



# Implementing Inter-calibration of Meteosat with IASI

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# IASI and/or AIRS as a reference?

**EUMETSAT: Meteosat-IASI**

**NOAA: AIRS-IASI**

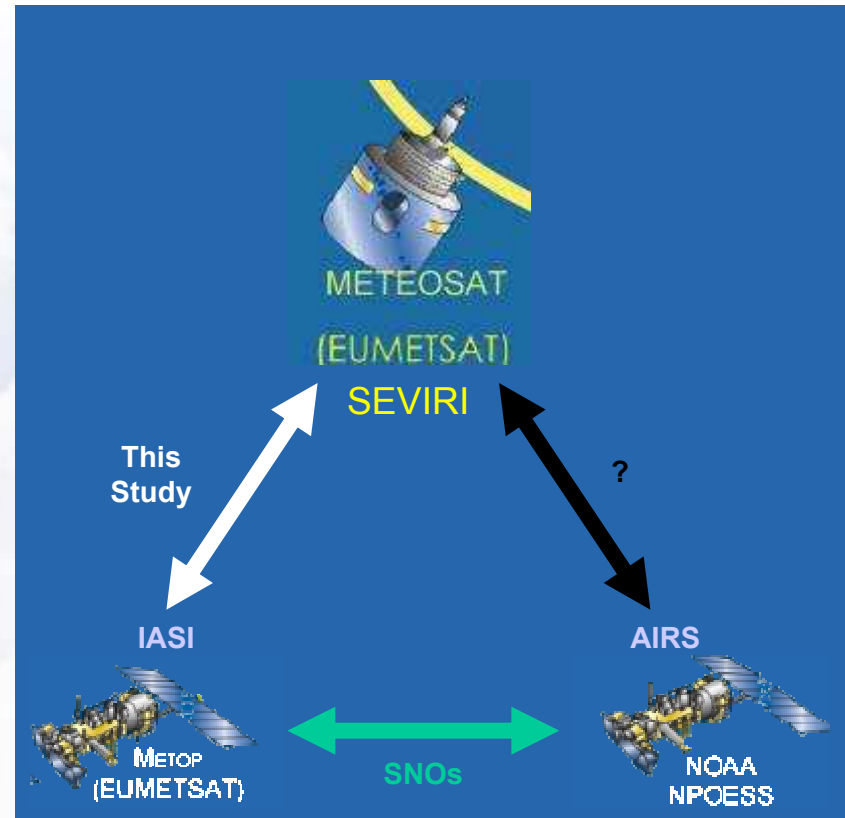
**IASI has no spectral gaps**

**IASI + HIRS/4 on same platform**

**A lot of work for us to  
complete the triangle:**

**Meteosat-AIRS**

**(Integrity check)**





# Collocation Criteria

## Meteosat First Generation

$\Delta Lat < 30^\circ$ ,  $\Delta Lon < 30^\circ$  of SSP

$\Delta t < 30$  mins (=scan period)

$|\theta| < 15^\circ$  (Incidence angle)

$\Delta\theta < 2^\circ$  (Incidence angle diff.)

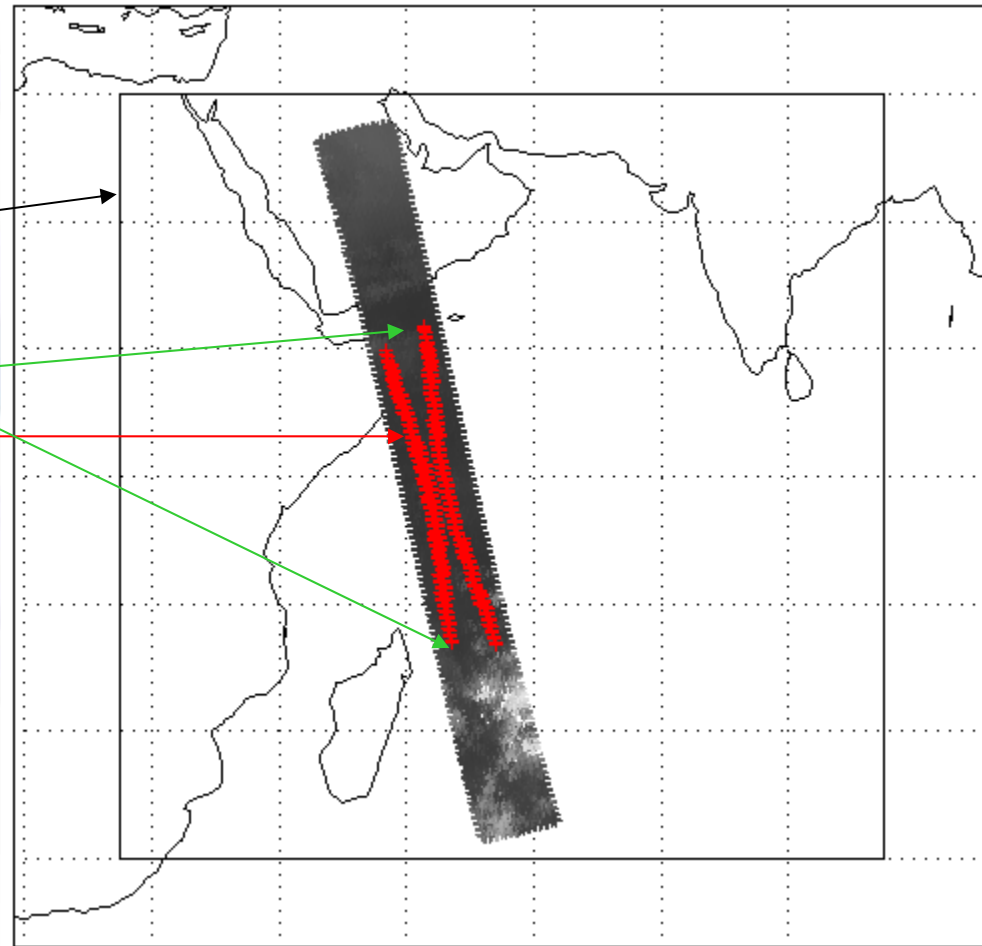
3x3 MFG pixels / IASI iFoV

### Filtering:

No filtering ~400 pts

$\sigma T_b(\text{MFG}) < 0.5\text{K}$  ~50 pts

$\sigma L(\text{MFG}) < 5\% L_{REF}$  ~200 pts





# New Radiance Definition

**Marianne told us all about the new radiance definition  
ECP833 also includes changes to non-linearity  
corrections**

**As a temporary work around for 2007 data,  
needed to ensure consistent definition of radiance:**

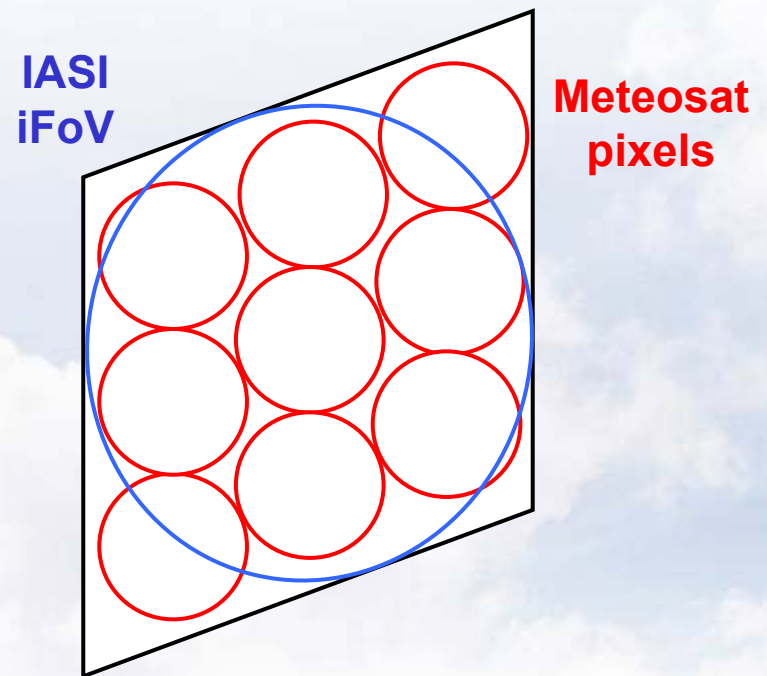
- Read in old IMPF-defined radiances**
- Convert to brightness temperatures**
- Convert back to effective radiances**



# Uncertainty due to Spatial Variability

**Estimate uncertainty  
due to spatial variability  
as Standard Deviation of  
Meteosat pixels within  
collocated IASI iFoVs**

**Use as error bars in  
weighted regression**

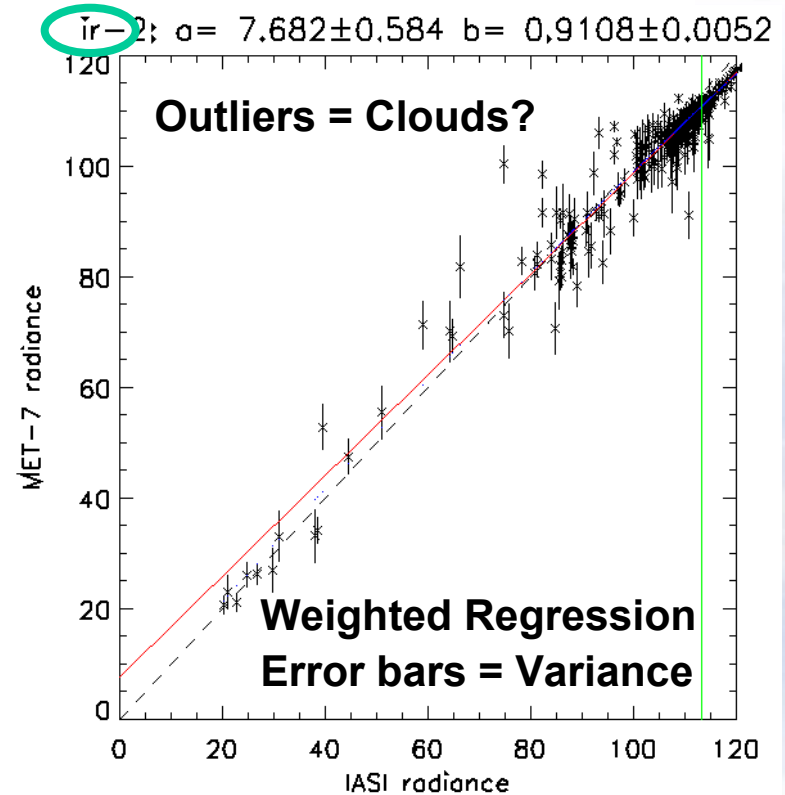
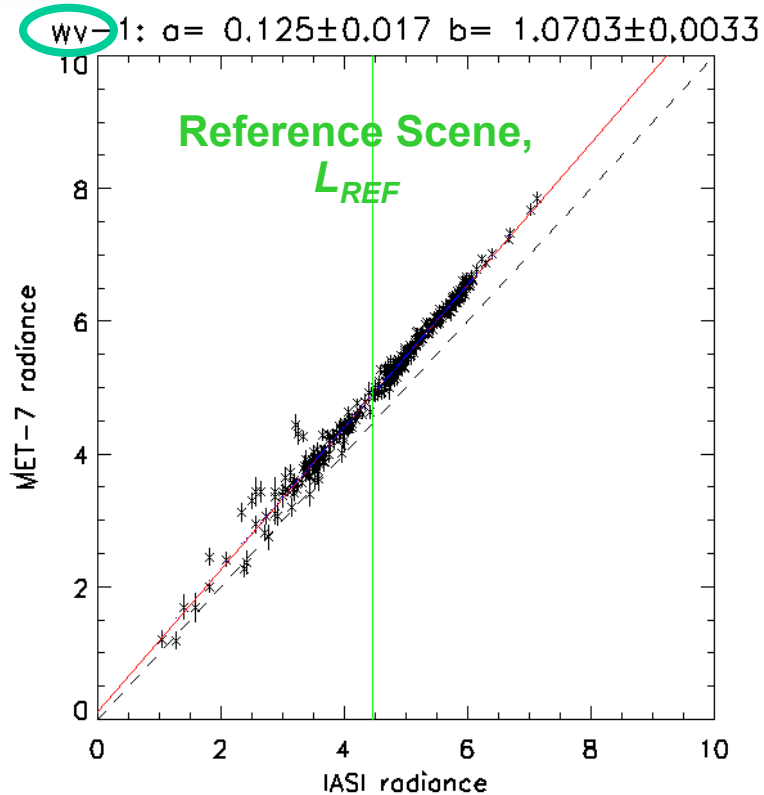






# Weighted Regression of Meteosat v IASI

Offset  $\neq$  0 Slope  $\neq$  1  $\Rightarrow$  Difference is scene-dependent



# Non-linearity

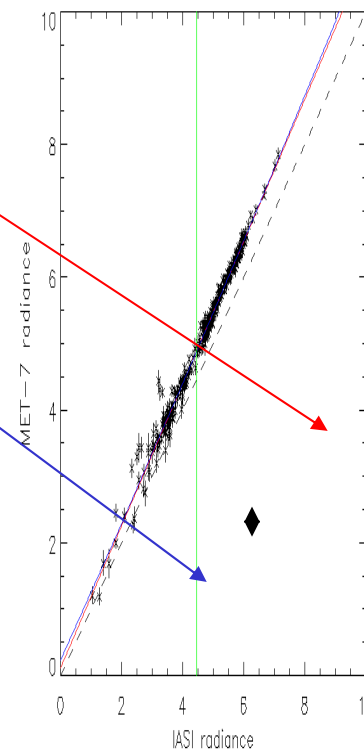
Compare **linear regression**  
with **quadratic fit**:

V. little difference at ref. scenes  
<0.05K

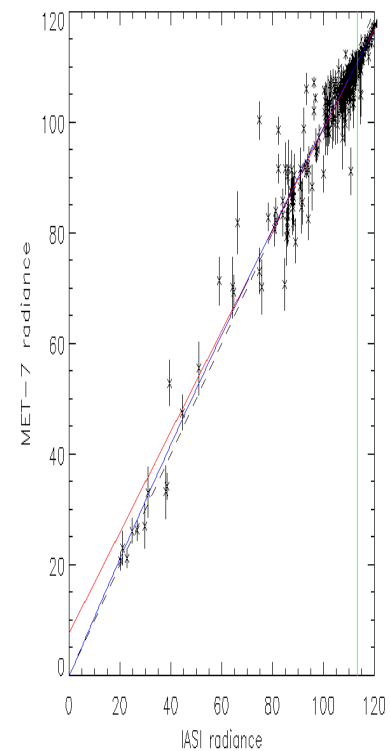
Difference increases for low  $T_b$   
As expected for non-linear errors  
Only significant for MSG 7.3 $\mu$ m  
channel and still <1K at  $T_b=220$ K

But differences are v. variable  
Error bars currently  
underestimated

wv-1:  $a = 0.125 \pm 0.017$   $b = 1.0703 \pm 0.0033$



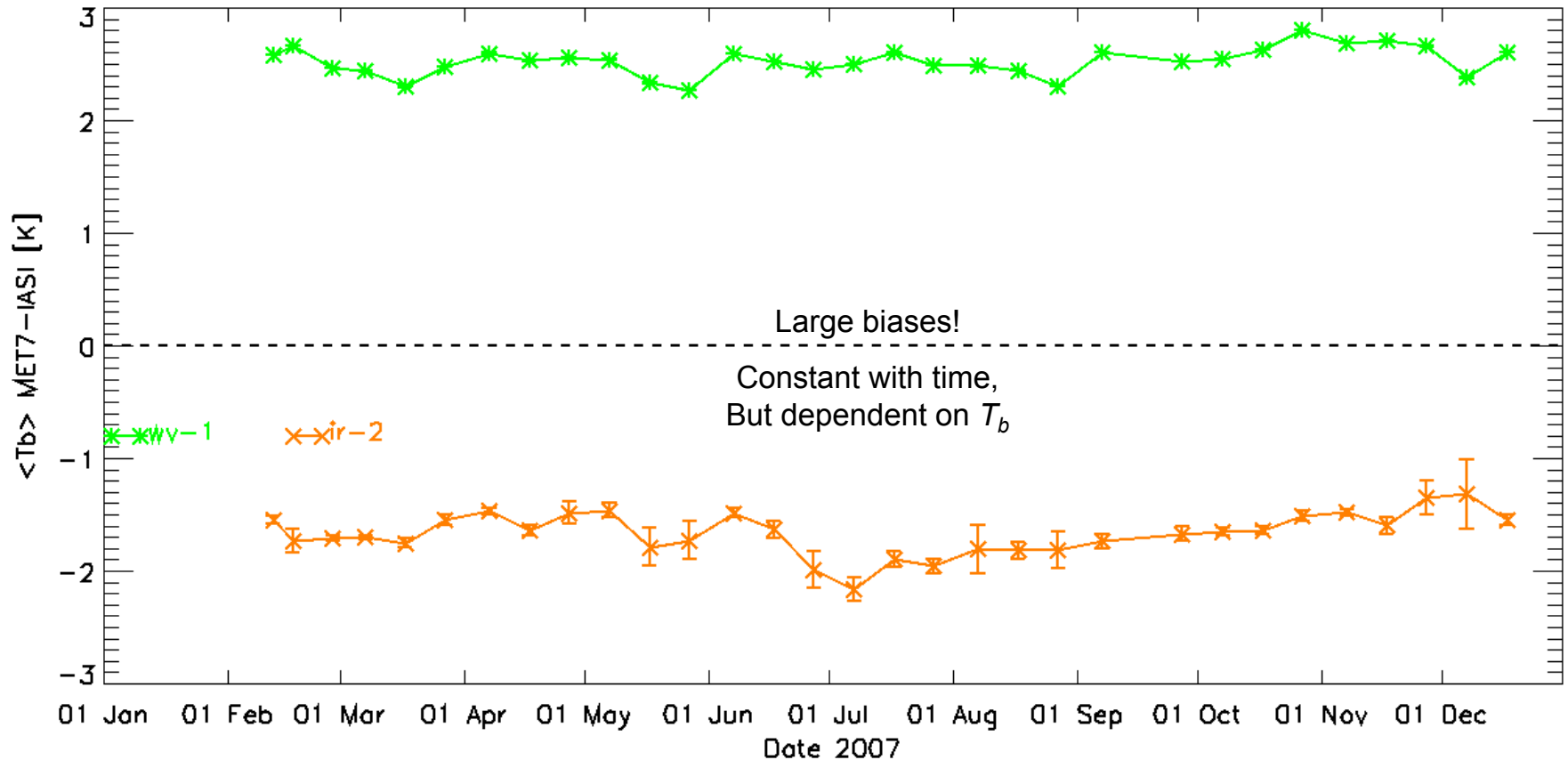
ir-2:  $a = 7.682 \pm 0.584$   $b = 0.9108 \pm 0.0052$







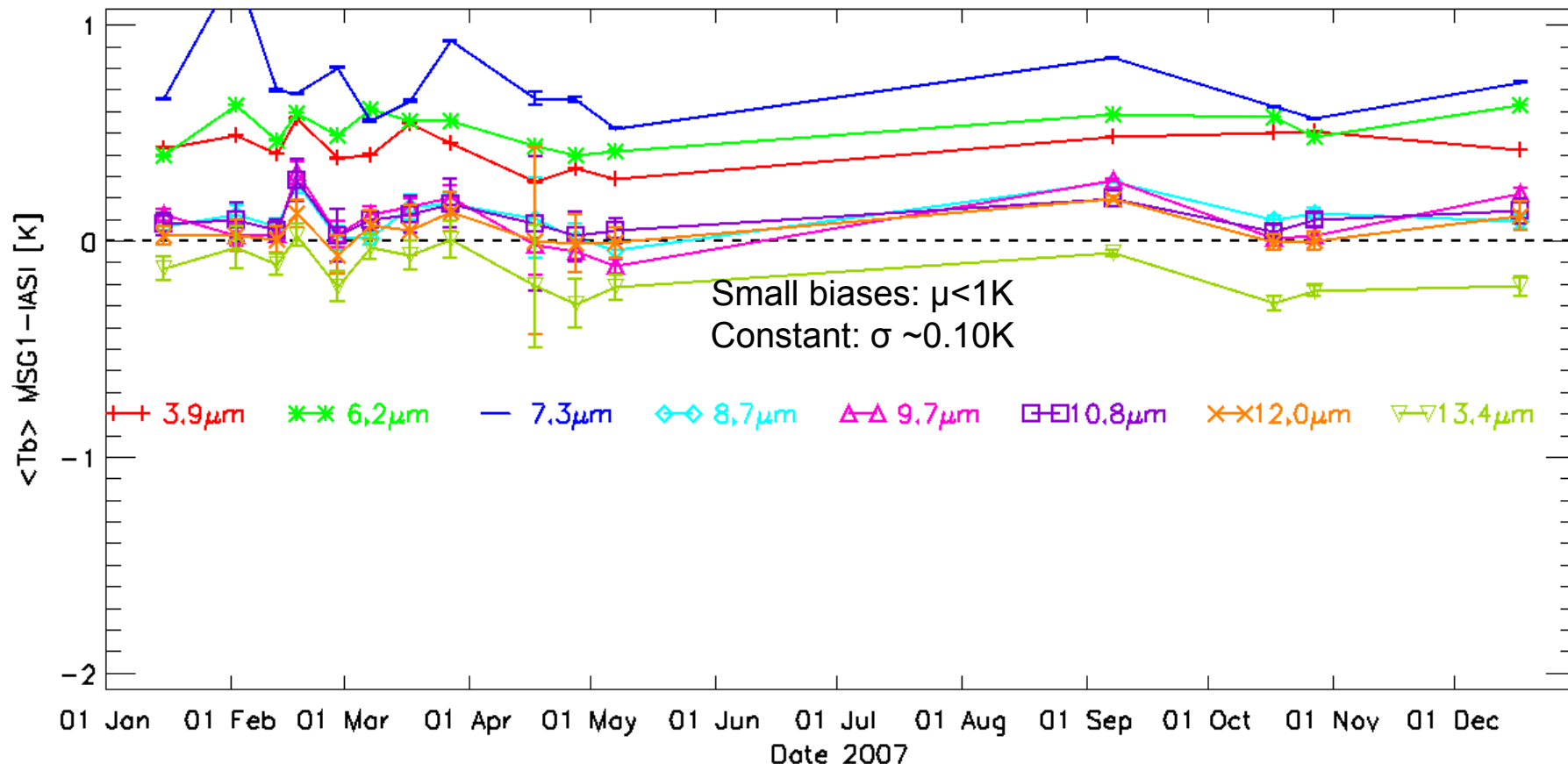
# MVIRI on Meteosat-7 – IASI on Metop



**Time series of brightness temperature differences between Met7-IASI for typical clear-sky radiances: Each Met7 infrared channel is shown in a different color, with different symbols, following the legend. Error bars represent statistical uncertainty on each mean bias (may be very small).**

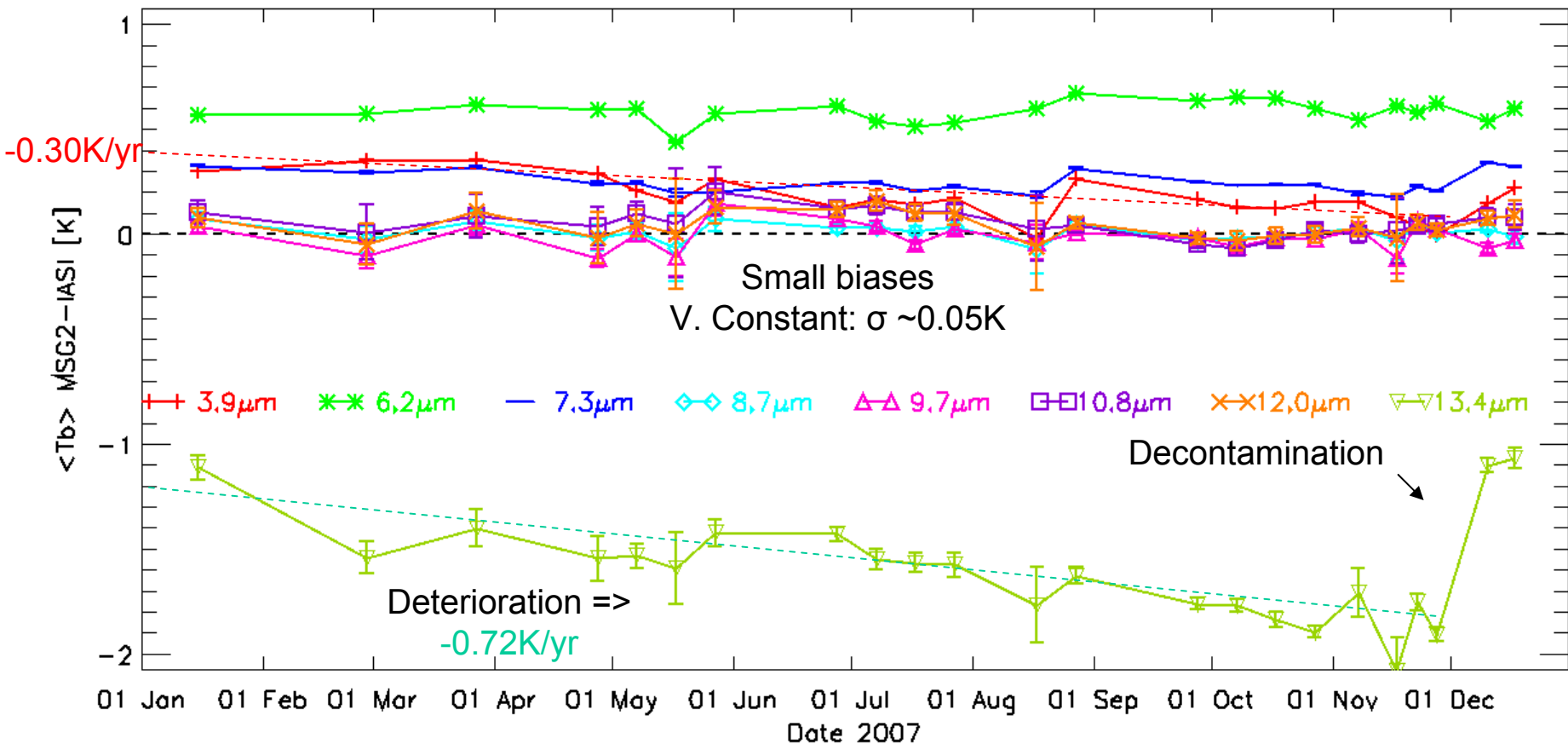
# SEVIRI on Meteosat-8 – IASI on Metop

n.b. Different scale!



Time series of brightness temperature differences between MSG1-IASI for typical clear-sky radiances. Each MSG infrared channel is shown in a different color, with different symbols, following the legend. Error bars represent statistical uncertainty on each mean bias (may be very small).

# SEVIRI on Meteosat-9 – IASI on Metop



Time series of brightness temperature differences between MSG2-IASI for typical clear-sky radiances. Each MSG infrared channel is shown in a different color, with different symbols, following the legend. Error bars represent statistical uncertainty on each mean bias (may be very small).



# EUMETSAT Inter-calibration Plans: 2008

## **IASI – Meteosat intercalibration:**

**Investigate impact of MSG radiance definition**

**Include temporal variability in error propagation**

**Investigate angular dependence using Rapid Scan at ~40°N**

**Compare with NWP bias monitoring statistics**

**Assess collocation requirements – WV, window, O<sub>3</sub> channels**

## **Extend inter-calibration to HIRS:**

**Compare HIRS/4-IASI on Metop-A**

**Compare HIRS-Meteosat-8 and -9**

**Build-up time series with older HIRS and MVIRI**

## **Set-up GSICS Data and Products server**