Sondes meets Hyperspectral

26.02.2013

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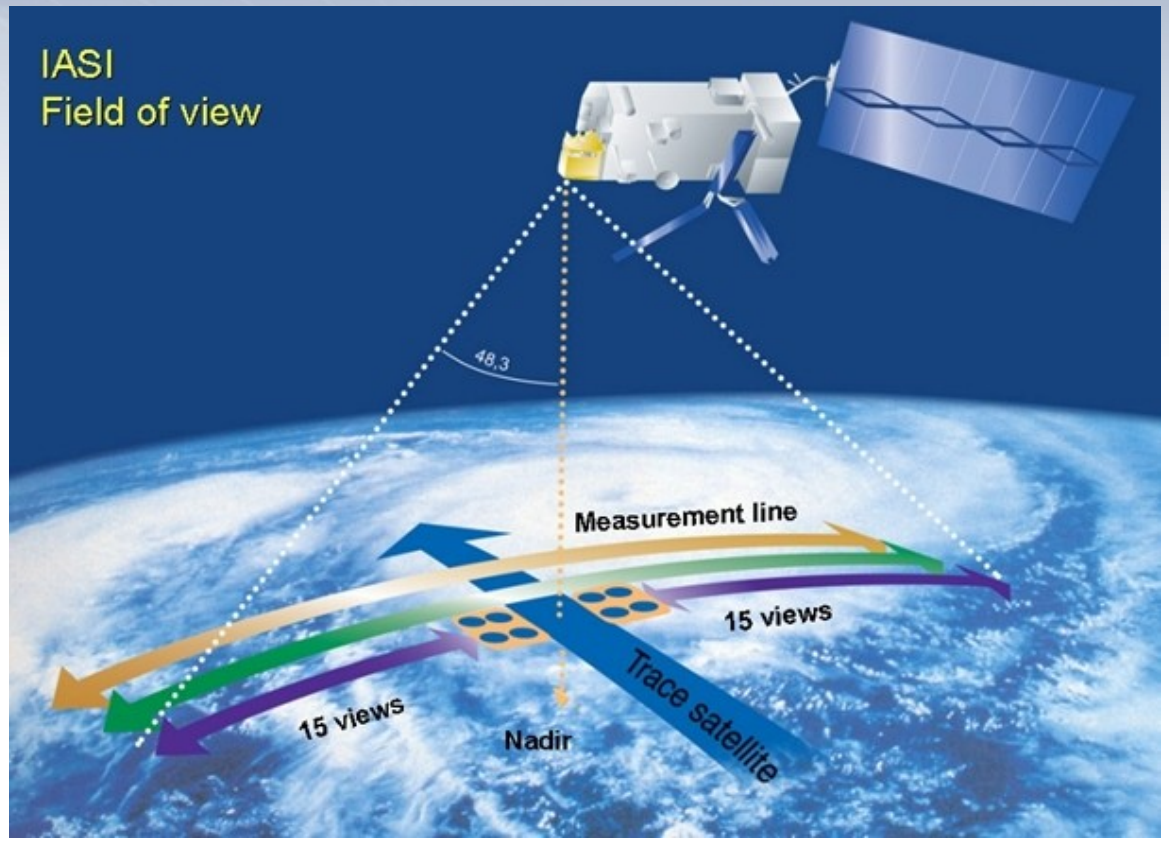
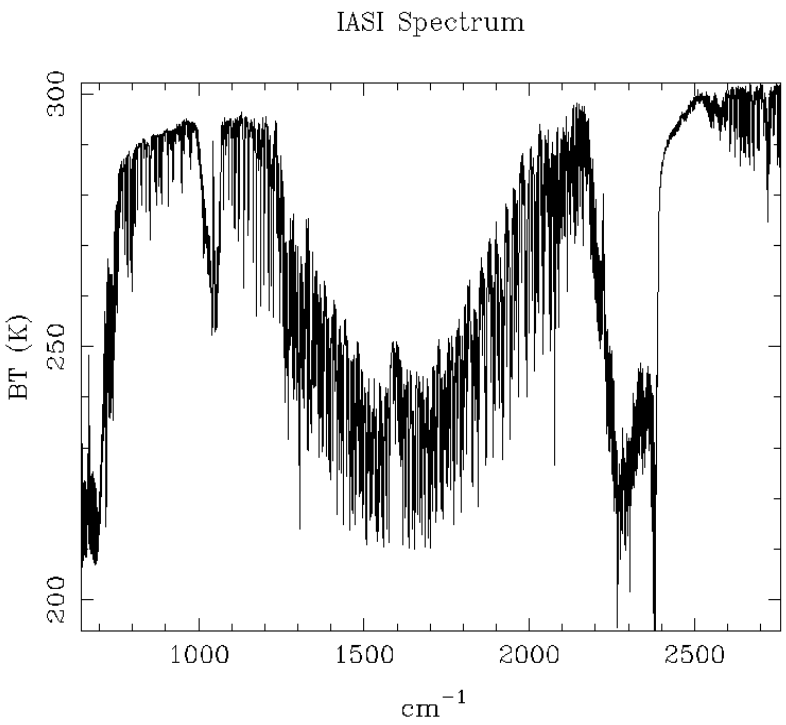
EUMETSAT

Hyperspectral Infrared Sounder: IASI

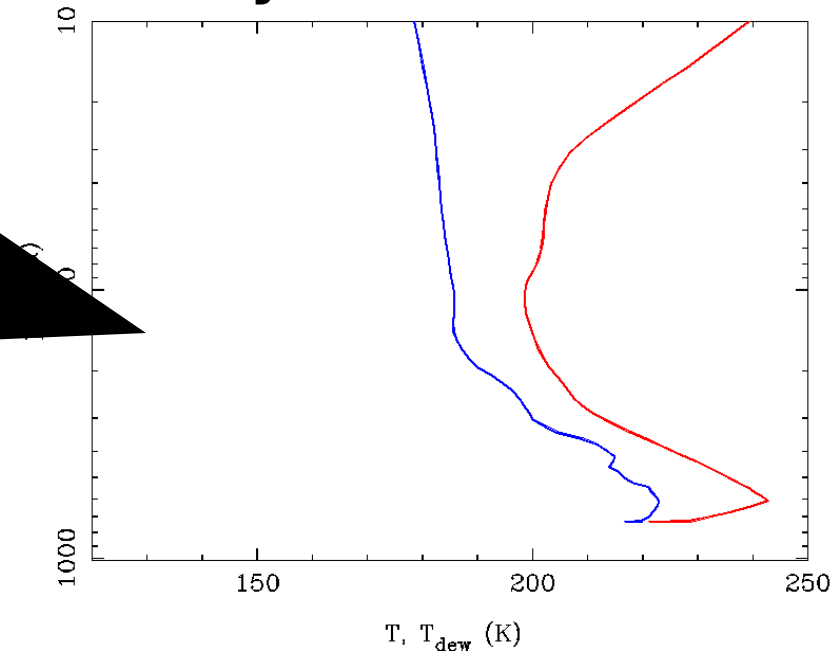


- Downward looking Sounding Hyperspectral Interferometer
- Spectral Range: 645 to 2761 cm^{-1}
- Spectral Sampling: 0.25 cm^{-1}
- Spatial Resolution: 12 km
- Number of Channels: 8461

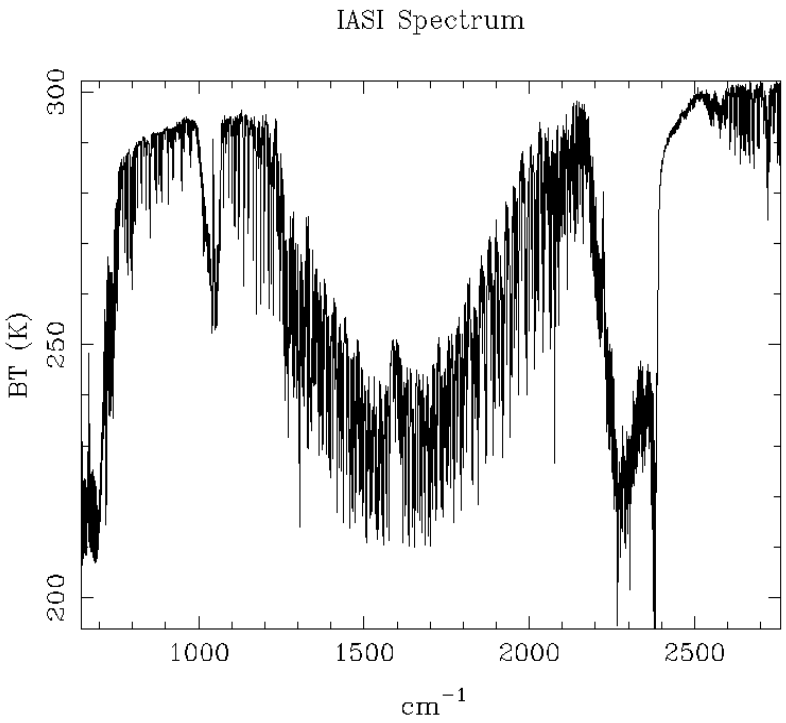
IASI Retrievals



- T Errors: 1 K in 1 km layers
- RH Errors: 10-20% in 2 km layers



IASI Retrievals



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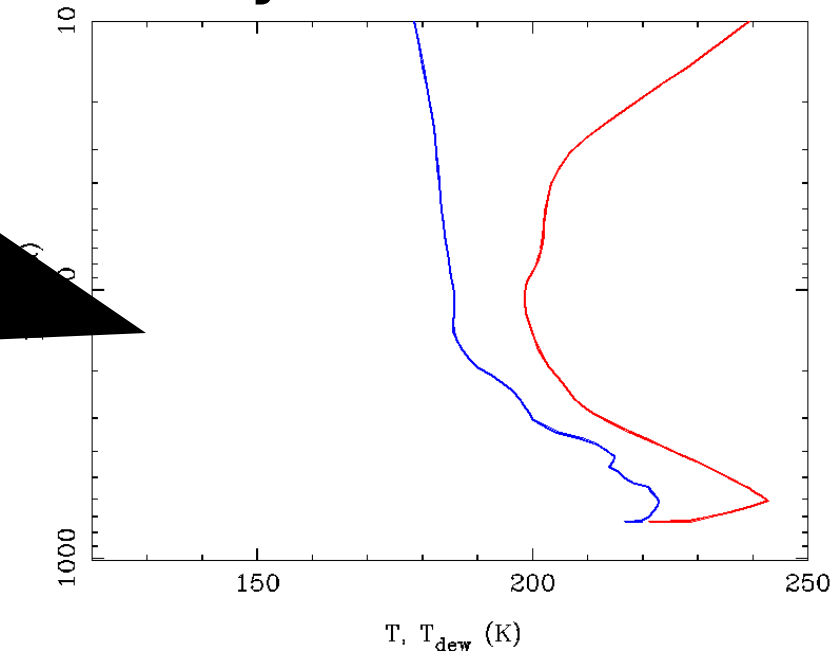
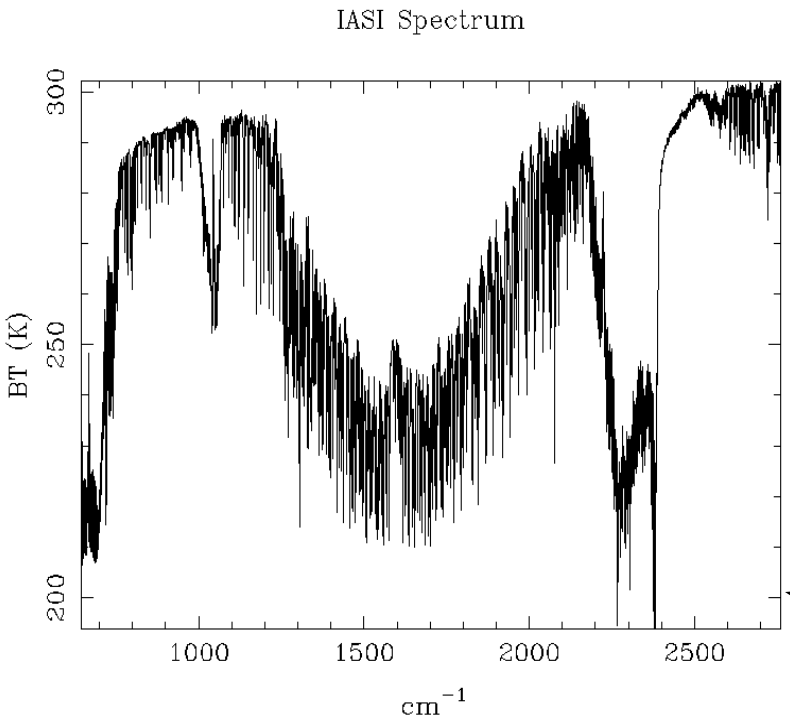
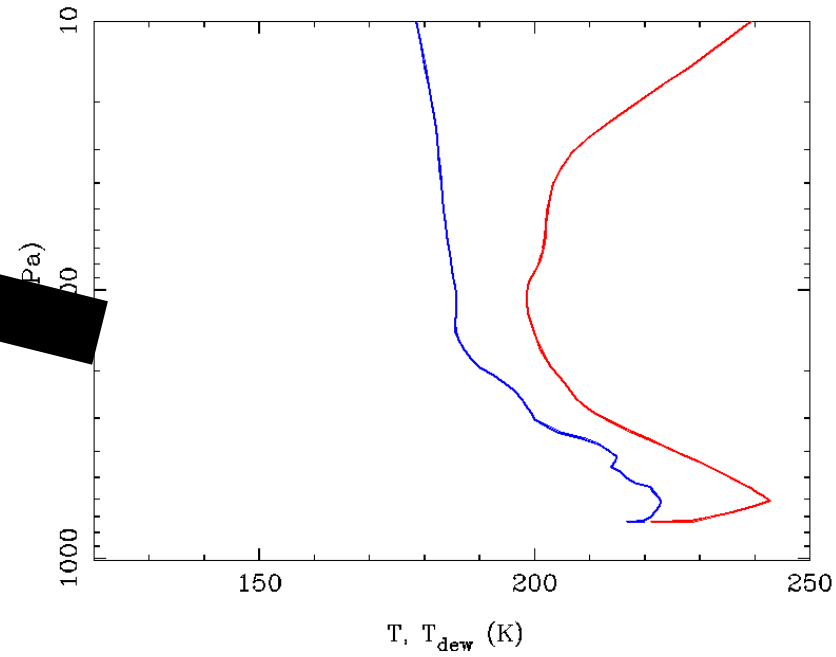


Useful for GRUAN????

IASI Radiances



- Sensitive to small deviations in profile: example 2% RH in whole column



YES!! If we go the other way!!

Validating Retrievals

1. Co-locate reference profiles with hyperspectral
2. Compare them
3. Obtain statistics

Retrieval Validation

1. Co-locate reference profiles with hyperspectral
2. Compare them
3. Obtain statistics

...but...

- Co-location errors??
- Sonde humidity errors??
- Bias OK, but RMS will depend on co-location
- NO GRUAN needed!!!

Alternative Retrieval Validation

1. Co-locate reference profiles with hyperspectral
2. Asses their co-location and quality by doing an Observed versus Calculated radiance comparison
3. Compare them
4. Obtain statistics

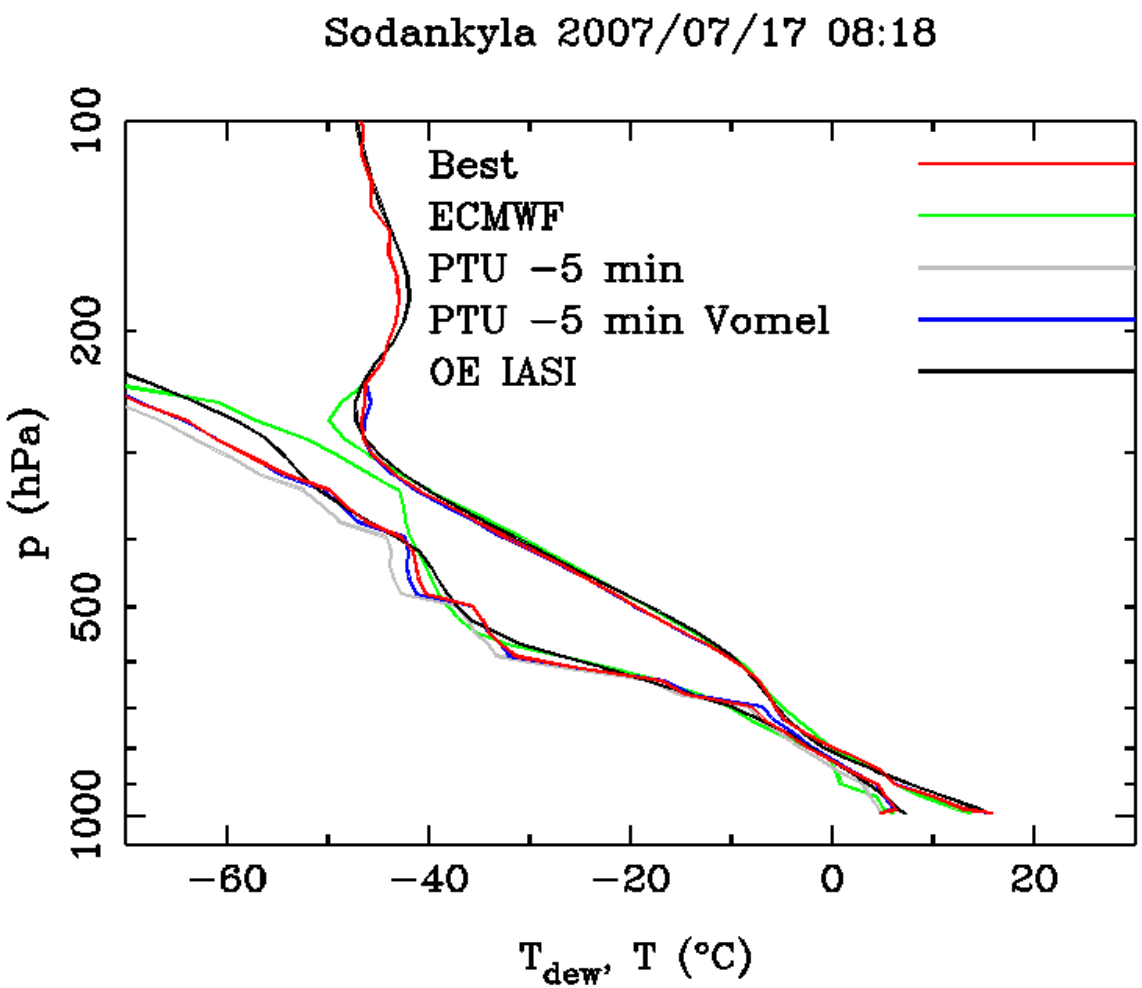
Alternative Retrieval Validation

1. Co-locate reference profiles with hyperspectral
2. Asses their co-location and quality by doing an Observed versus Calculated radiance comparison
3. Compare them
4. Obtain statistics

… and …

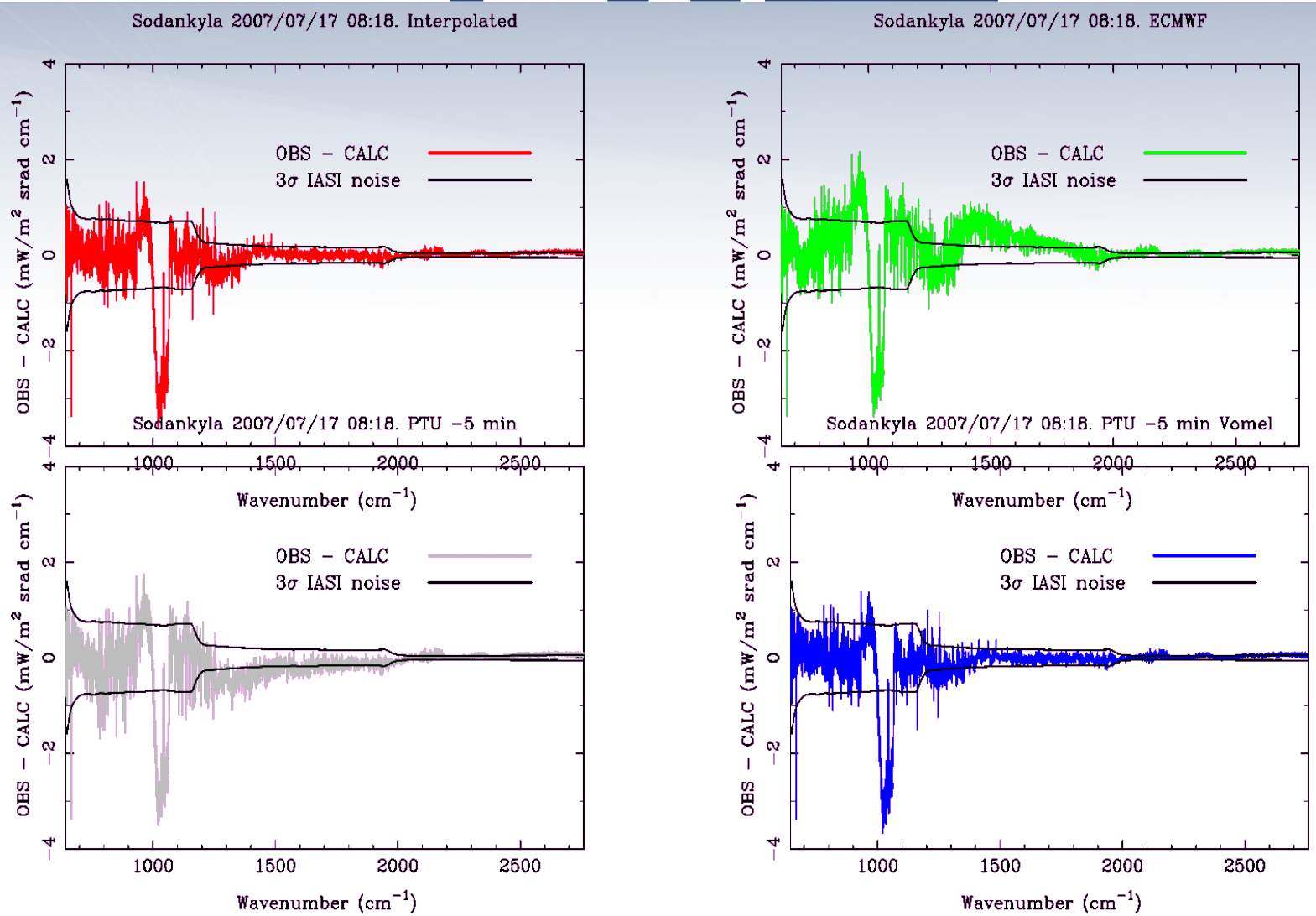
Good reference needed = GRUAN!!

Alternative Retrieval Validation: Example

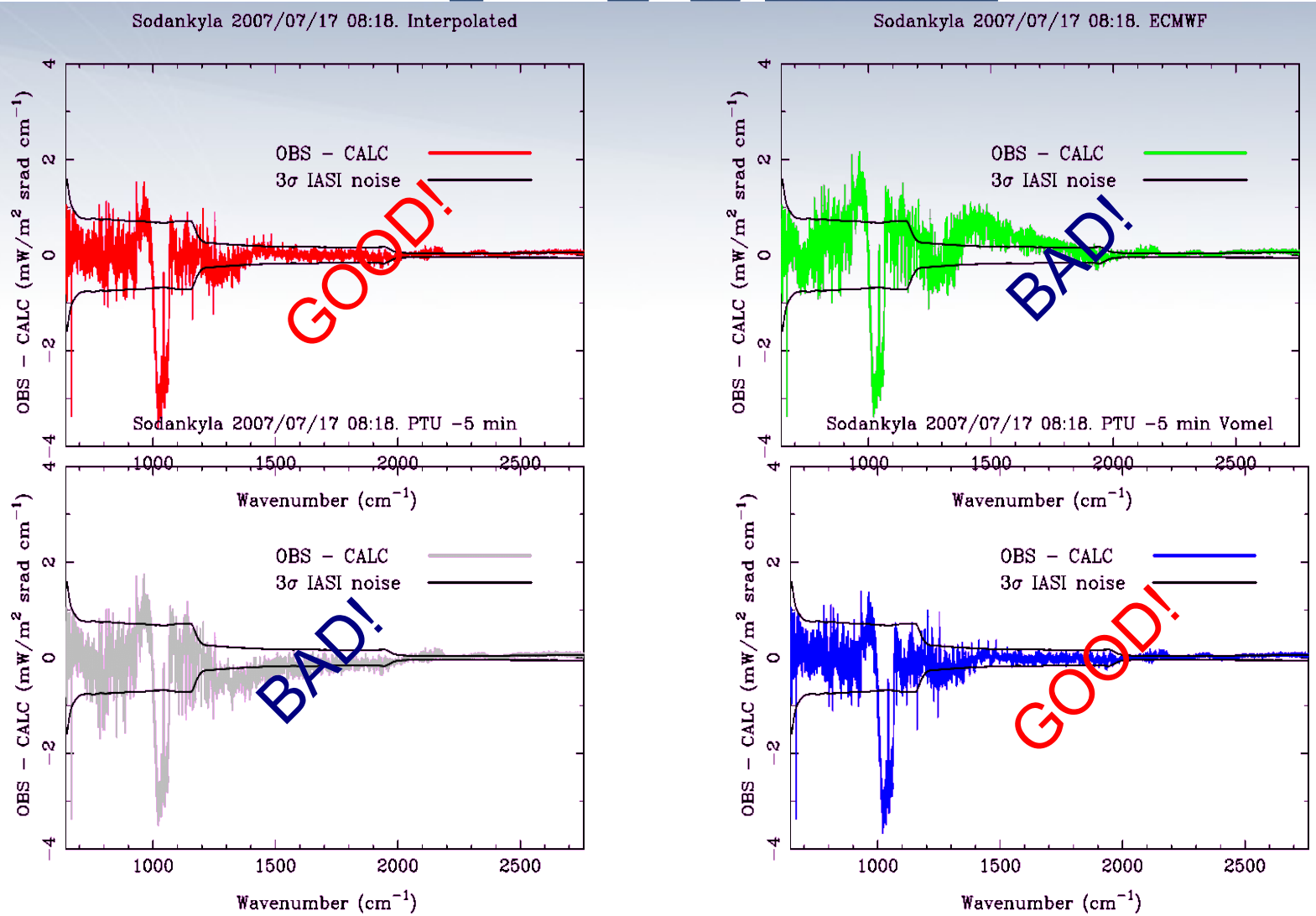


Ack: FMI, Rigel Kivi

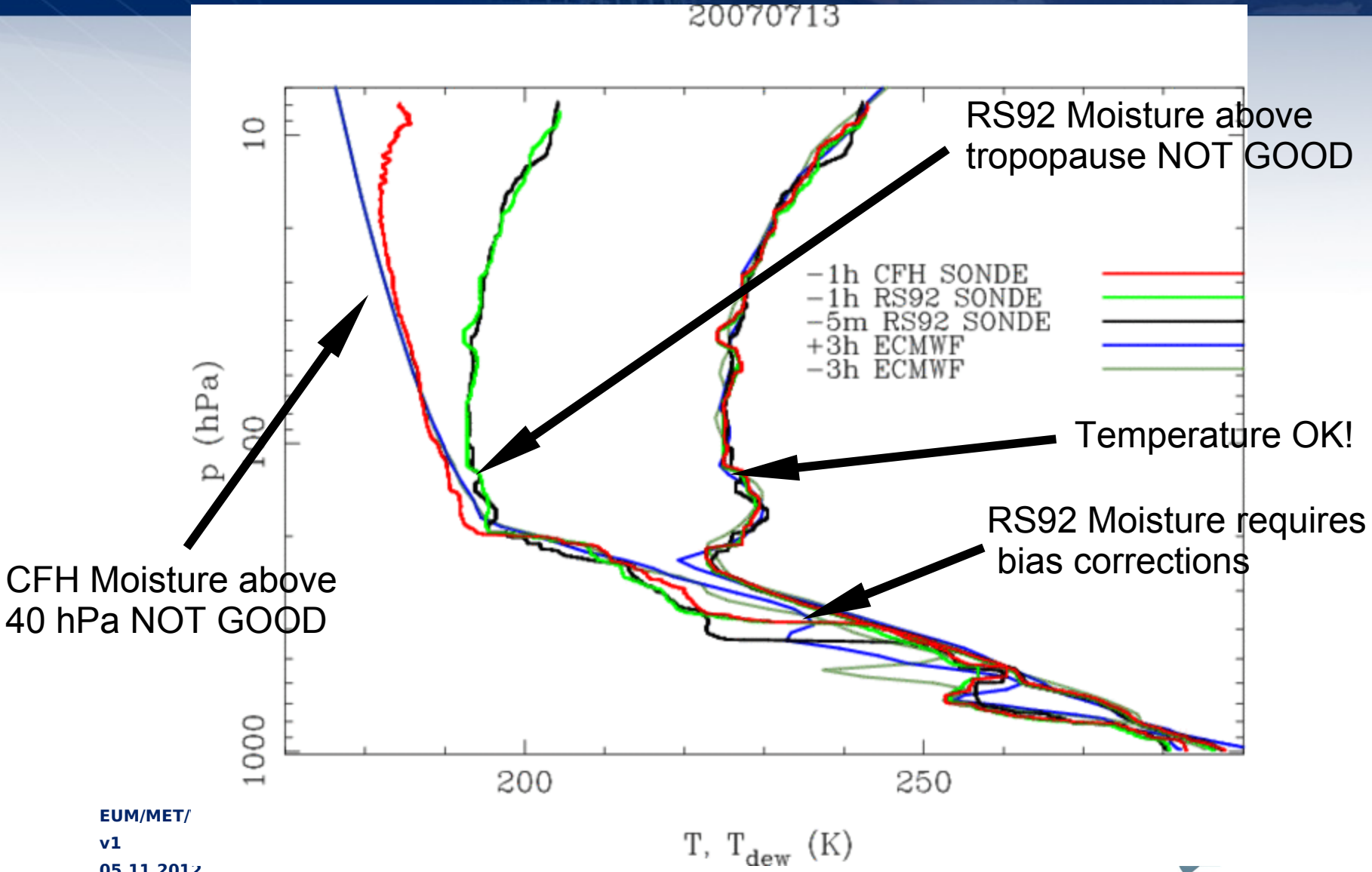
Alternative Retrieval Validation: Example



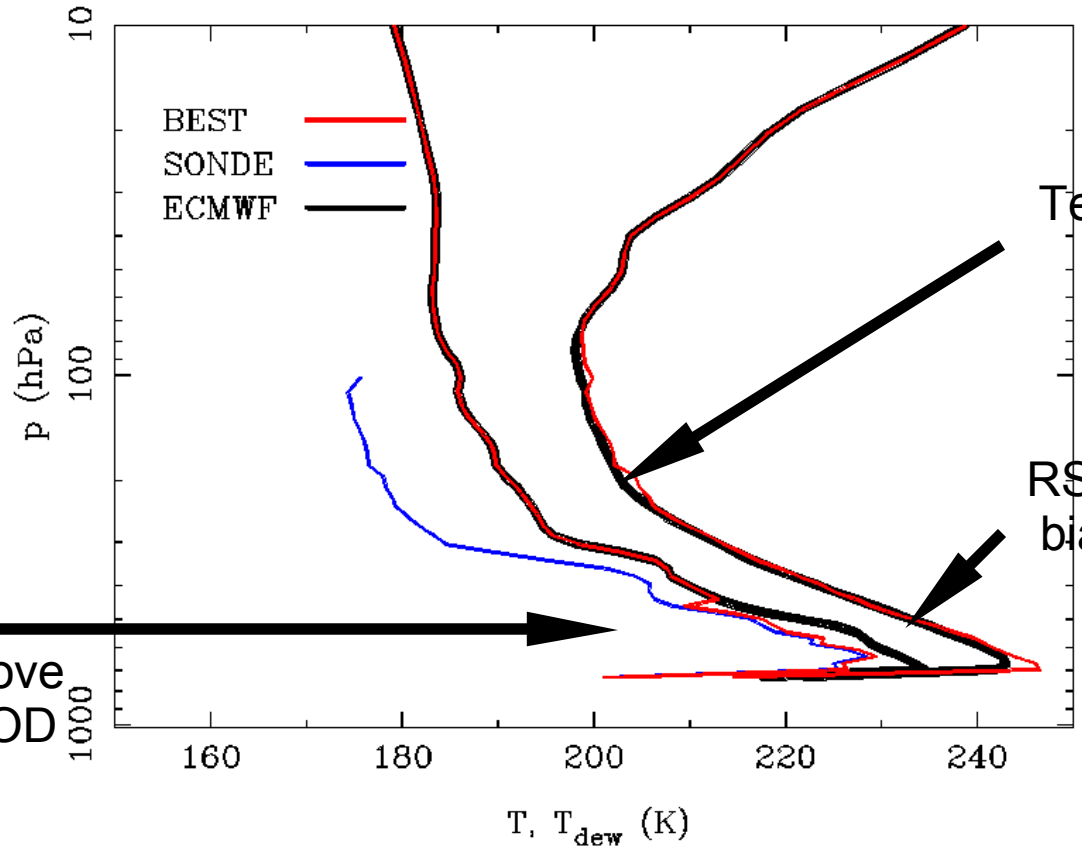
Alternative Retrieval Validation: Example



Sodankylä: Added Value - Assessment of Sondes



Concordiasi: Added Value - Assessment of Sondes



Temperature OK!

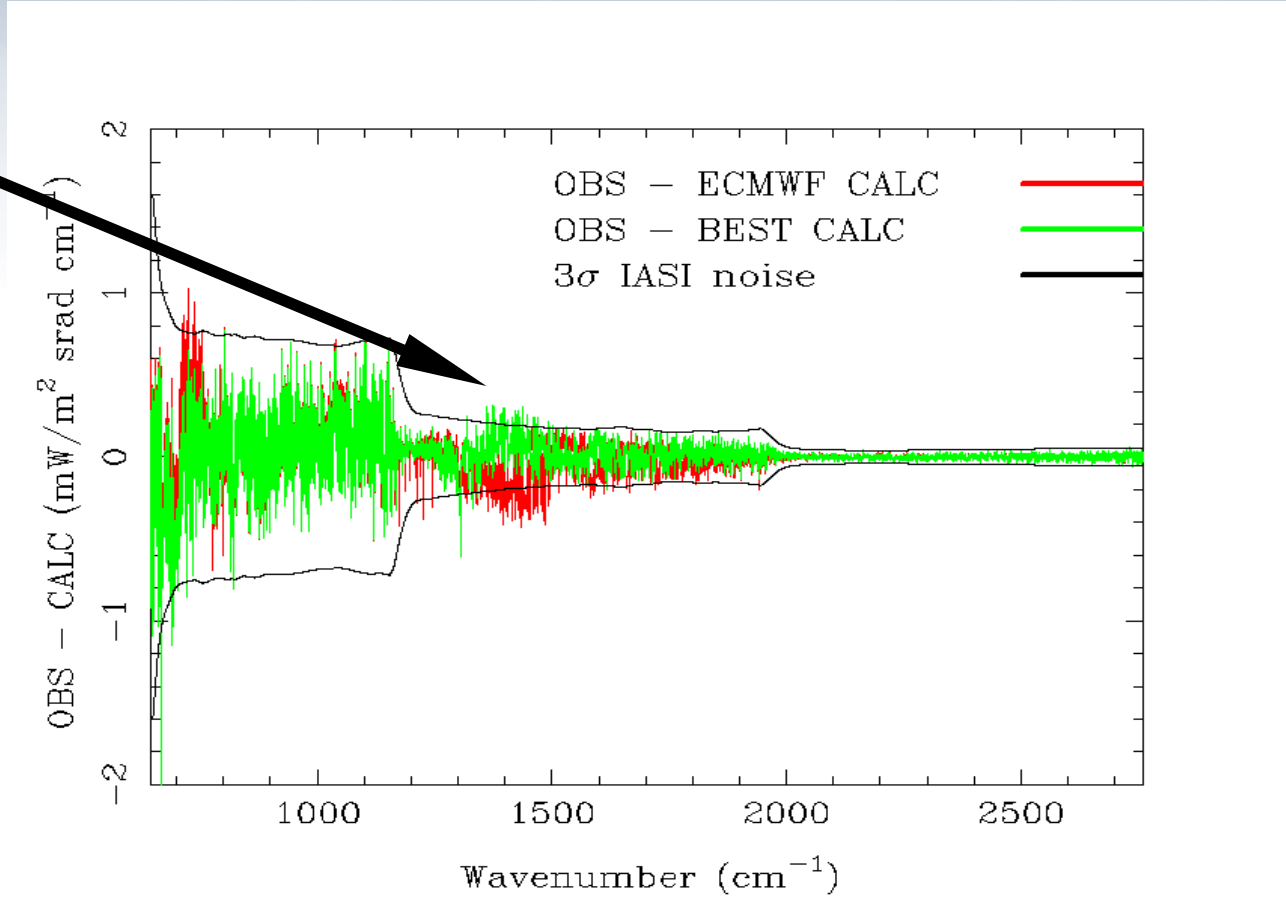
RS92 Moisture requires bias corrections

RS92 Moisture above 450 hPa NOT GOOD

Ack: Meteo-France, Florence Rabier, Thomas August

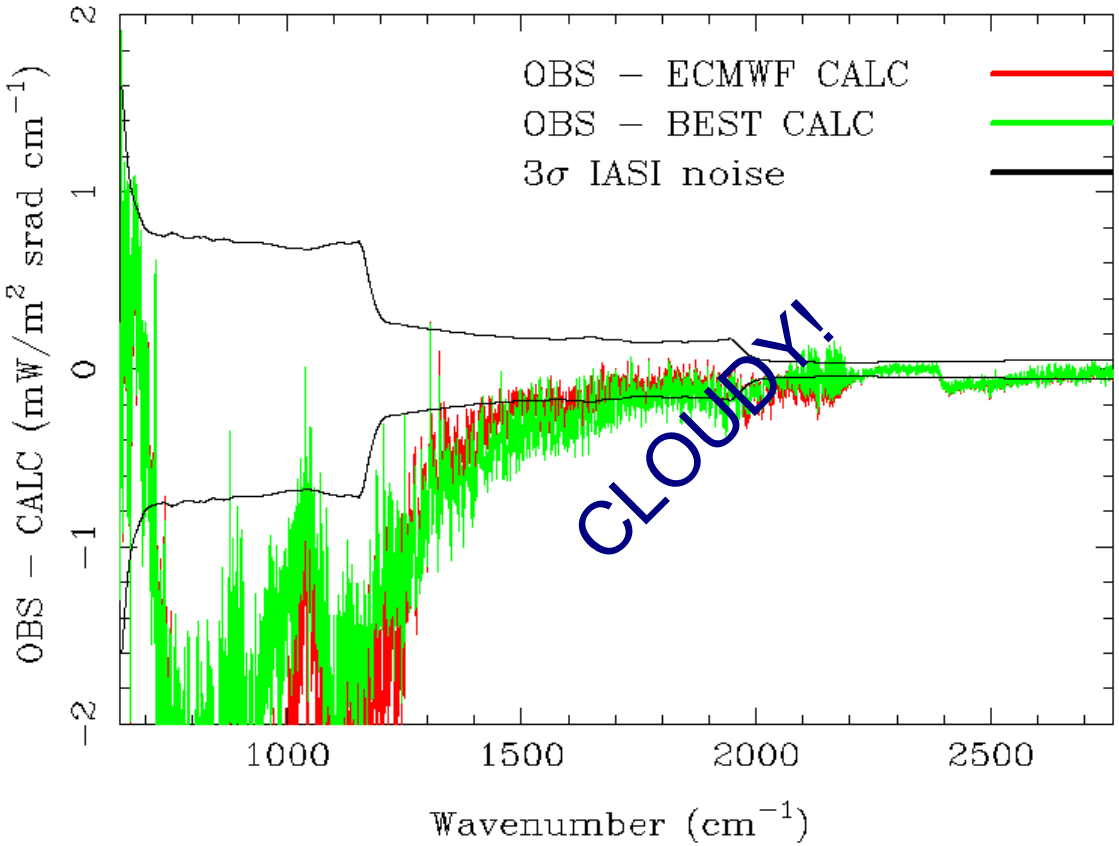
Concordiasi: Added Value - Assessment of RTM

RTM Continuum issue??



Ack: Stuart Newman

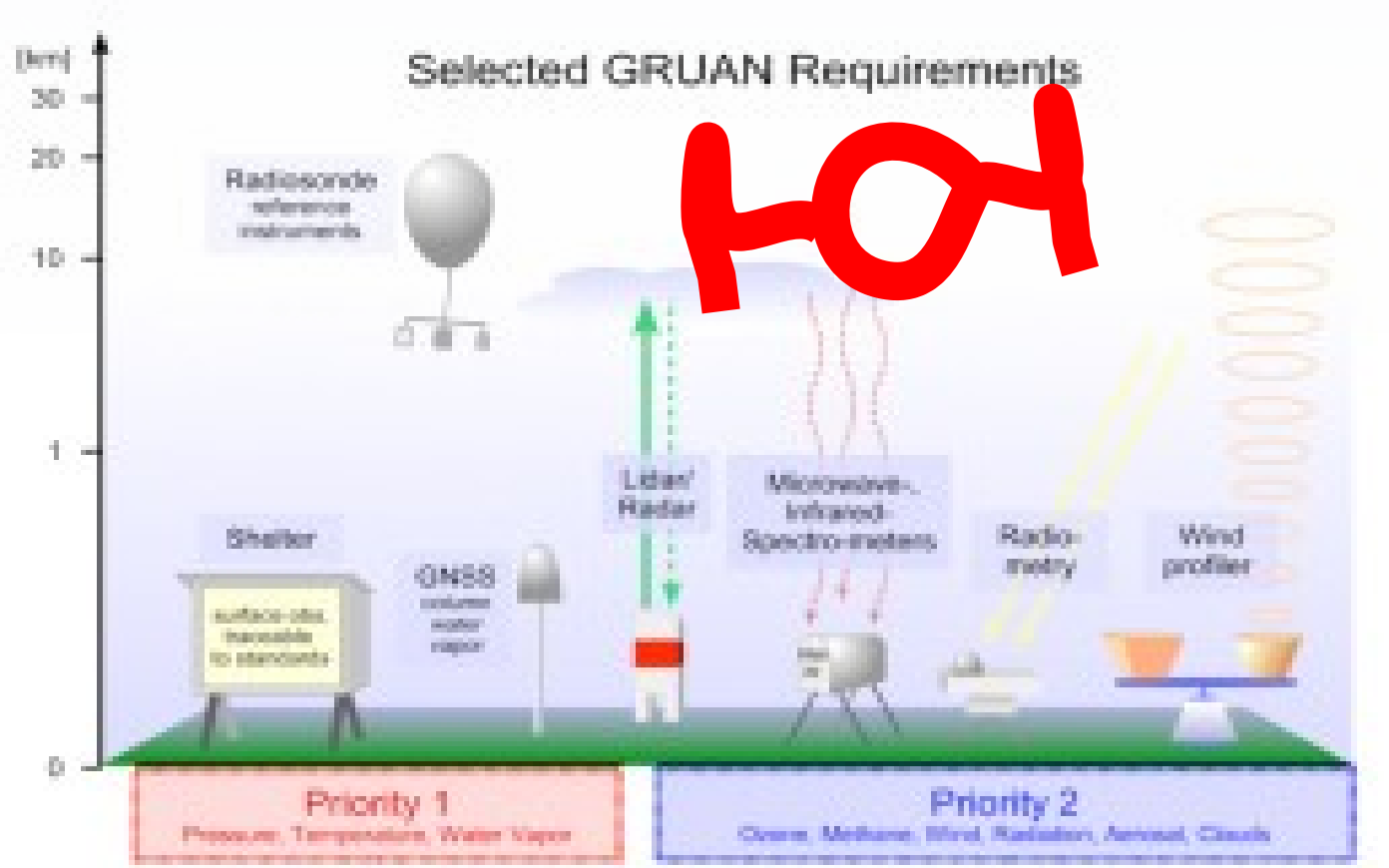
GRUAN: Alternative Retrieval Validation



SUMMARY

1. Huge added value when assessing adequate co-location and quality by OBS – CALC exercise:
   - “Clean” retrieval validation statistics
   - Assessment of radiative transfer models
   - Assessment of atmospheric profile
2. IASI data is a remote sensing instrument available everywhere for FREE!!
3. PRICE: IASI co-located reference profile (sonde) + clear conditions + use of radiative transfer model

GRUAN!


Selected GRUAN Requirements
[km]
30
20
10
1
0
Radiosonde
Shelter
GNSS
Lidar/
Radar
Microwave-,
Infrared-
Spectro-meters
Radio-
metry
Wind
profiler
Priority 1
Priority 2