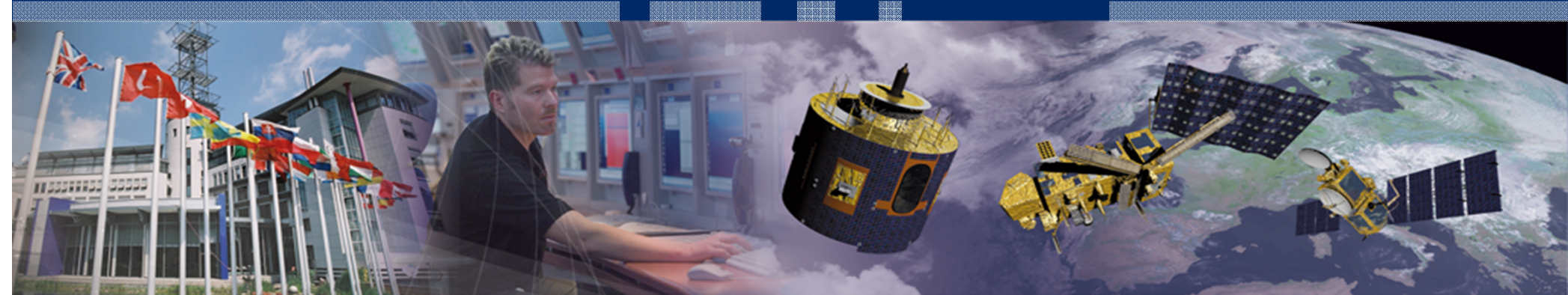




# Towards a consolidated MTG-IRS L2 processor

Stephen Tjemkes, Xavier Calbet, Alessio Lattanzio,  
Rolf Stuhlmann





# Meteosat Third Generation Infrared Sounder (MTG-IRS)

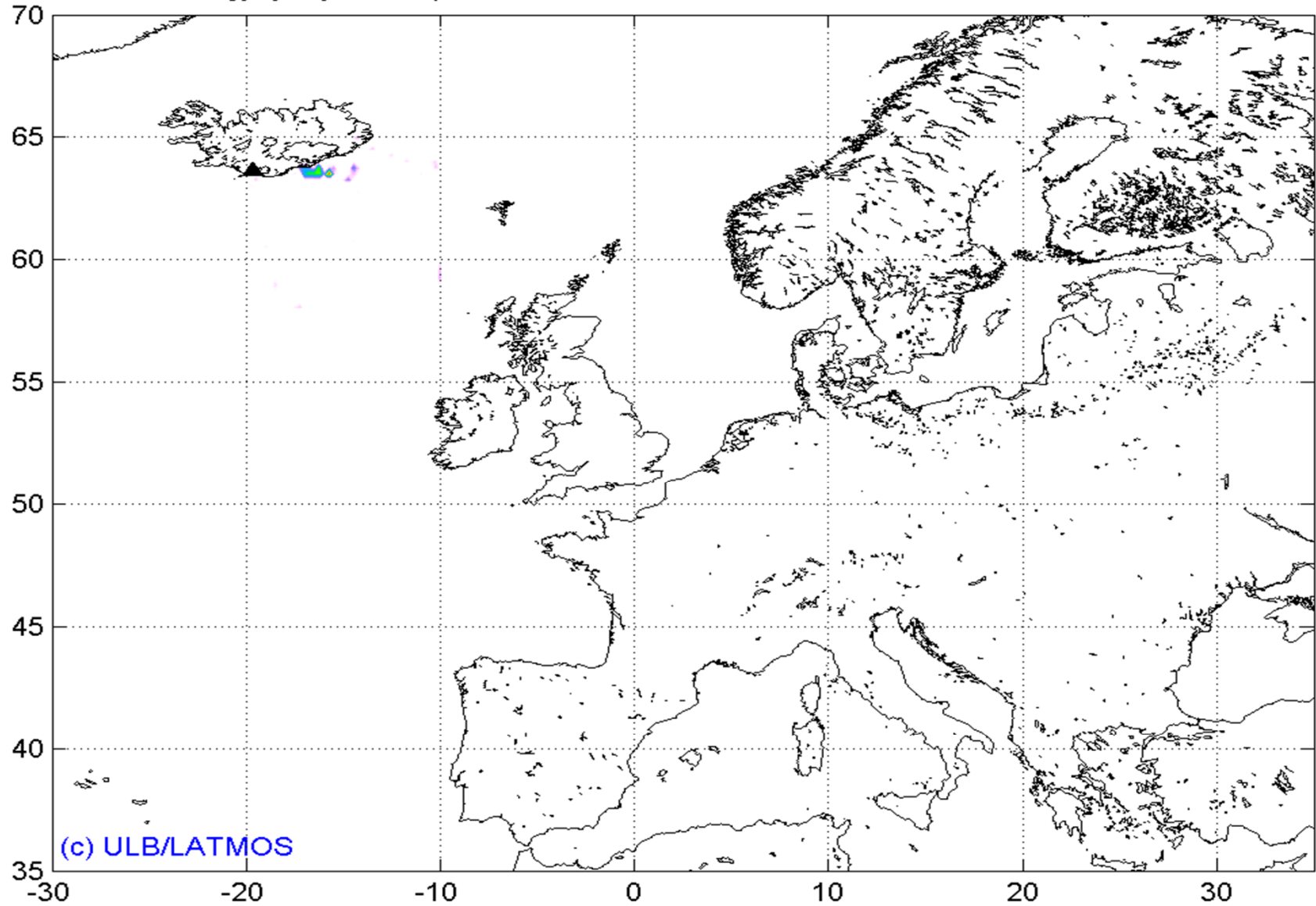
## Primary Mission Objective:

To provide high spatial and temporal resolution observations of atmospheric state, in particular moisture .

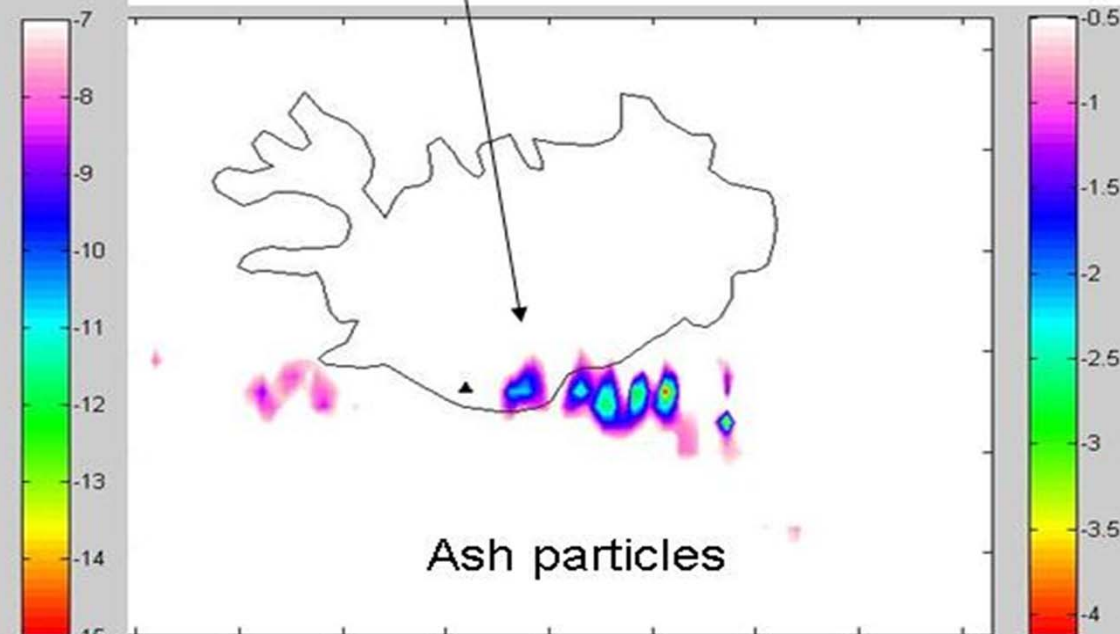
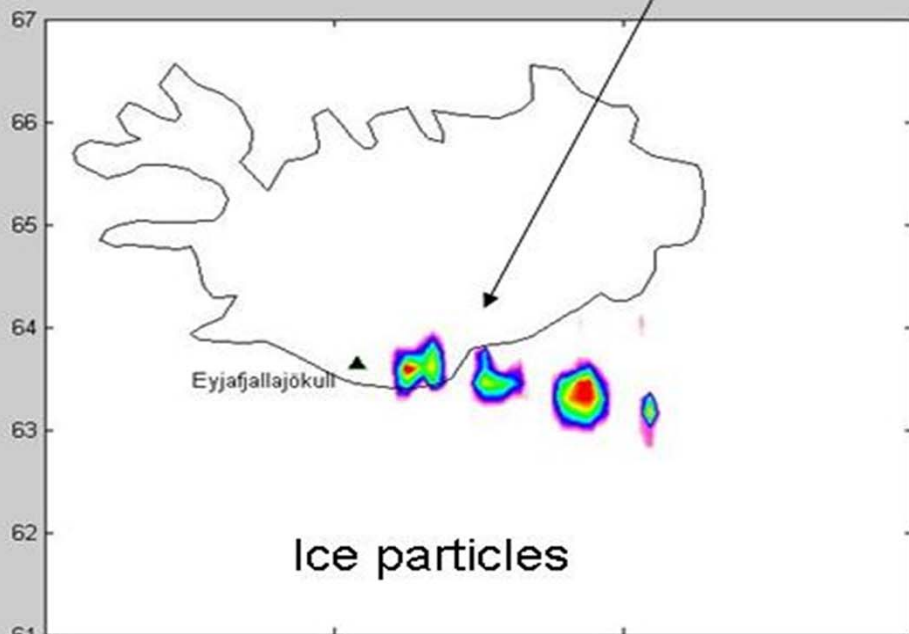
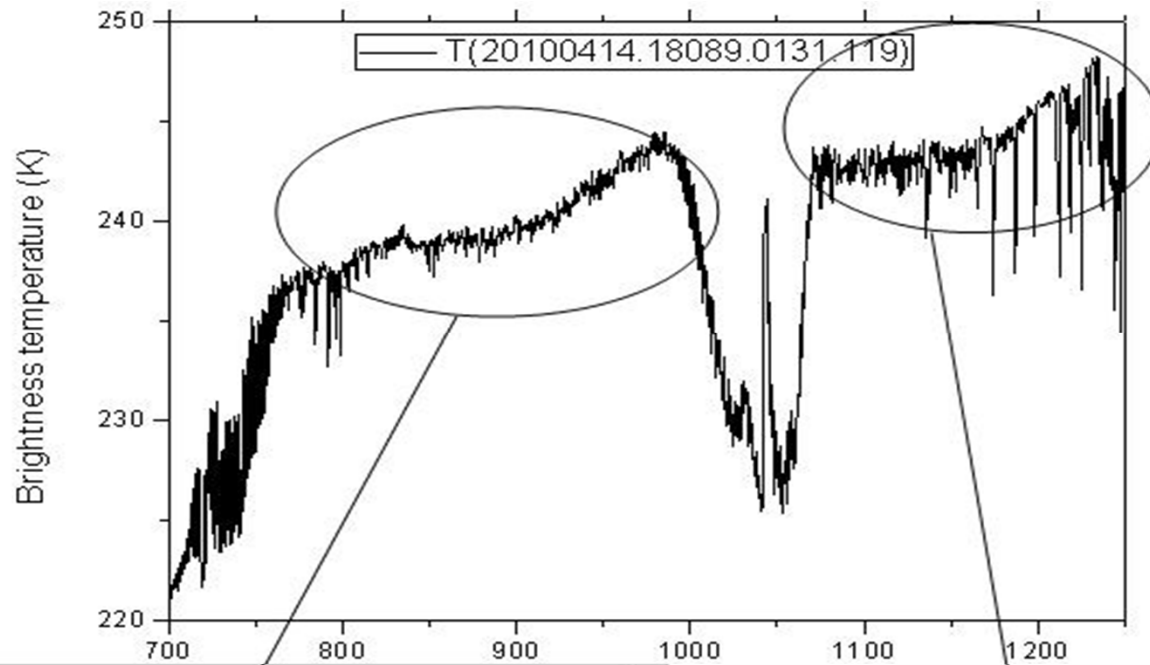
## Further Mission Objective:

**Eyjafjallajökull lässt grüssen**

Eyjafjallajökull eruption - IASI Ash radiance index - 14.04.2010 ~22h UTC



Cathy Clerbaux, Lieven Clarisse, P. Coheur, D. Hurtmans



Cathy Clerbaux, Lieven Clarisse, P. Coheur, D. Hurtmans 



# Meteosat Third Generation Infrared Sounder (MTG-IRS)

## **Instrument Characteristics:**

**FTS, large detector array, integration time of 10 sec.**

**Large data volume: approx. 2500 spectra / sec.**

**(cf. IASI: 15 spectra / sec)**

# Development of L2 Concept

Why ?



# Issues being considered

## General Processing Issues:

- Use of compact representation of radiances (PCA)

- Apodisation

- Channel Selection

## Data Acceptance

## Specific Scene Analysis

## Pre-Processing

- Surface Properties retrieval

- Specific Statistical retrieval method to generate First Guess

## Iterative Retrieval

- Background state and covariance for iterative retrieval

- Forward model errors

- How to handle CO and O3

## Specific Quality Indicators

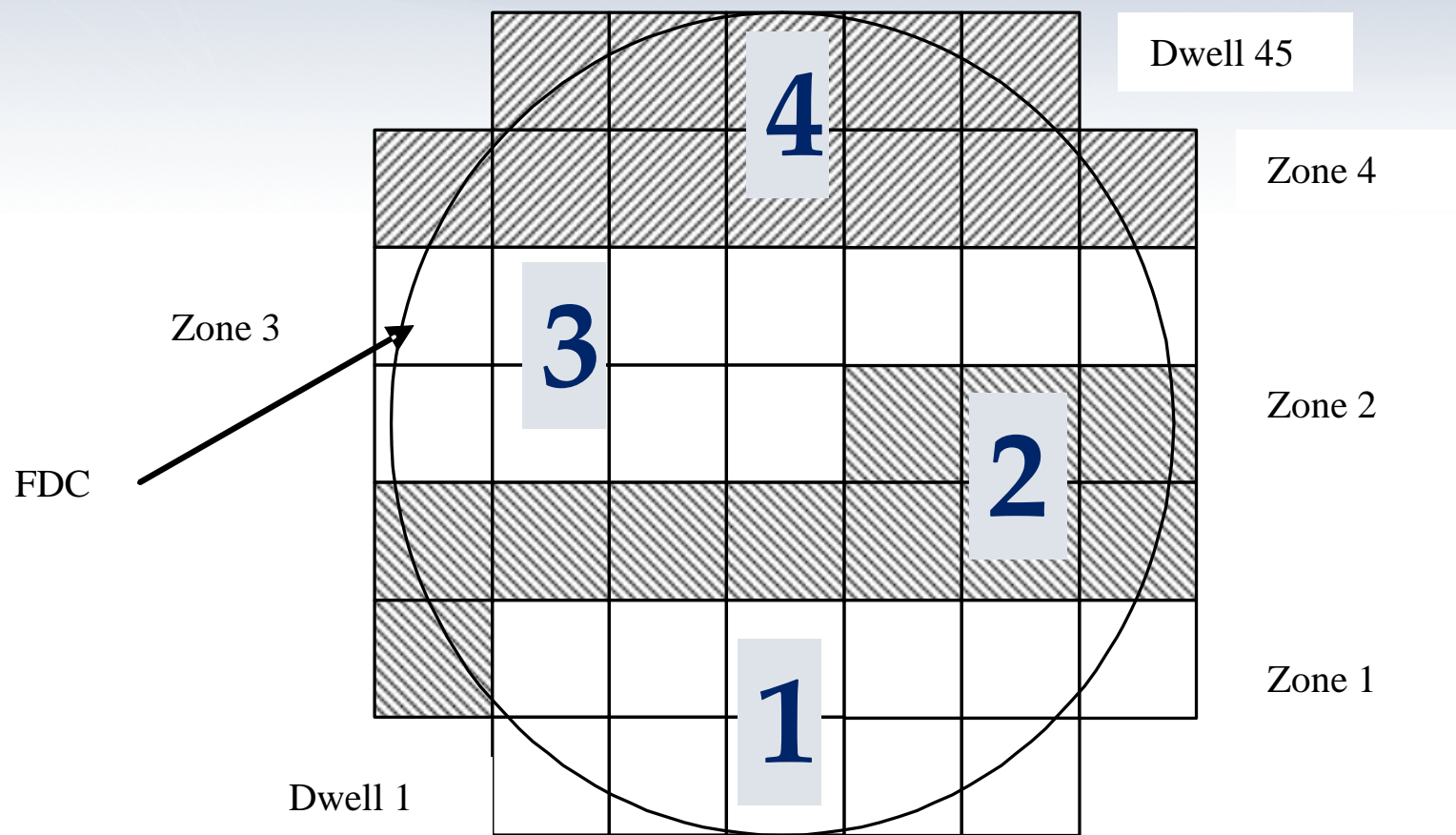
# Examples

## Data Acceptance





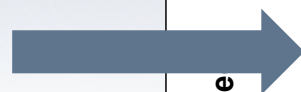
# Four 15 min scan zones.



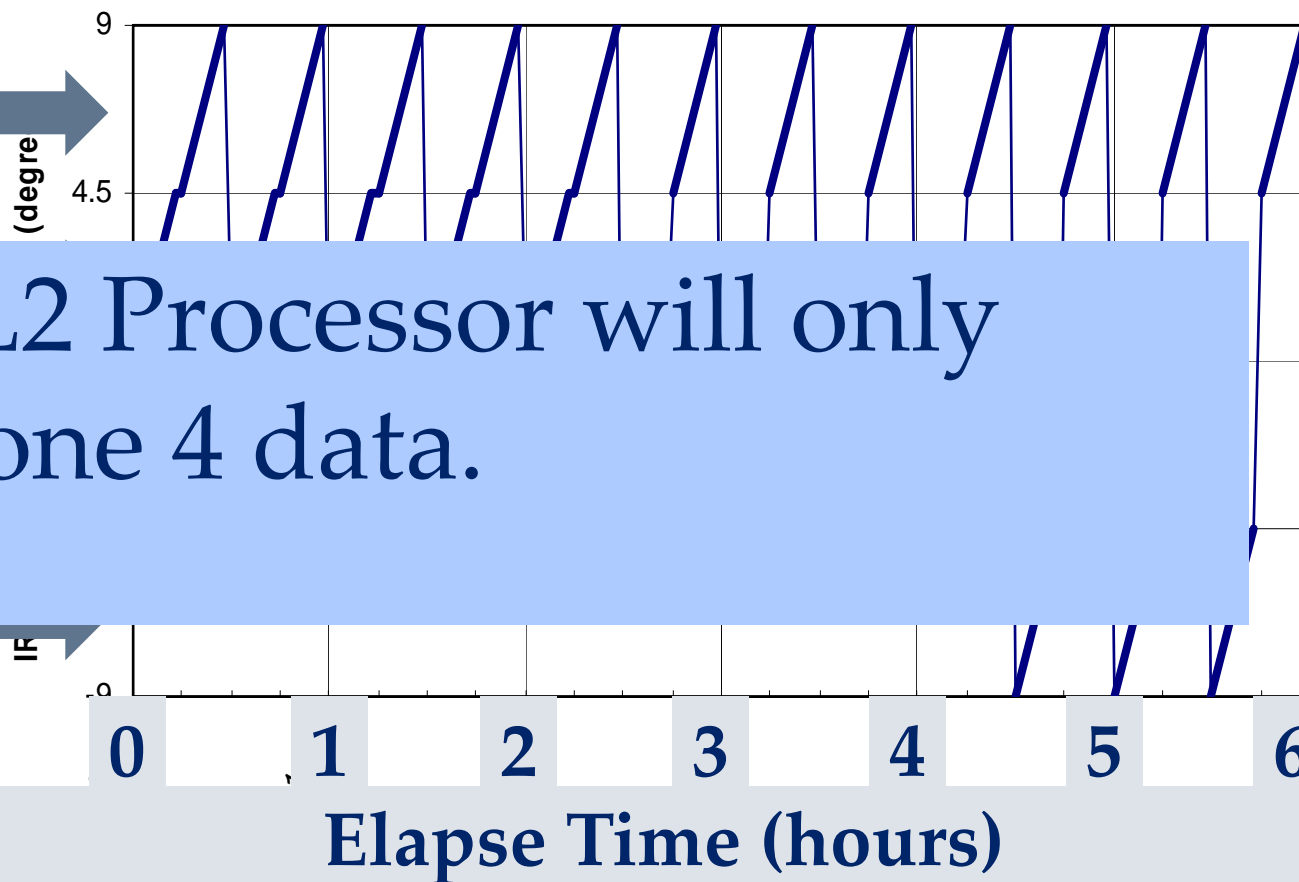


# Zone 4 observed in 15 min every other 15 min

Zone 4



Operational practice for IRS scanning pattern



# Development of L2 Concept

## How ?



# How (1): MTG-IRS Science Team (MIST)

P. Antonelli (SSEC)

N. Bormann (ECMWF)

G. Camps-Valls (Univ. Valencia)

S. English (Met Office)

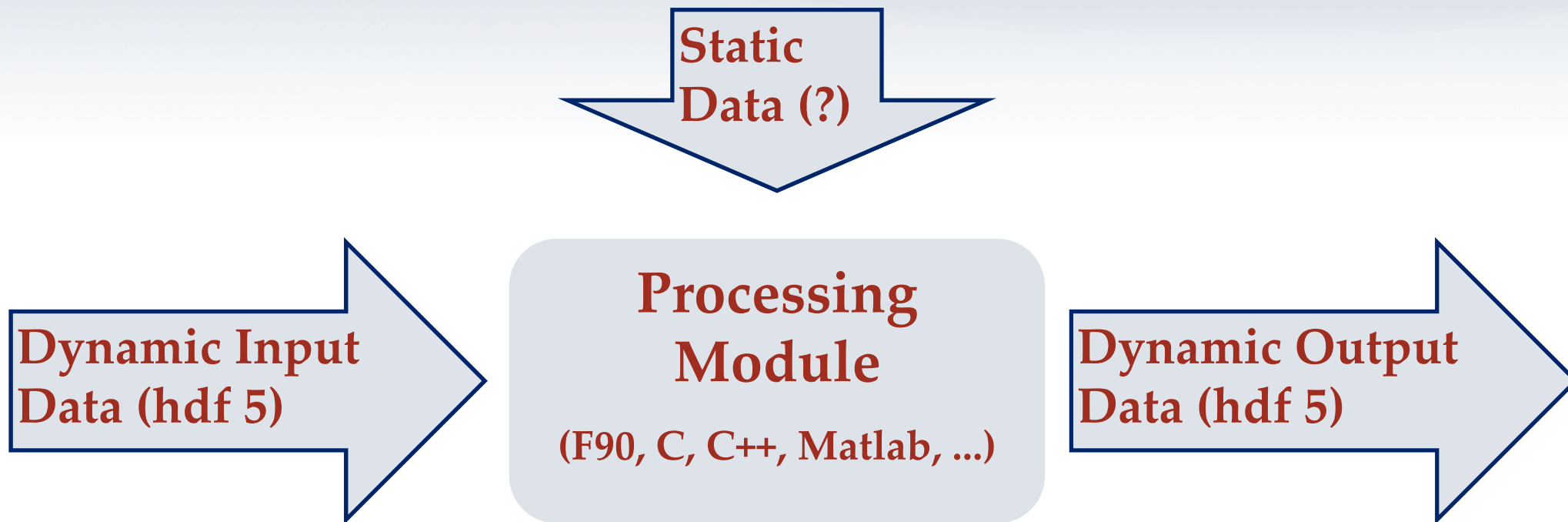
F. Friedl-Vallon (KIT)

L. De Leonibus (CNMCA)

S. Klonecki – P. Prunet (Noveltis)

C. Serio (DIFA)

# How(2): Processing Framework



# Illustration

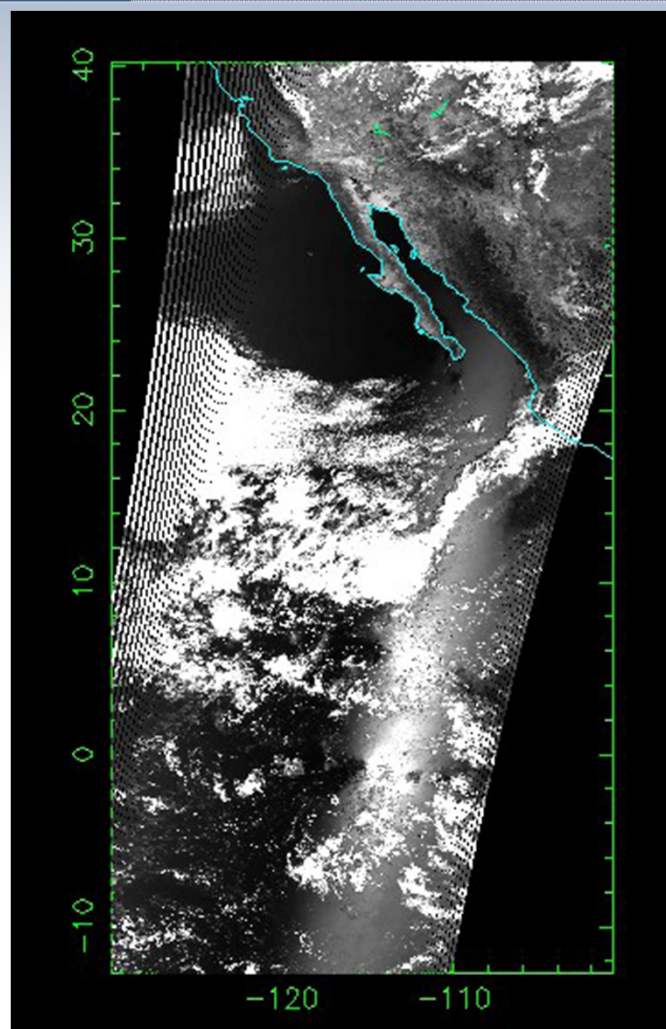
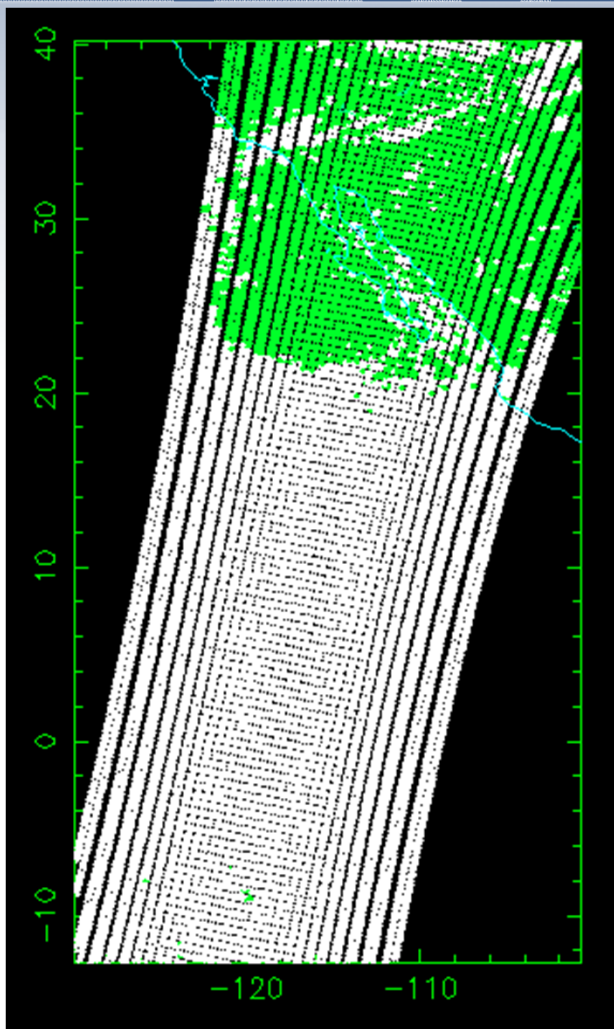
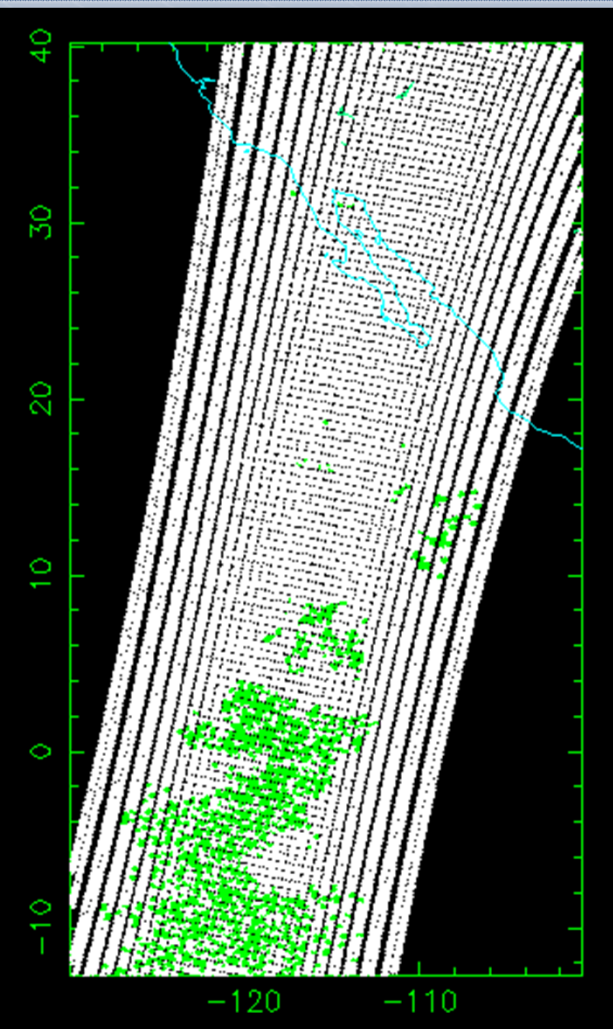
Two different Scene analysis modules applied to  
same IASI data



DIFA

EUMETSAT

AVHRR



Green: cloud free, white: cloudy



**Illustrates the need for a reference dataset.**





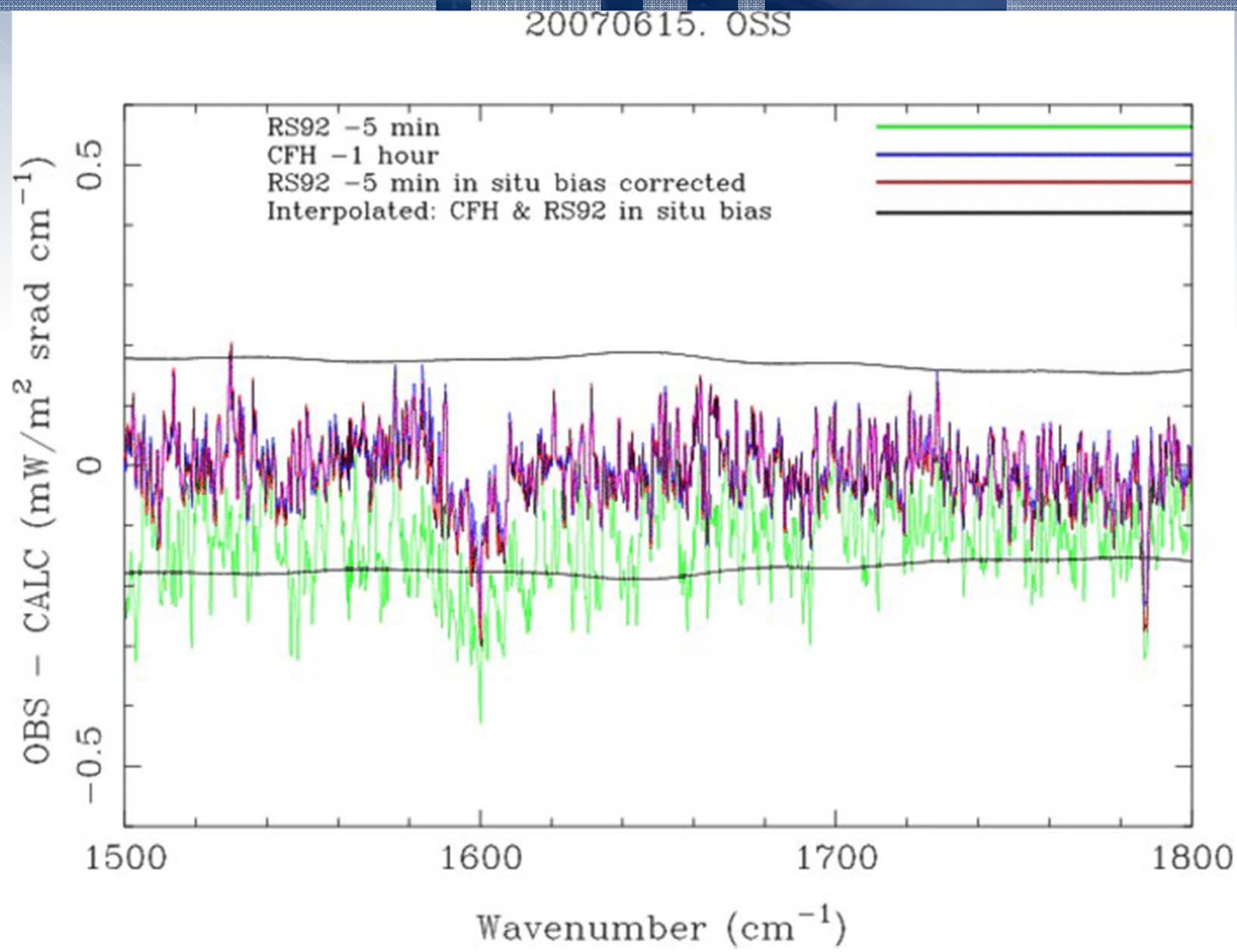
## Further issues: Covariance Matrices

Maximum likelihood method requires specification of

- background state and covariance matrix
- forward model error covariance matrix.

How to establish forward model error covariance matrix?

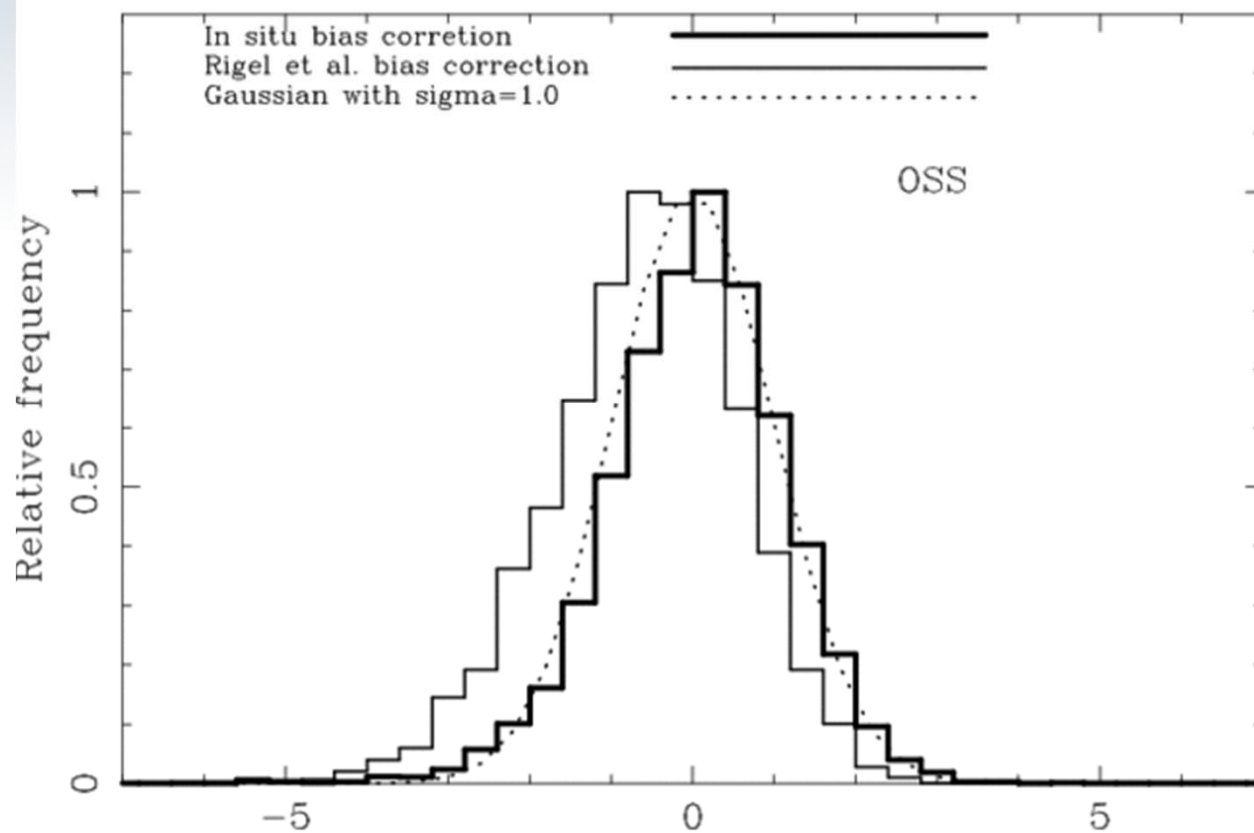
# Radiance difference IASI - Calculations





# Histogram Noise Normalised Differences

Chans.  $w_n > 1500$  &  $< 1570$  or  $w_n > 1615$  &  $< 1800$   $\text{cm}^{-1}$ . All days



IASI instrument noise normalized radiance residuals

# Summary



**Through the concerted effort by MTG-IRS Science Team, we hope to converge towards a consolidated MTG-IRS L2 processor capable of generating products which satisfies the needs of the user community.**

International TOVS Study Conference, 17<sup>th</sup>, ITSC-17, Monterey, CA, 14-20 April 2010.  
Madison, WI, University of Wisconsin-Madison, Space Science and Engineering Center,  
Cooperative Institute for Meteorological Satellite Studies, 2011.