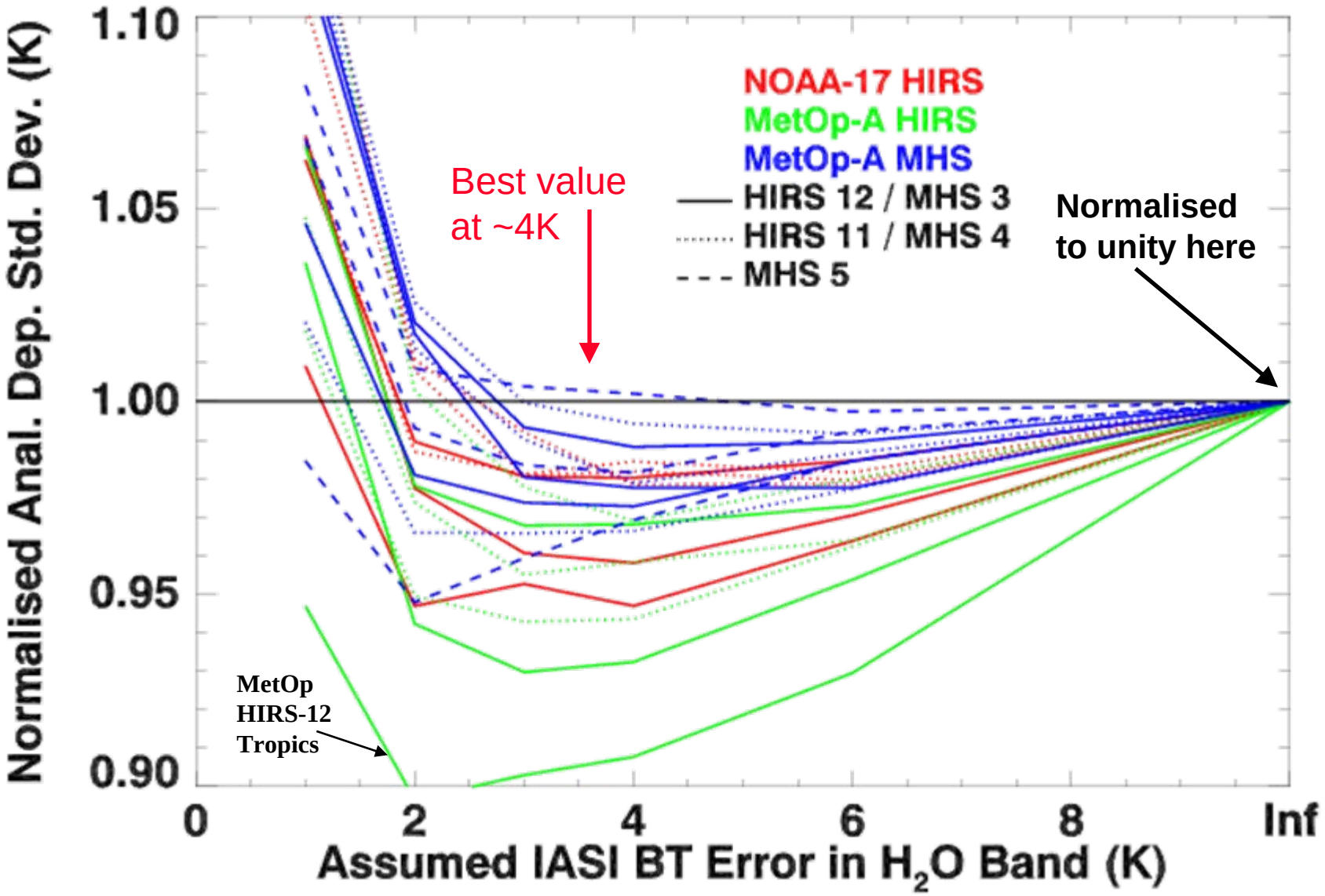
Fit to other observations
84 IASI Water Channels



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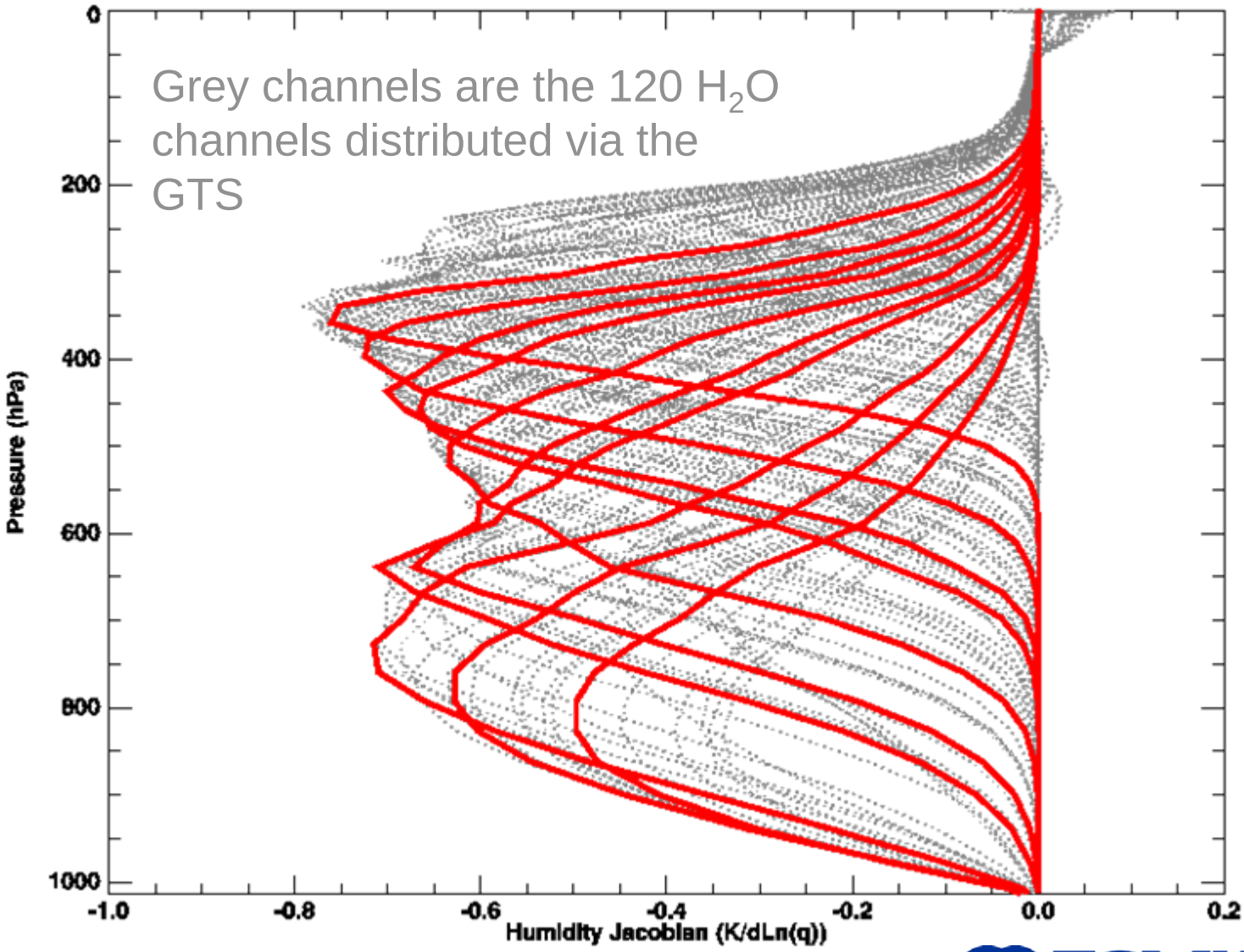
Choosing 10 IASI Water Vapour Channels



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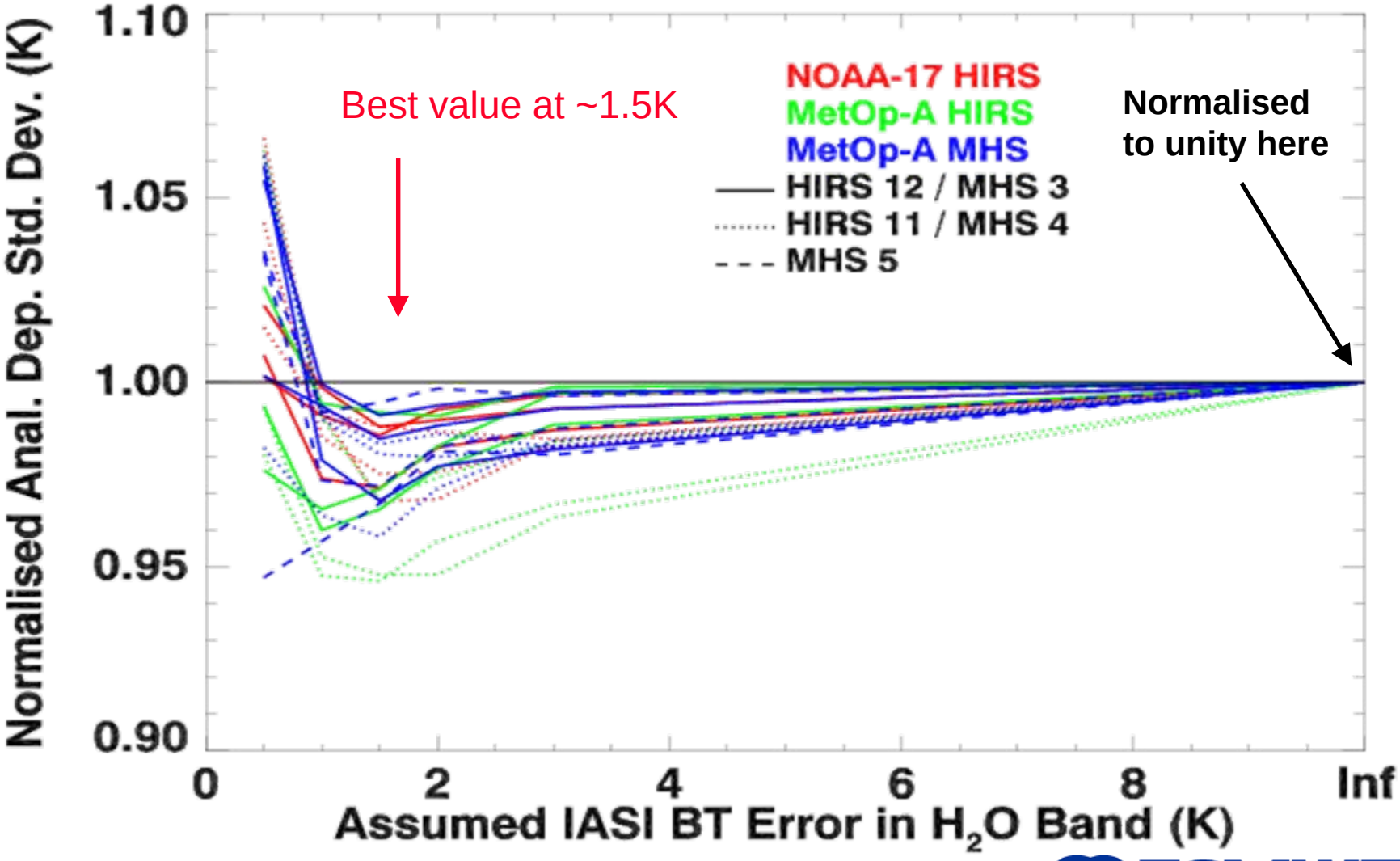
Fit to other observations:
10 IASI Water Channels



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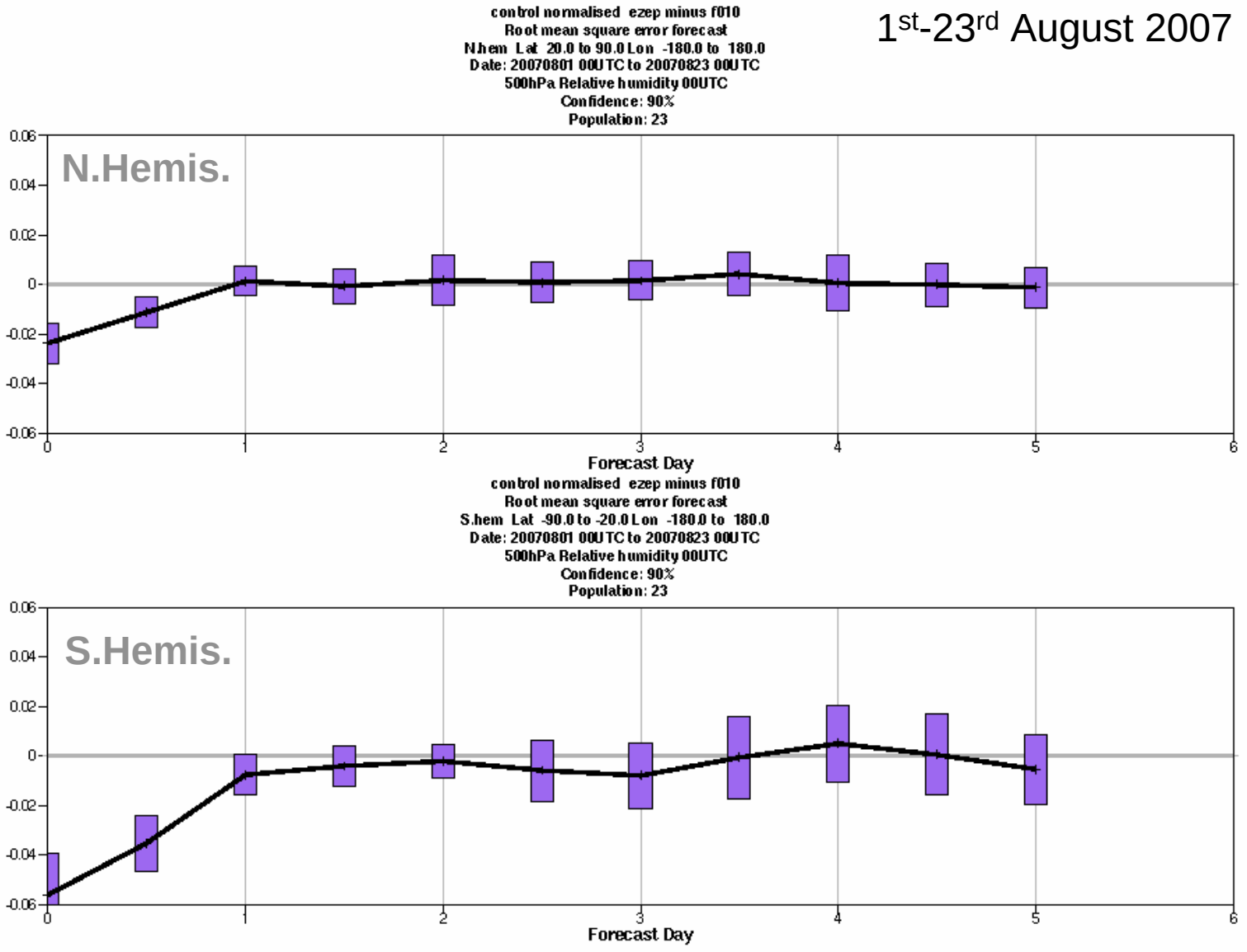
RH500 Forecast Impact
Root Mean Square Error verified vs Operational Analysis

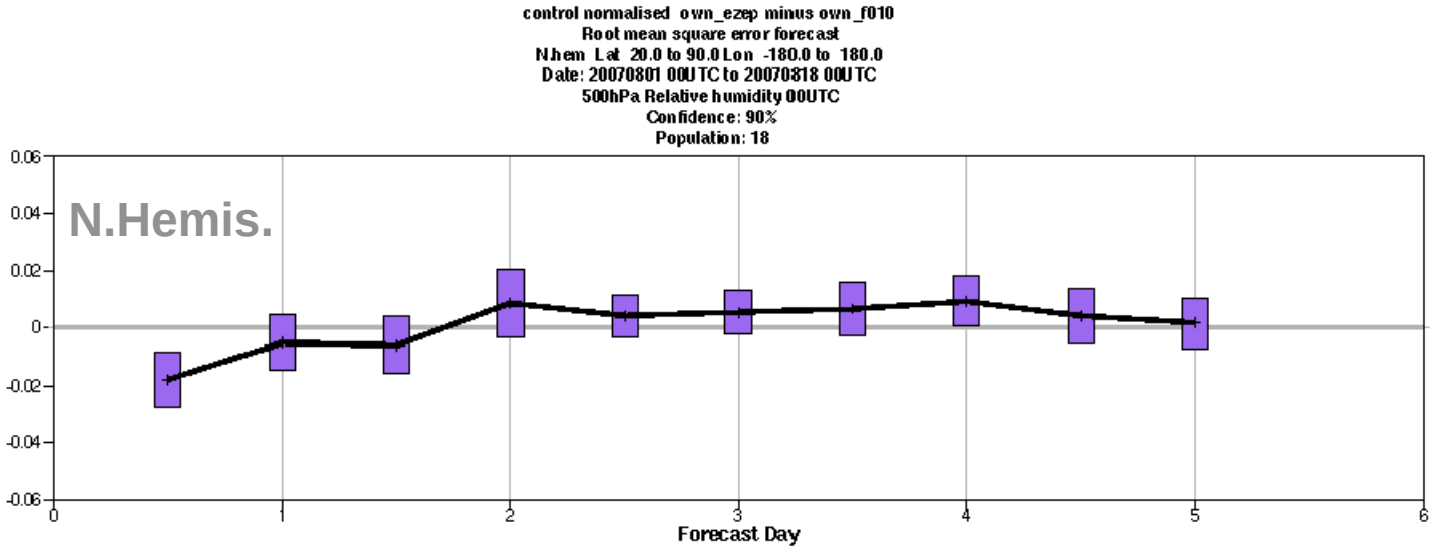
1st-23rd August 2007

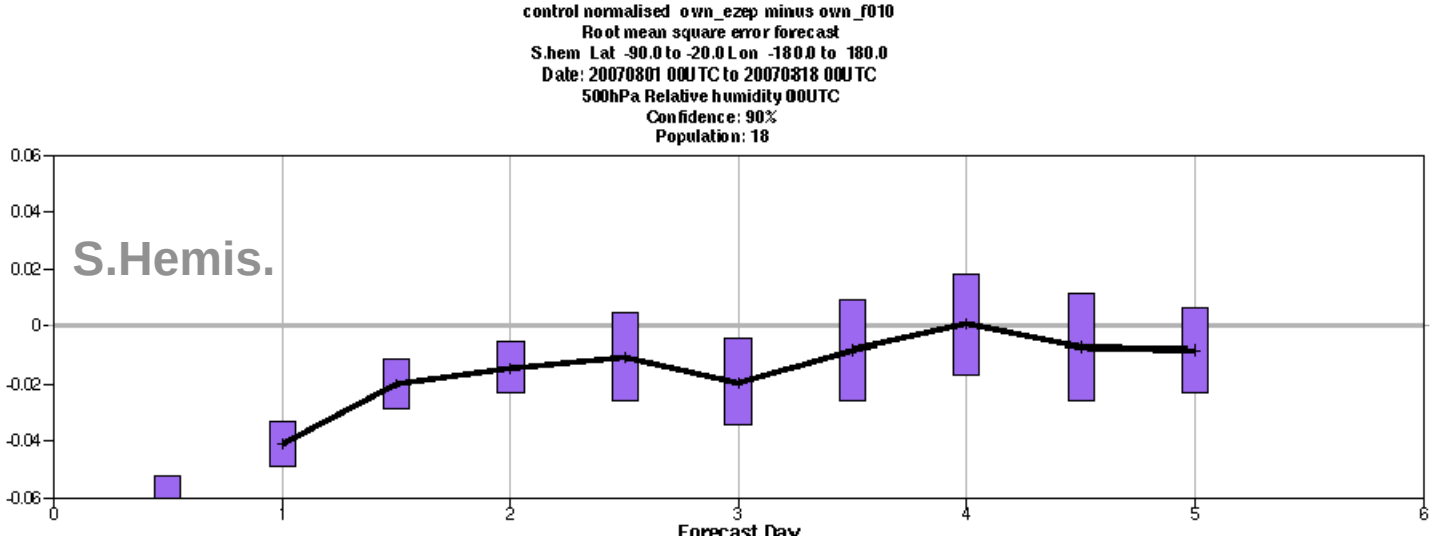


Expt Better

Cntrl Better

RH500 Forecast Impact
Root Mean Square Error verified vs Own Analysis





Expt Better

Cntrl Better

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Next Steps and Conclusions

Conclusions

- IASI is performing as expected
- The initial ECMWF implementation has focussed on the areas most likely to give positive impact (based on AIRS experience)
- IASI is providing positive impact on forecast scores – even using a system where AIRS is already used
- We aim to be able to use water band soon with appropriate weights (trading off #channels, obs errors and correlations)

Next Steps

- Use the water vapour band operationally
- Use over land
- Cloud affected radiances
- Use of compressed data

Obrigados

Thankyou

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