IASI L0/L1 NRT Monitoring at EUMETSAT: Results from 2.5 years of Operations

Lars Fiedler, Yakov Livschitz, Francois Montagner, and Gökhan Kayal

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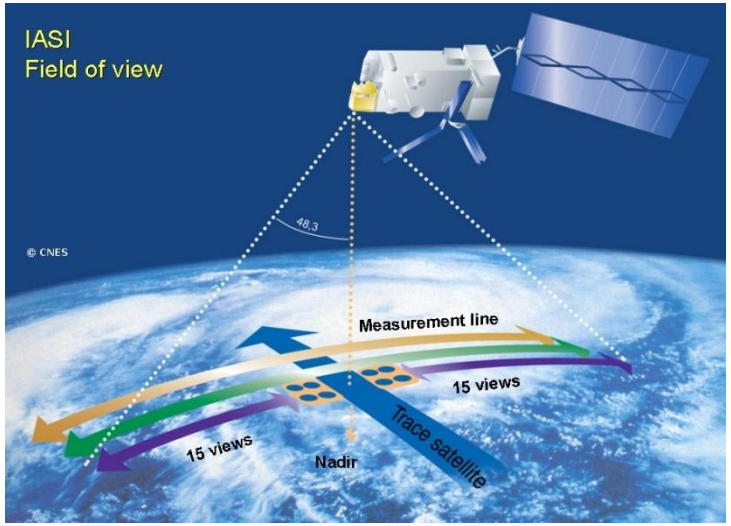
Outlook

- Introduction
- NWP based Monitoring set up
- Results from NWP based Radiance Monitoring
- Results from IASI-HIRS comparison
- Conclusions

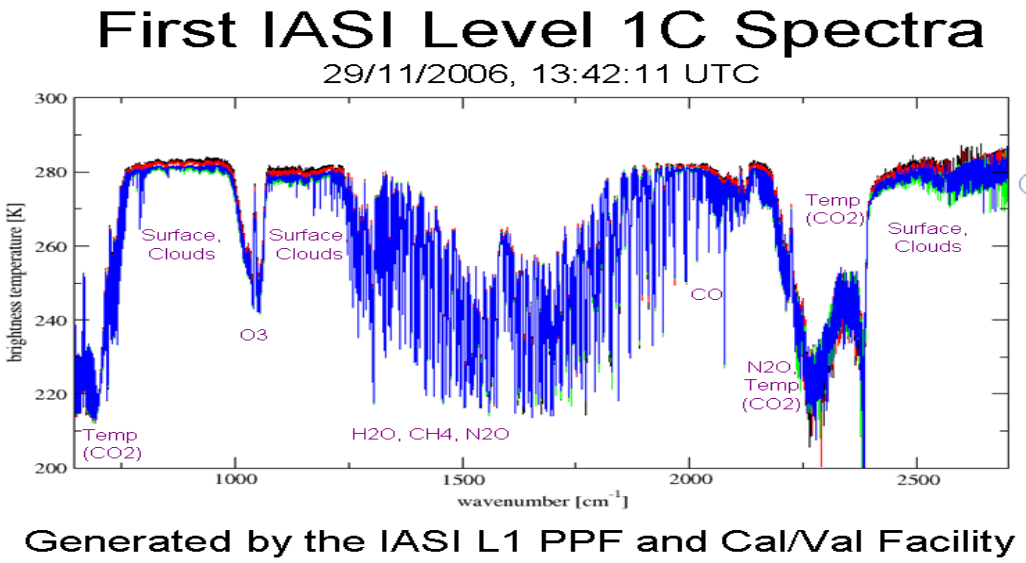
Introduction

IASI (Infrared Atmospheric Sounding Interferometer):

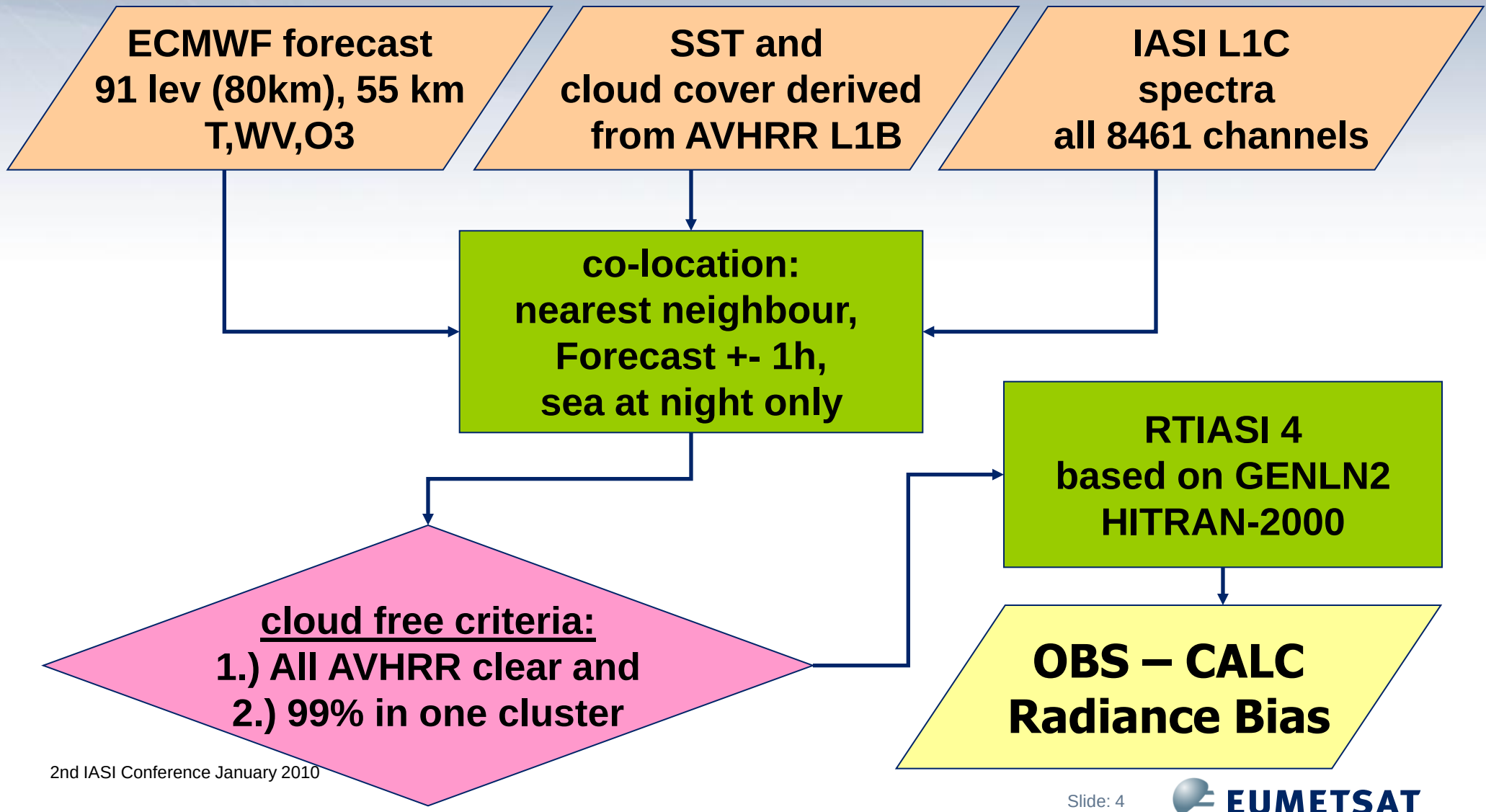
- Covering the range 645 cm^{-1} to 2760 cm^{-1}
- with 8461 spectral samples and
- 4 instantaneous field of view (IFOV)
- a spectral resolution 0.5 cm^{-1} of the IASI L1C product
- On-board the MetOp satellite in sun-synchronous 09:30 morning orbit



2nd IASI Conference January 2010

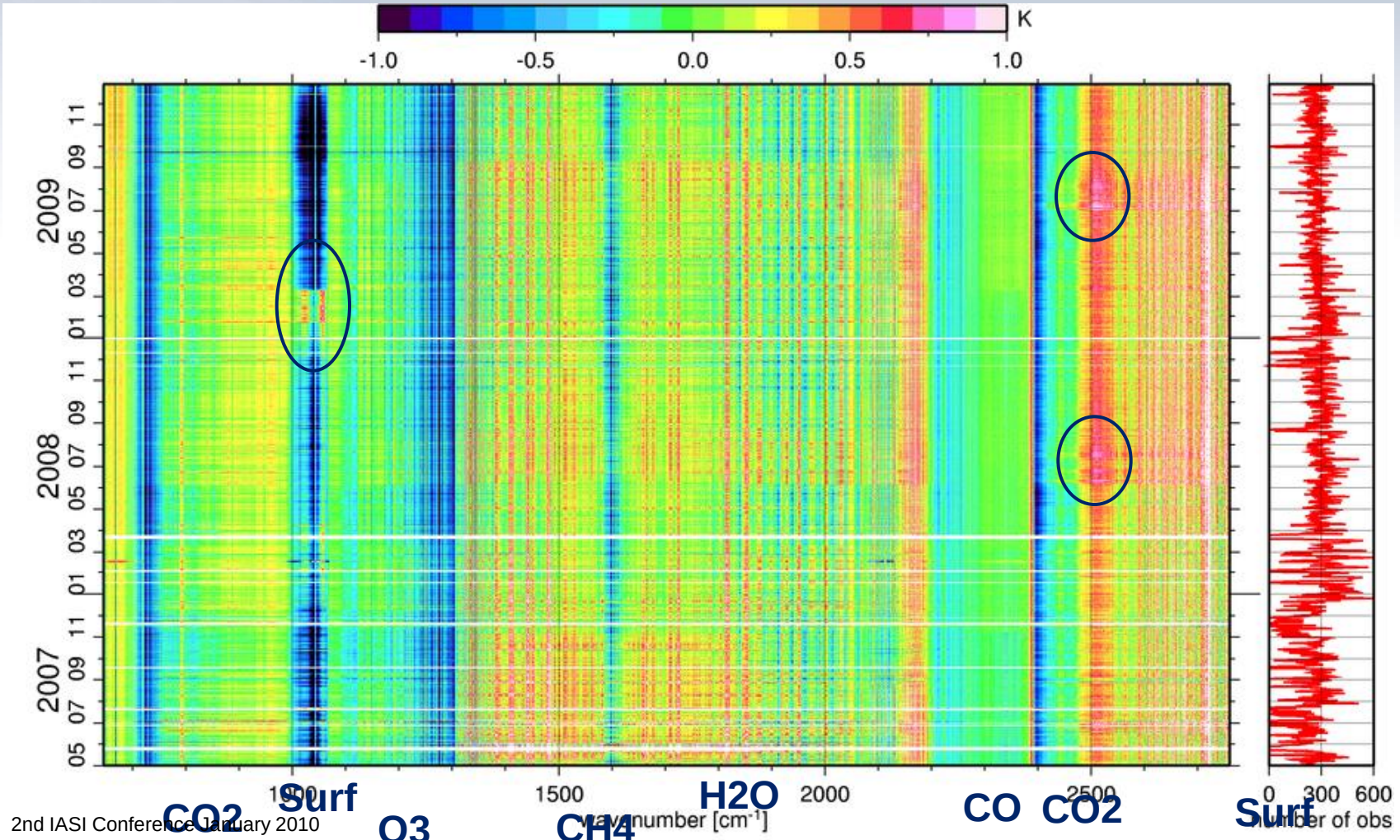


IASI NWP based Radiance Monitoring at EUMETSAT



IASI NWP based Radiance Monitoring: 24h average

Brightness Temperature at 280K



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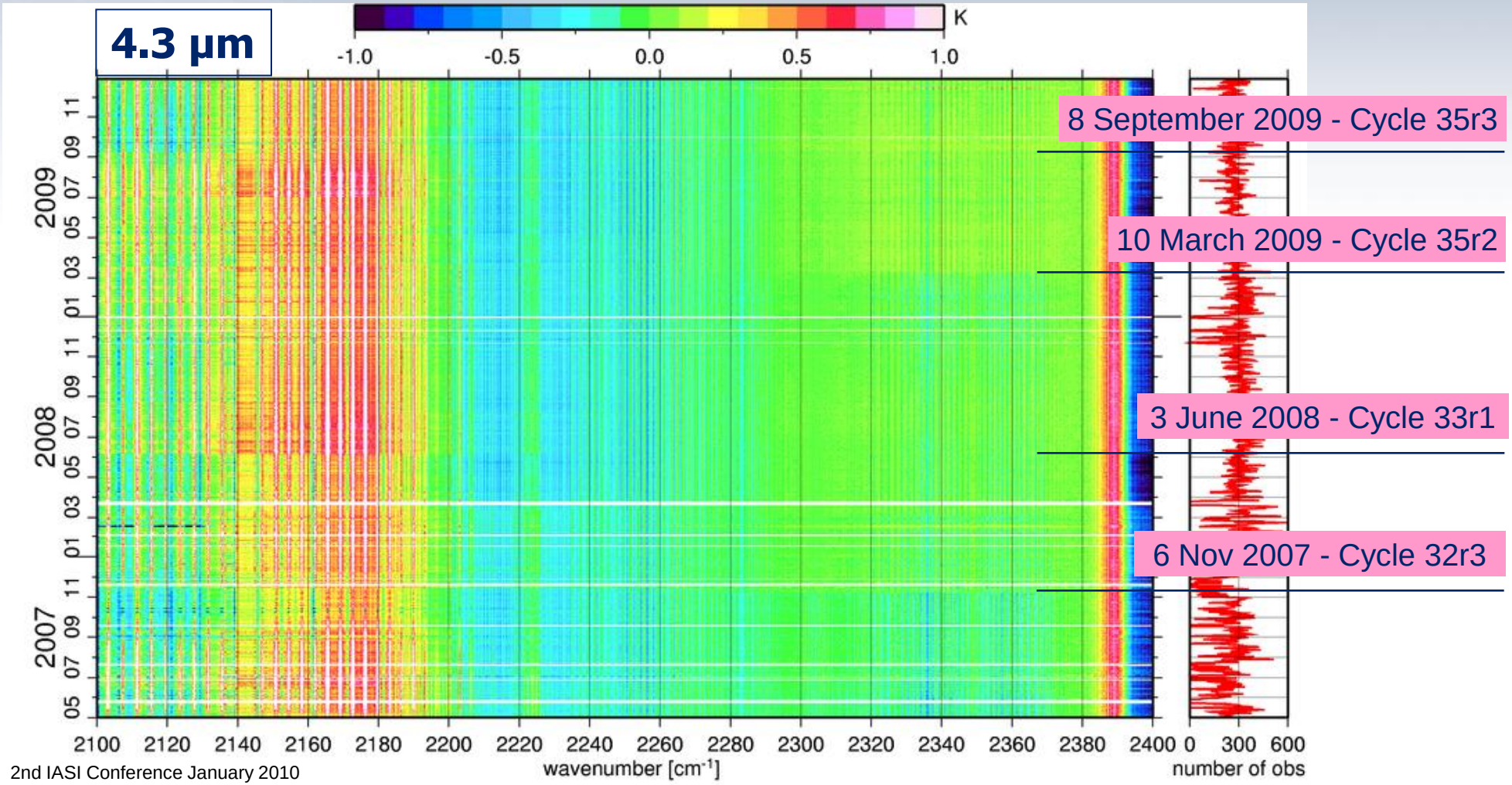
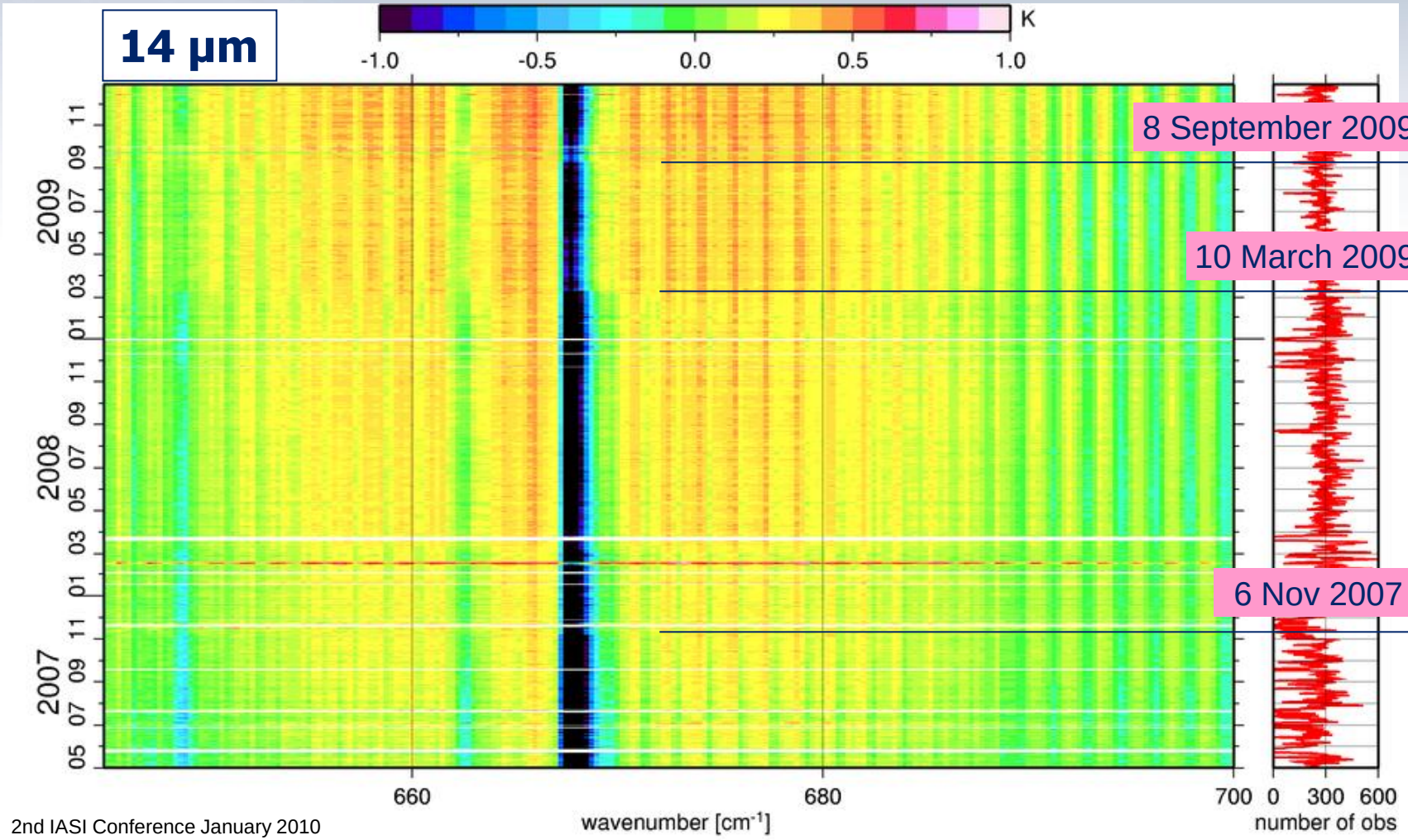
IASI NWP based Radiance Monitoring - CO_2

Brightness Temperature at 280K



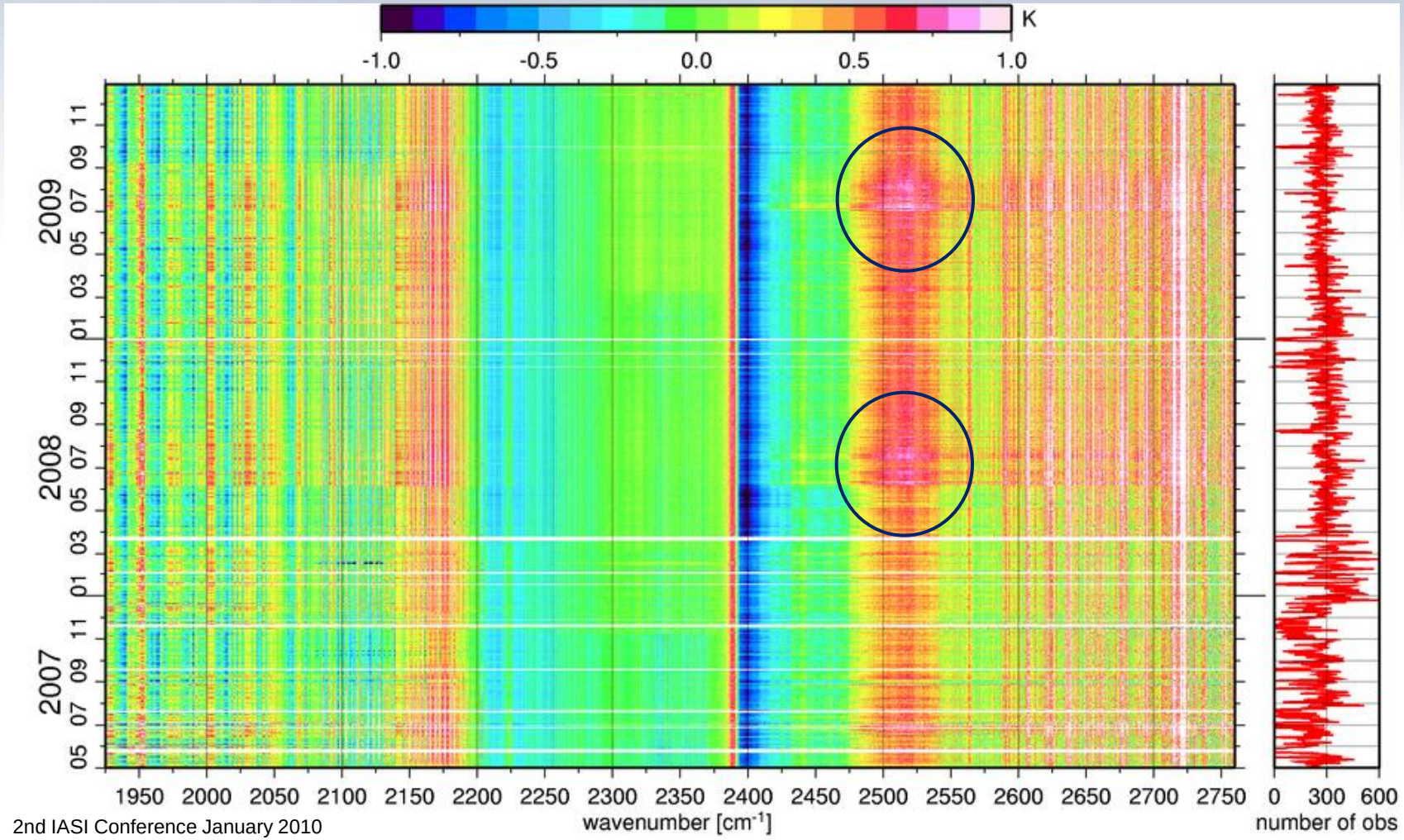
IASI NWP based Radiance Monitoring – CO_2

Brightness Temperature at 280K



IASI NWP based Radiance Monitoring - Band 3

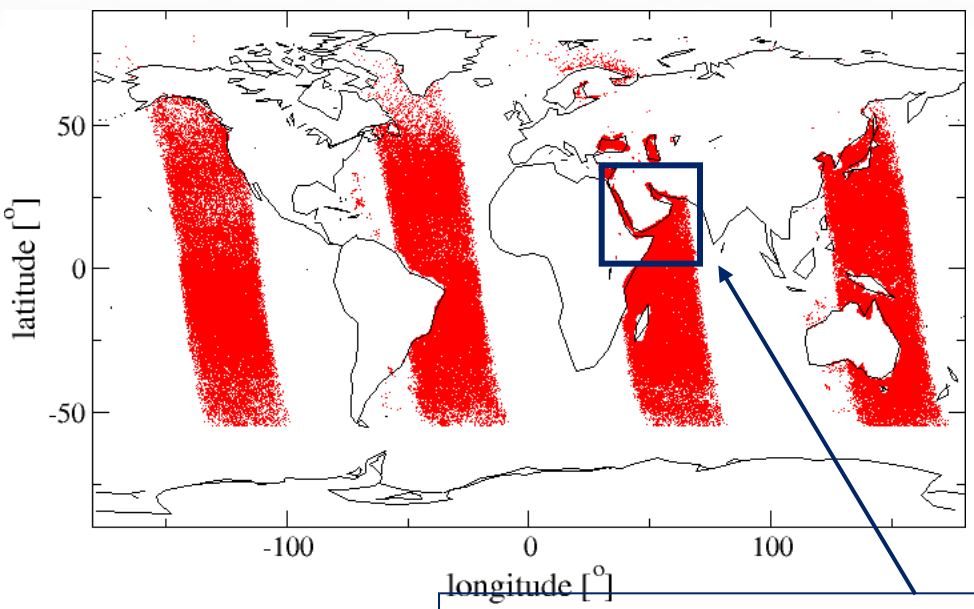
Brightness Temperature at 280K

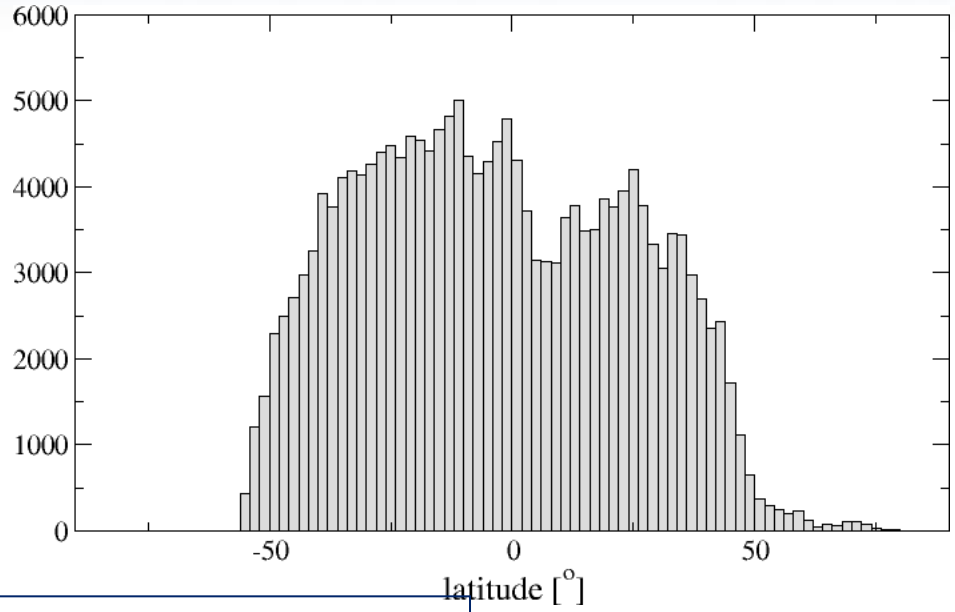


Reduced Coverage

Reduced global coverage due to usage of:

- clear sky situations at night only and
- of 6h forecast data (+- 1h)
- July to September 2009

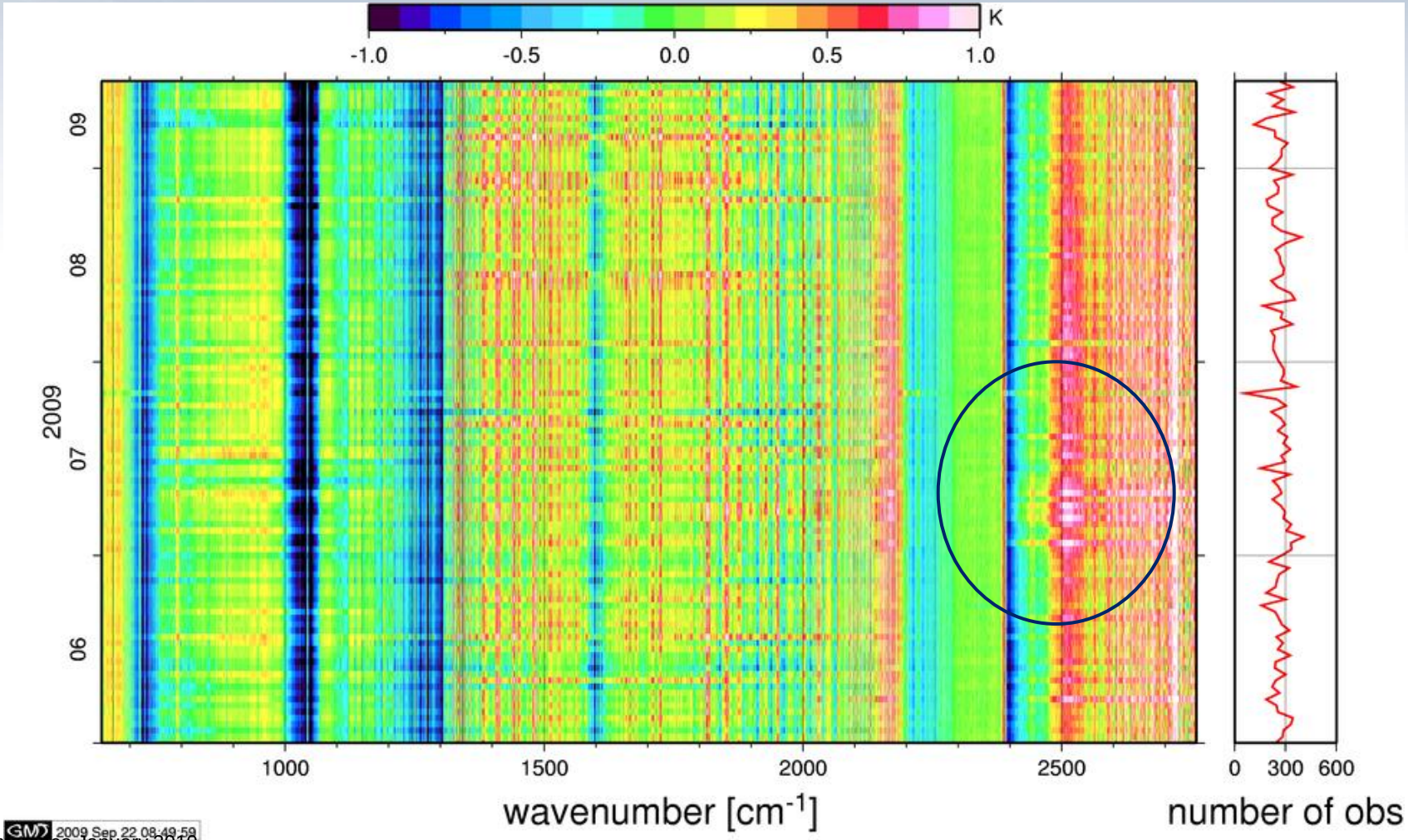




Exclusion of 40°N to 0°N and 30°E to 75°E due to Monsoon winds in the Arabian Sea

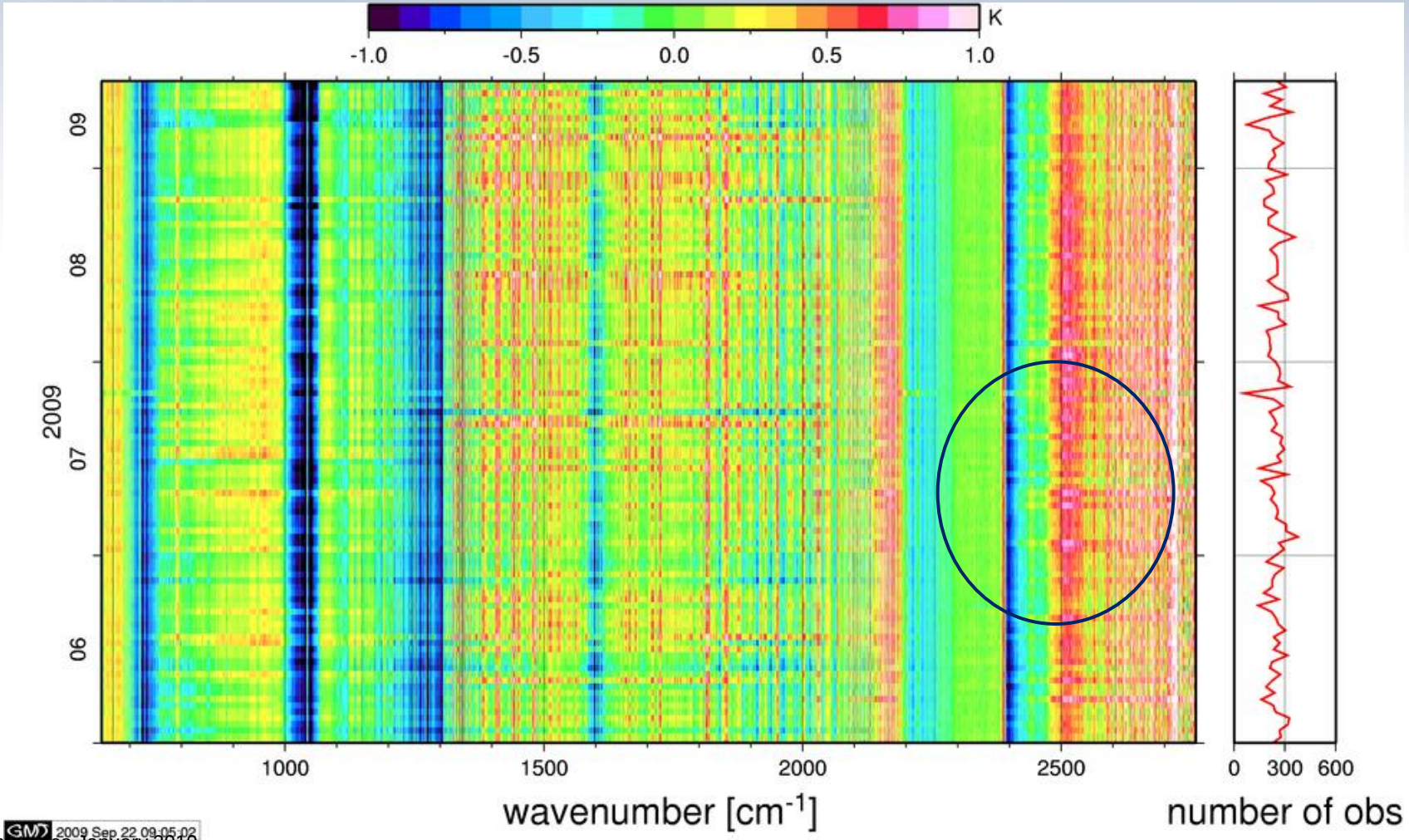
IASI RM: Standard coverage

Brightness Temperature at 280K



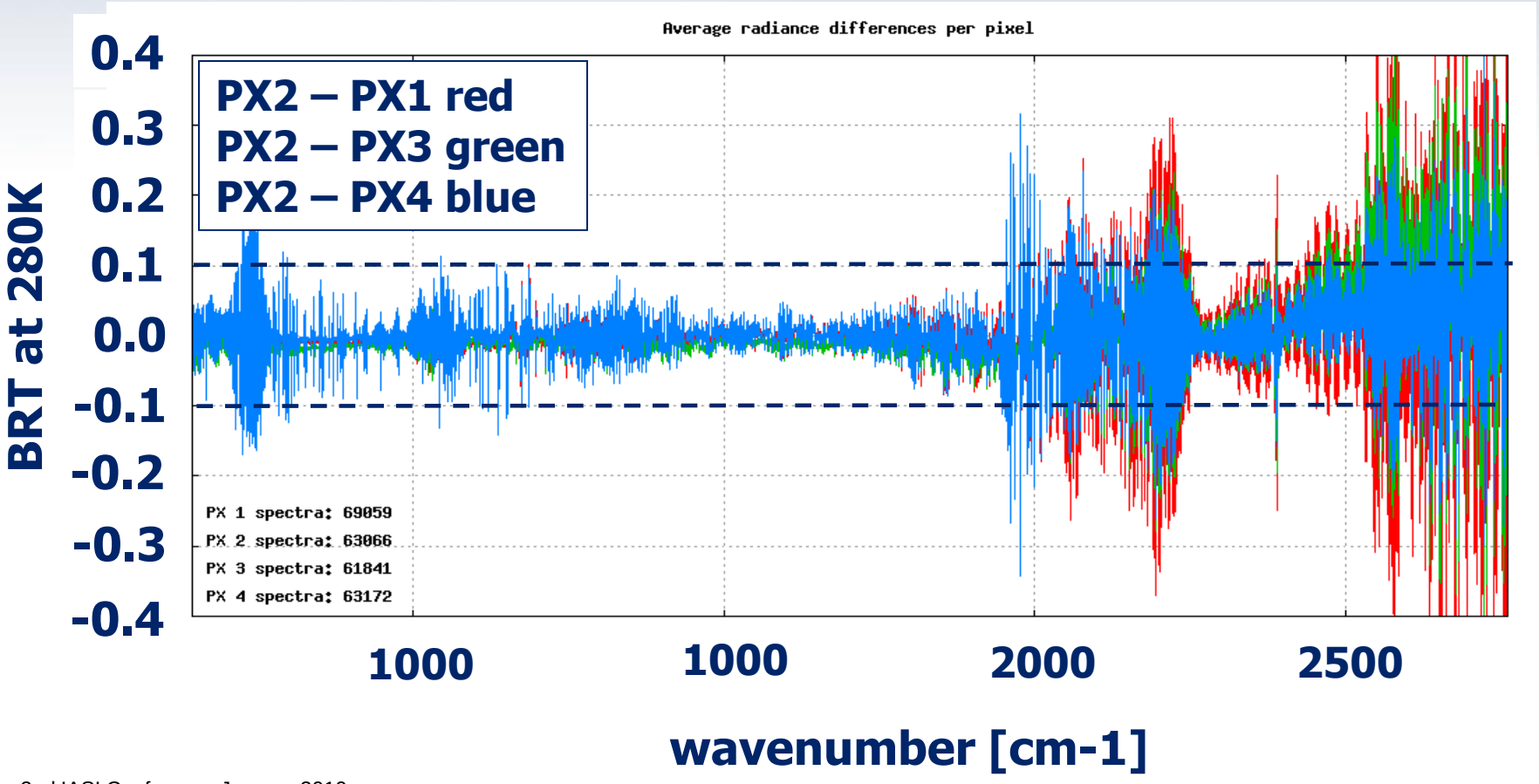
IASI RM: without 40°N to 0°N and 30°E to 75E

Brightness Temperature at 280K



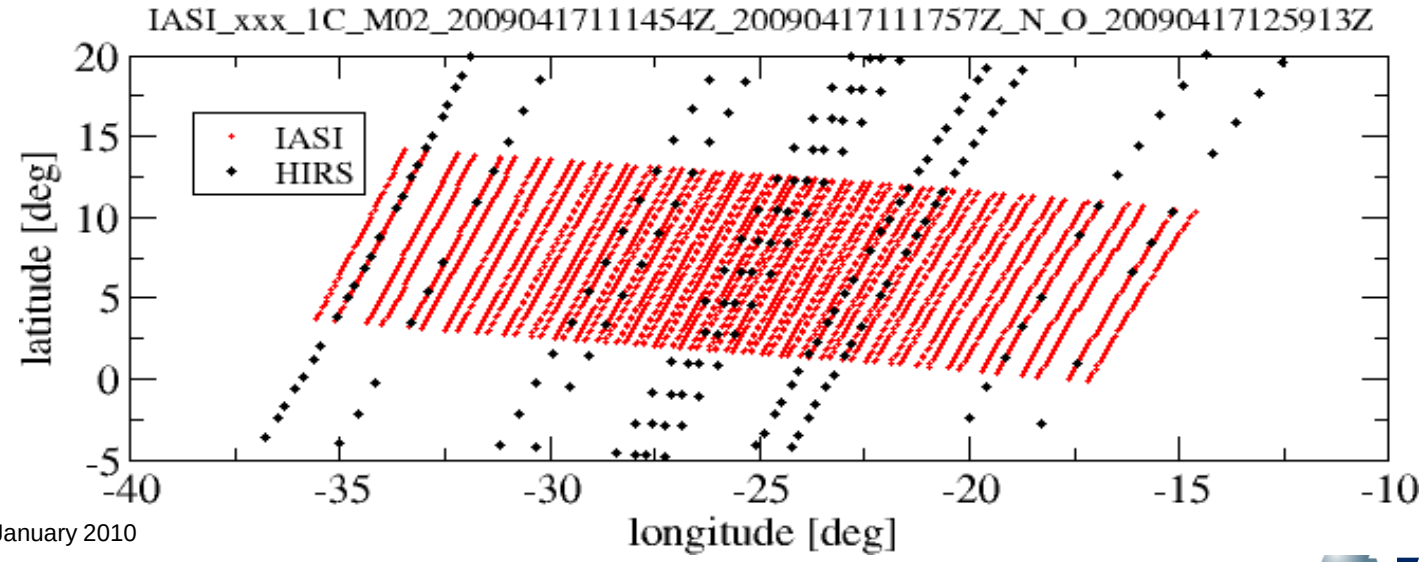
Average double differences between the 4 IASI pixel (IFOV)

$(Obs-Cal)_{PX2} - (Obs-Cal)_{PXi}$

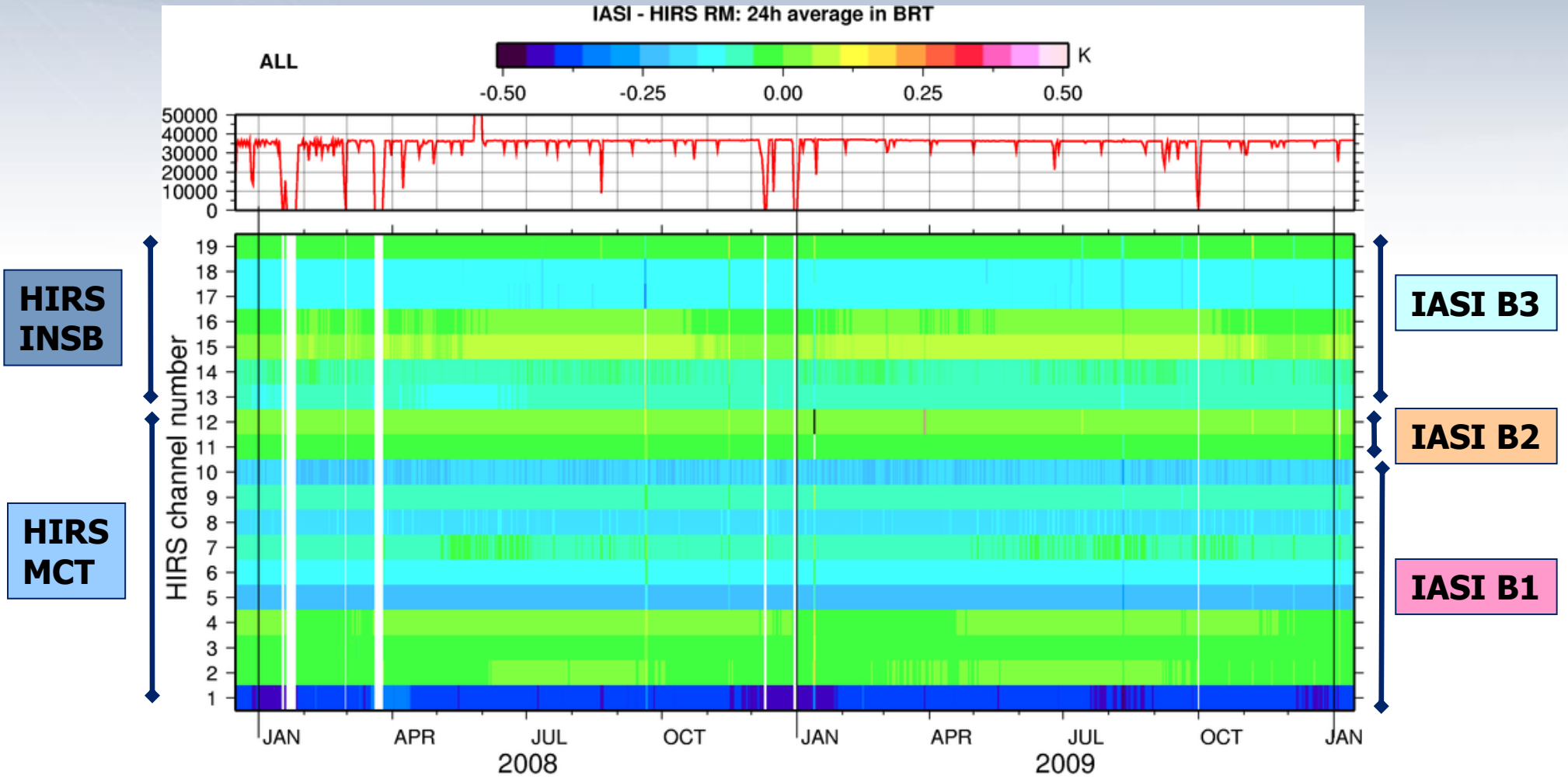


IASI - HIRS radiance monitoring set up

- IASI and HIRS co-location criteria is 3 km distance
- All situations (land, sea, day, night, etc.) are collected
- HIRS spectral response function convolved with IASI L1C provide the HIRS pseudo channels
- Cloud cover of IASI FOV based of co-located AVHRR L1B cloud flag
- IASI versus HIRS NRT monitoring started end of May 2008



IASI-HIRS 24h average radiance bias in BRT



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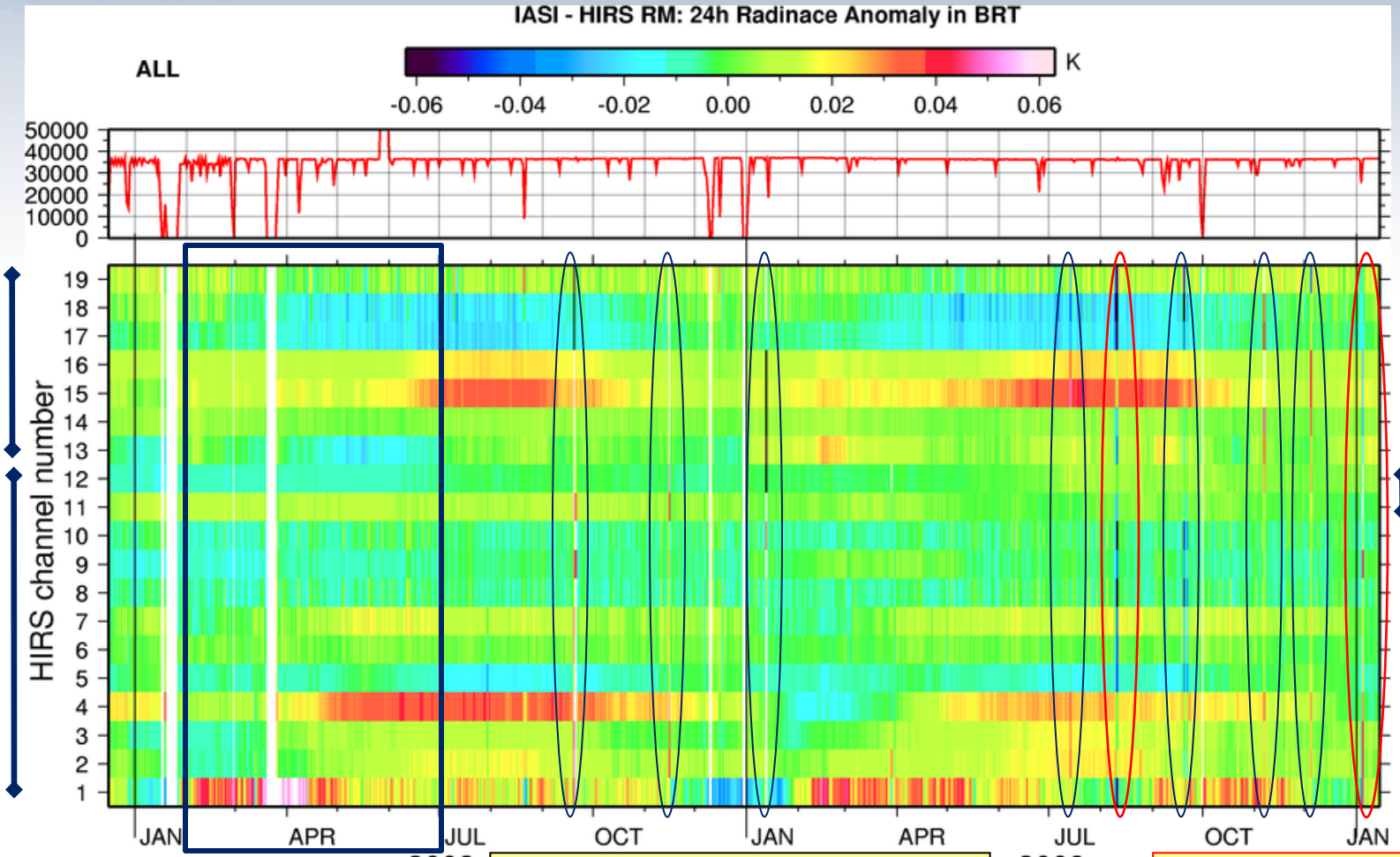
IASI-HIRS 24h average radiance anomaly in BRT



HIRS INSB

HIRS MCT

IASI B3

IASI B2

IASI B1

IASI decontamination

Moon in Cold Space of HIRS

IASI L1 PPF related

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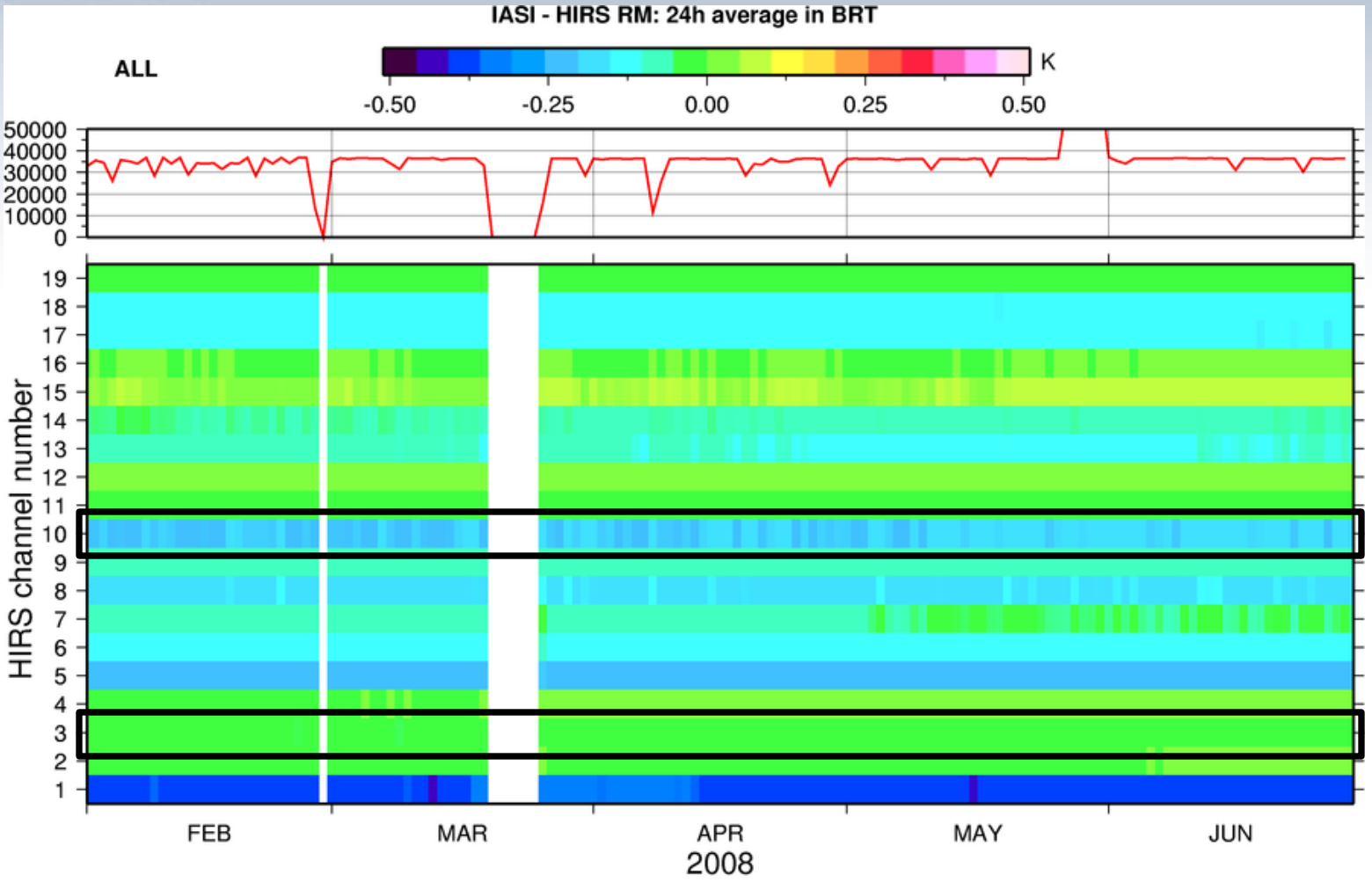
IASI-HIRS radiance bias at IASI decontamination 2008



IASI decontamination

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Conclusions

- The IASI radiance monitoring shows small and stable differences between IASI observations and calculations (NWP and RTIASI-4).

- IASI – HIRS L1 product comparison shows very good agreement all differences are well within specifications.
  - IASI and HIRS show a very stable in-orbit performance
  - The IASI decontamination in March 2008 had no impact on radiance bias.

- Systematic radiance bias changes in the operational phase were not related to the IASI instrument.

- Small degradation of products for few minutes during the moon avoidance on the 10/11th August 2009 and 3/4th January 2010 were related to IASI L1 PPF.
  - A software patch is in preparation for March 2010.
- The excellent instrument stability and accuracy of the spectral calibration reveals a small radiance differences between the 4 IASI pixel on a few number of IASI channels mainly in Band 3.
  - A on-ground parameter update is scheduled for February/March 2010.

IASI L1C Day-2 product evolution

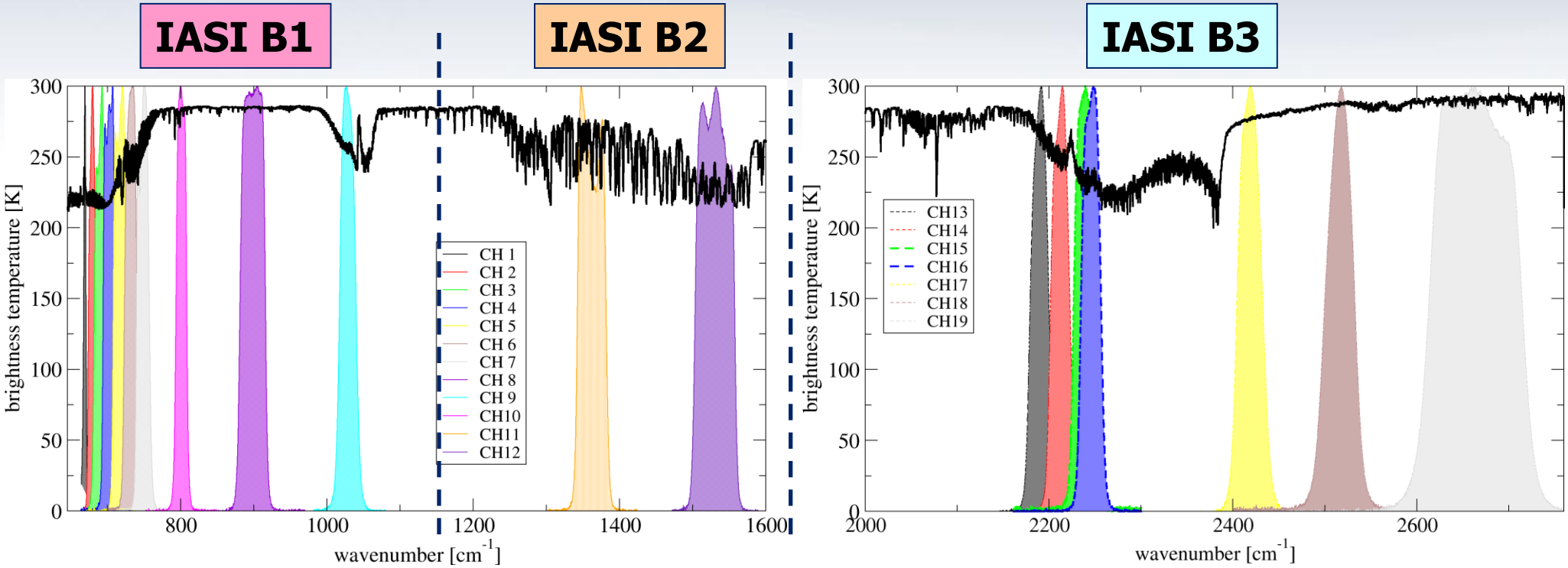
- New L1C product content:
  - Land, cloud and sea-ice fraction within the IASI IFOV, average of AVHRR L1B
  - IASI Band dependent Boolean quality flag
  - A detailed IASI system quality flag
  - Scene homogeneity information (IIS average and variance)

- New IASI L1 PPF Day-2 version will become operational in March/April 2010

HIRS spectral response functions of channels 1 to 19

HIRS MCT Detector

HIRS InSb Detector



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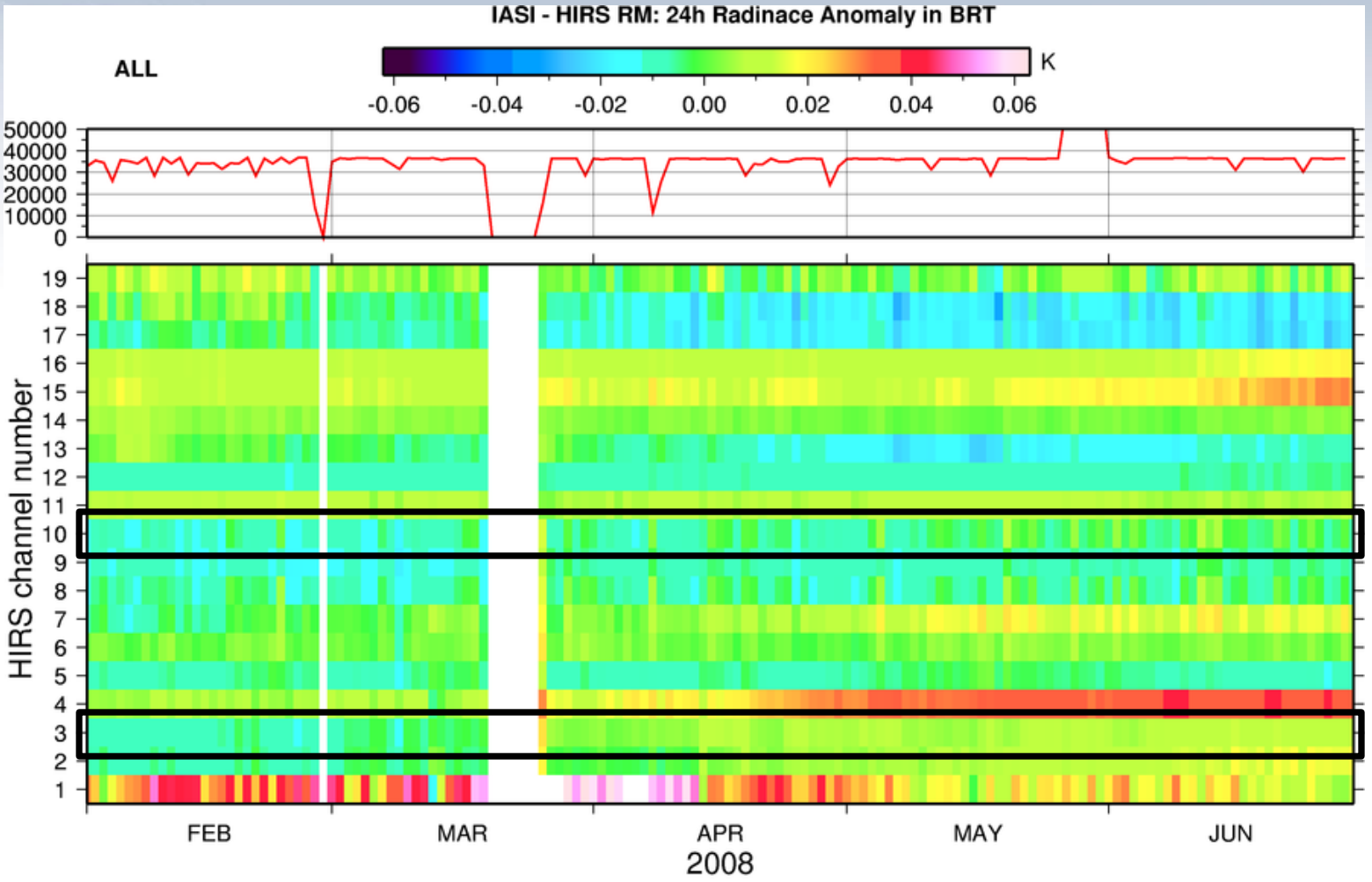
Radiance anomaly at IASI decontamination 2008



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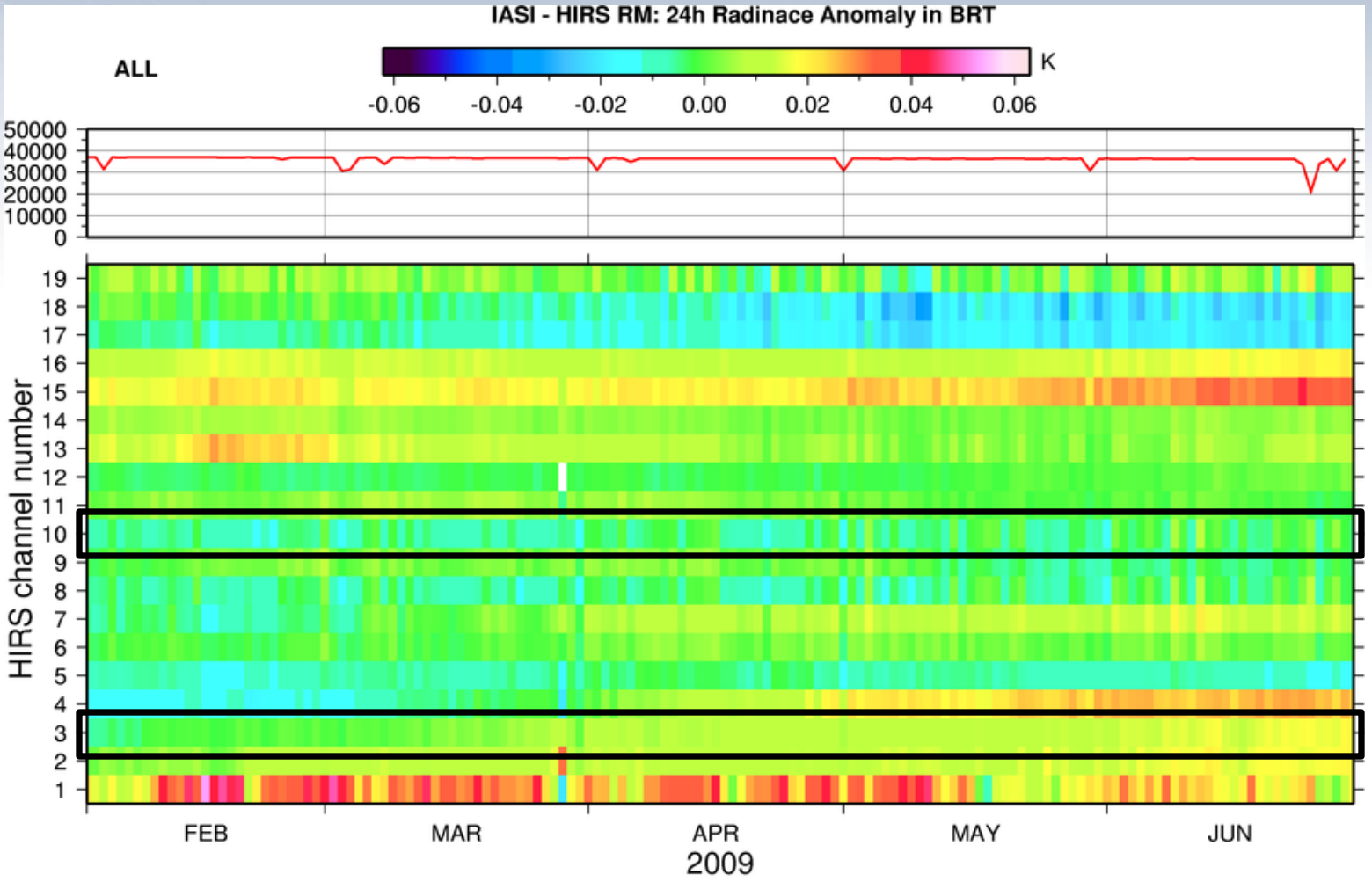
Same month in 2009



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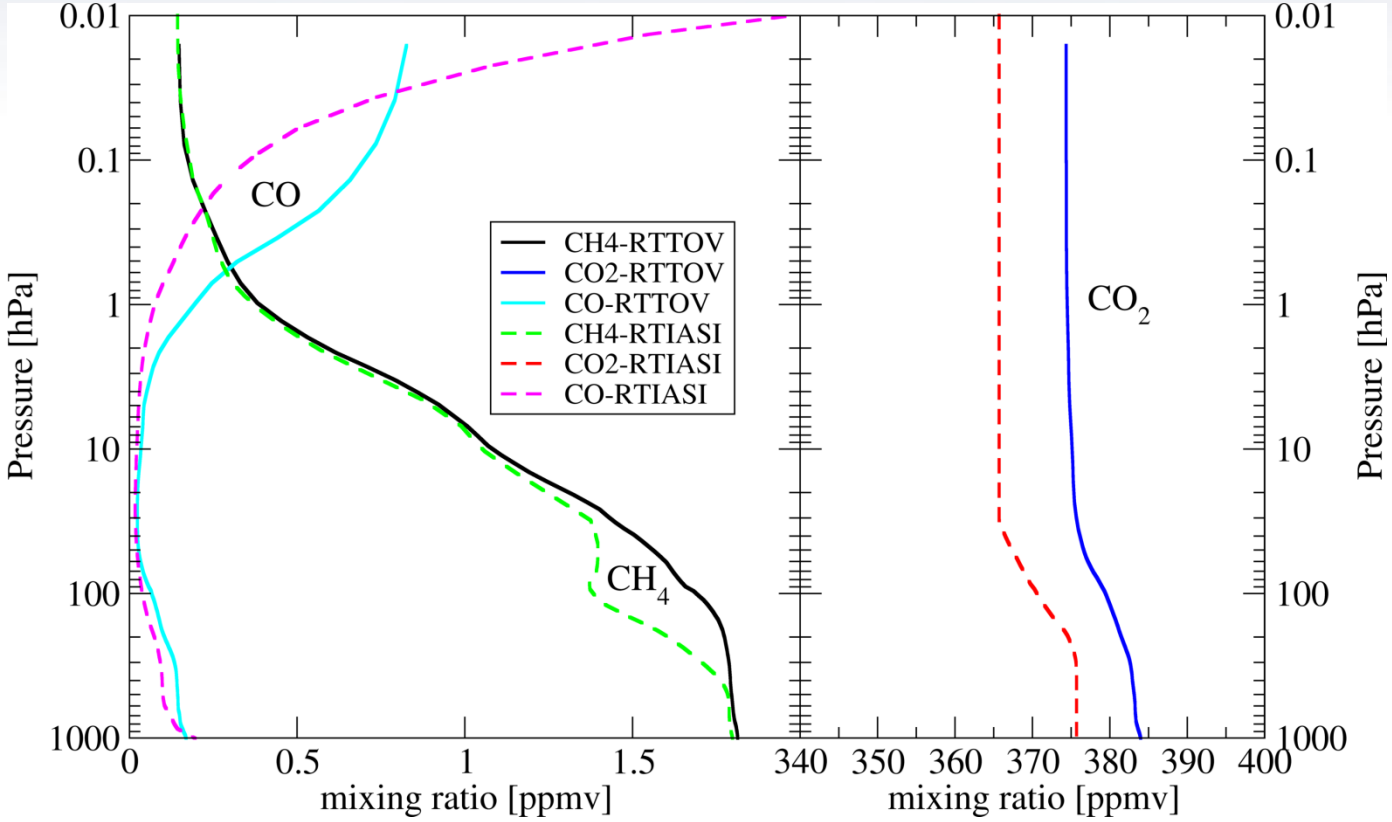
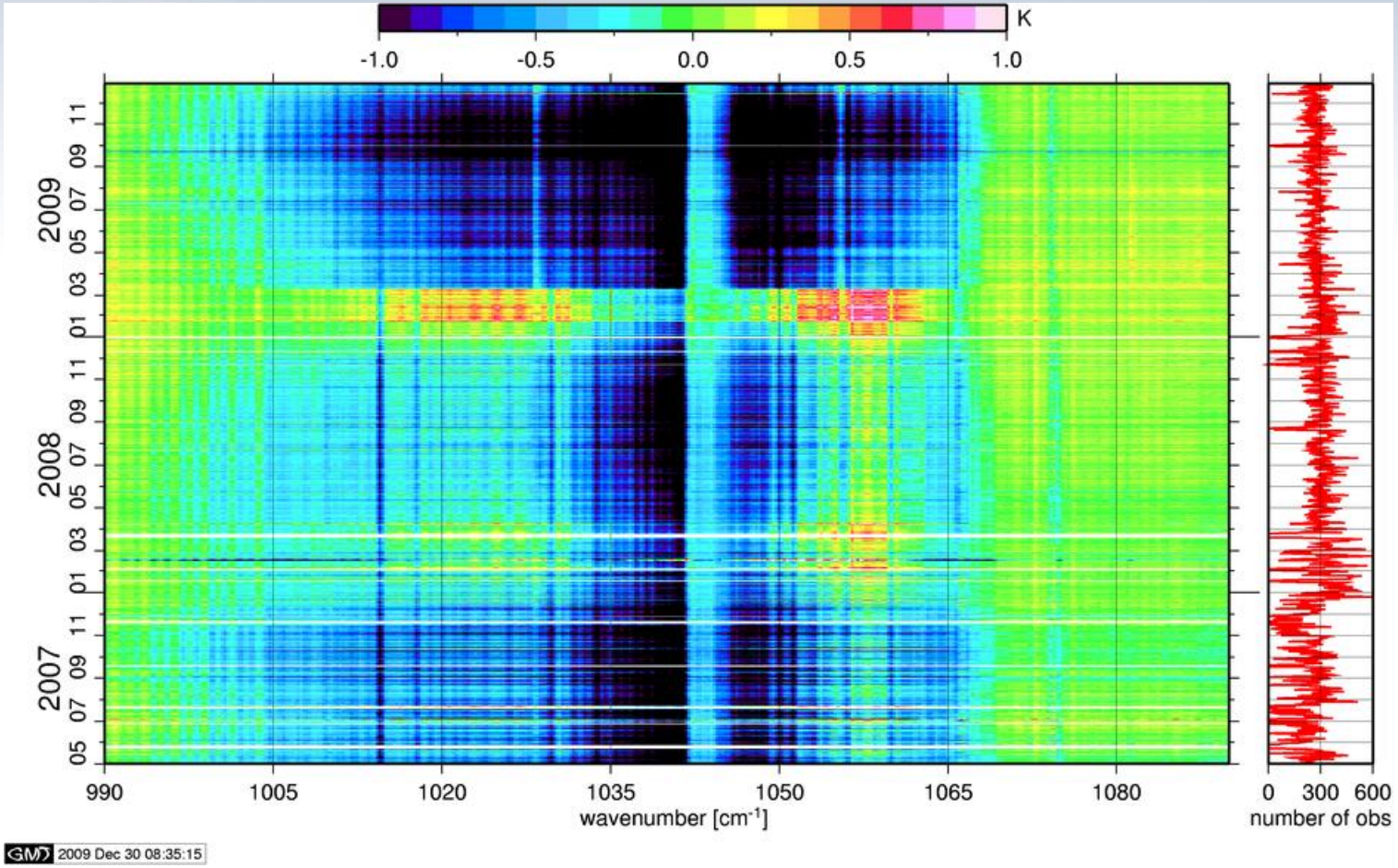
RTIASI-4 and RTTOV-9.3 set up: Trace Gases

- CH4, CO, CO2 and N2O are constant
- O3 profiles taken from ECMWF
- SST based on AVHRR L1B

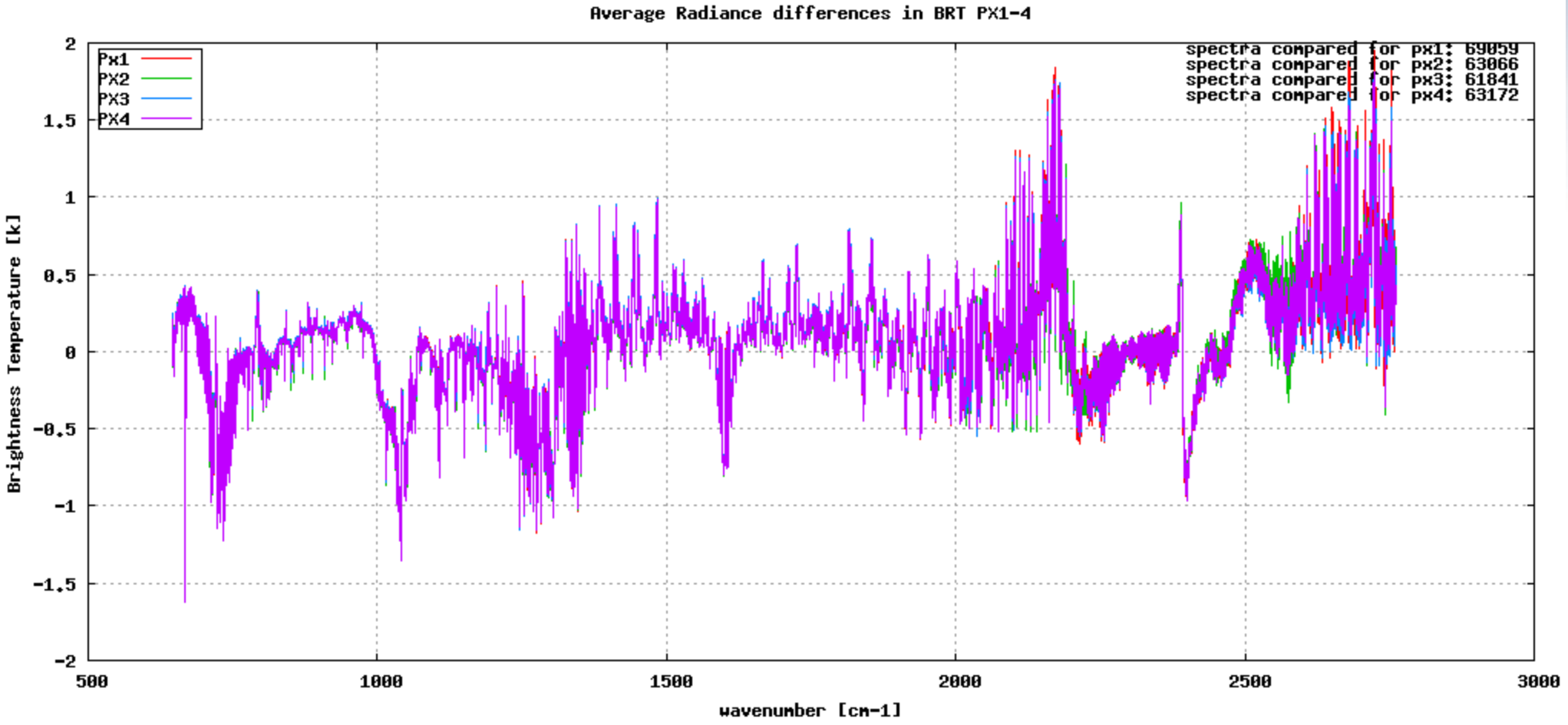


IASI NWP based Radiance Monitoring – O_3

Brightness Temperature at 280K



Average radiance bias (OBS-CAL) for Pixel 1 to 4



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