

# Status of IASI assimilation and IASI retrievals compared with dropsondes from the pre-Concordiasi campaign

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Météo-France / CMS



**CONCORDIASI**



**METEO FRANCE**  
Toujours un temps d'avance

# Overview

## 1. IASI in NWP models

data selection

data usage

impact on forecasts

## 2. Processing the data from the pre-Concordiasi campaign in the Tropics

Methodology

Example: Dropsonde released on 9 March 2010 @ 20:49 UTC

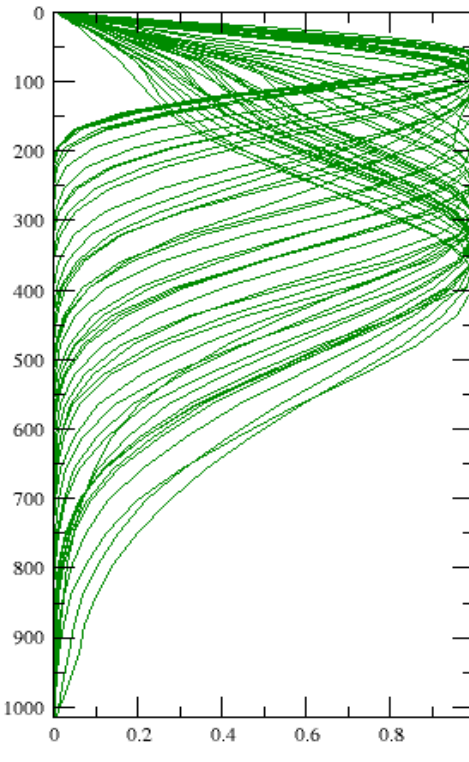
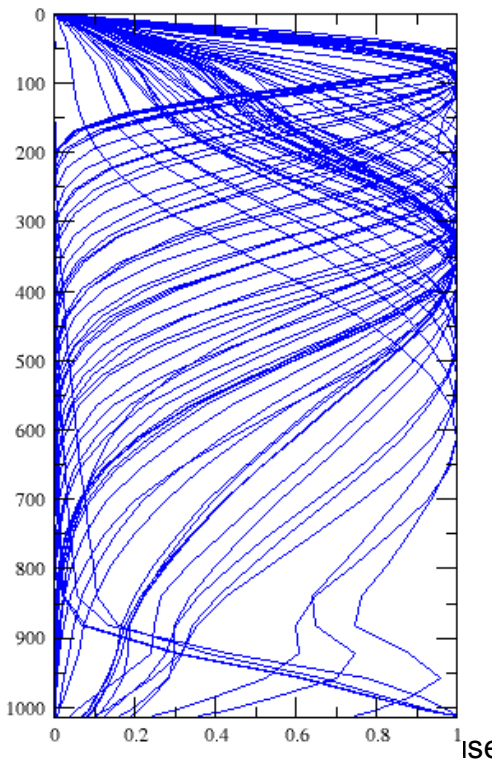
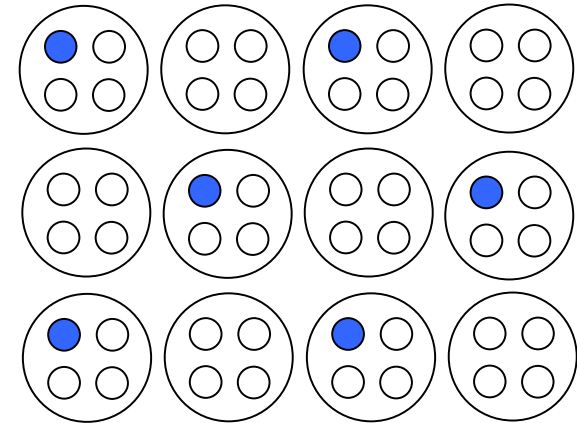
Statistics over 18 cases

First lessons

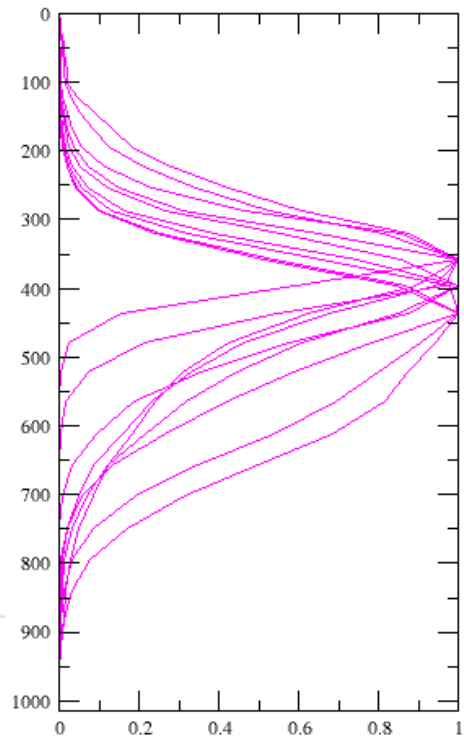
## Conclusion

# 1. IASI in NWP models: data selection

- Pre-selection:
  - Only data from detector #1
  - Pattern depending on scanline →
- Geographical thinning: 1 prof. / 125km



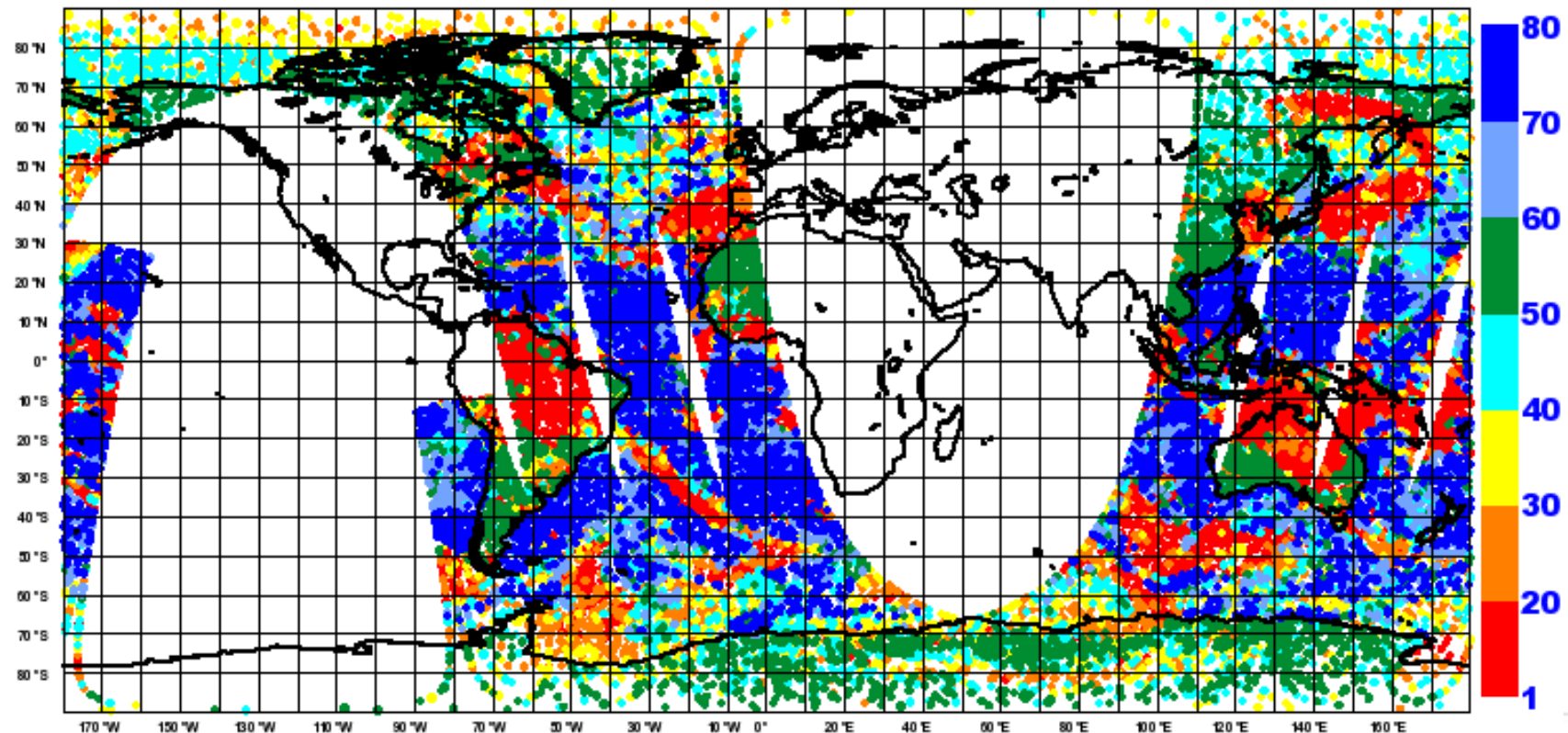
9 WV  
channels  
LW - T  
68 over sea  
50 over land



# 1. IASI in NWP models: data usage in ARPEGE

- Number of assimilated channels per profile for a typical 6-hour assimilation window

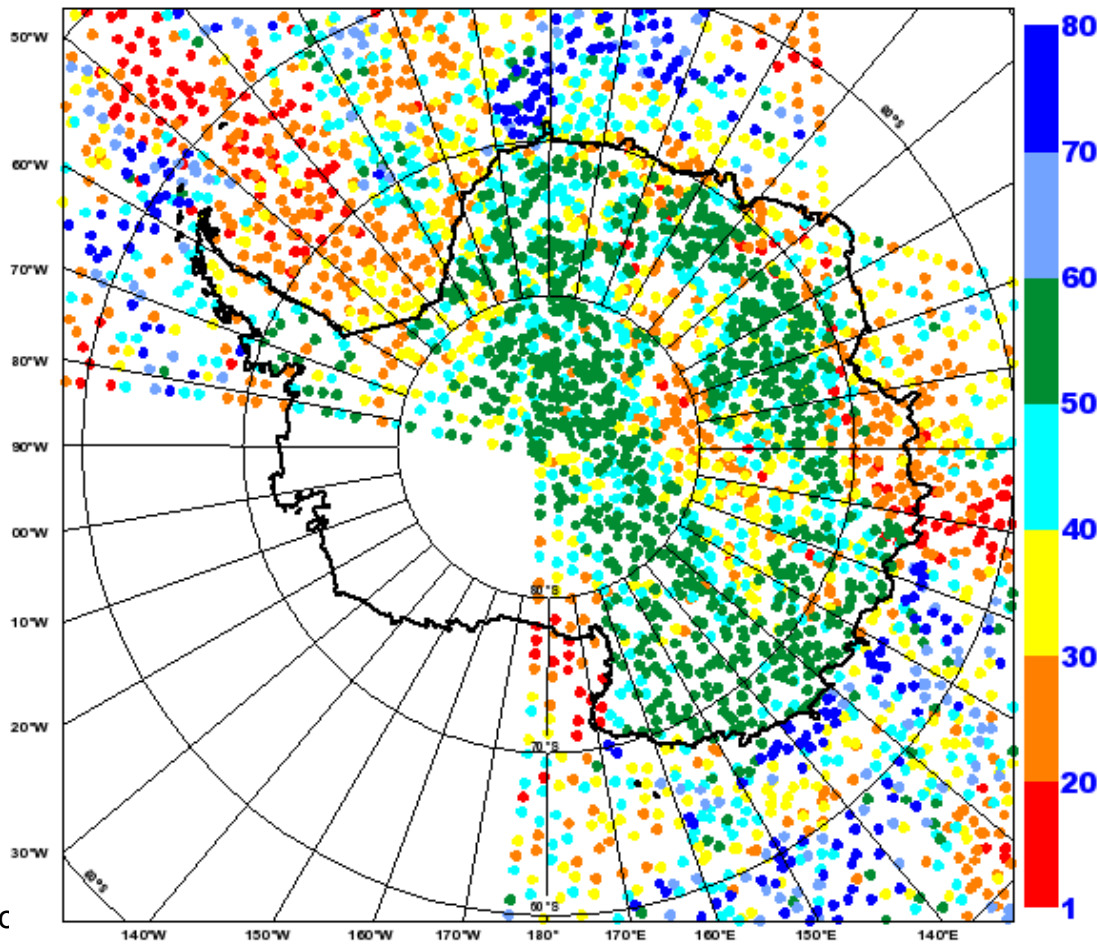
example for 27<sup>th</sup> February 2010 @ 00 UTC assimilation time



# 1. IASI in NWP models: data usage in ARPEGE

- Number of assimilated channels per profile for a typical 6-hour assimilation window

example for 27<sup>th</sup> February 2010 @ 00 UTC assimilation time

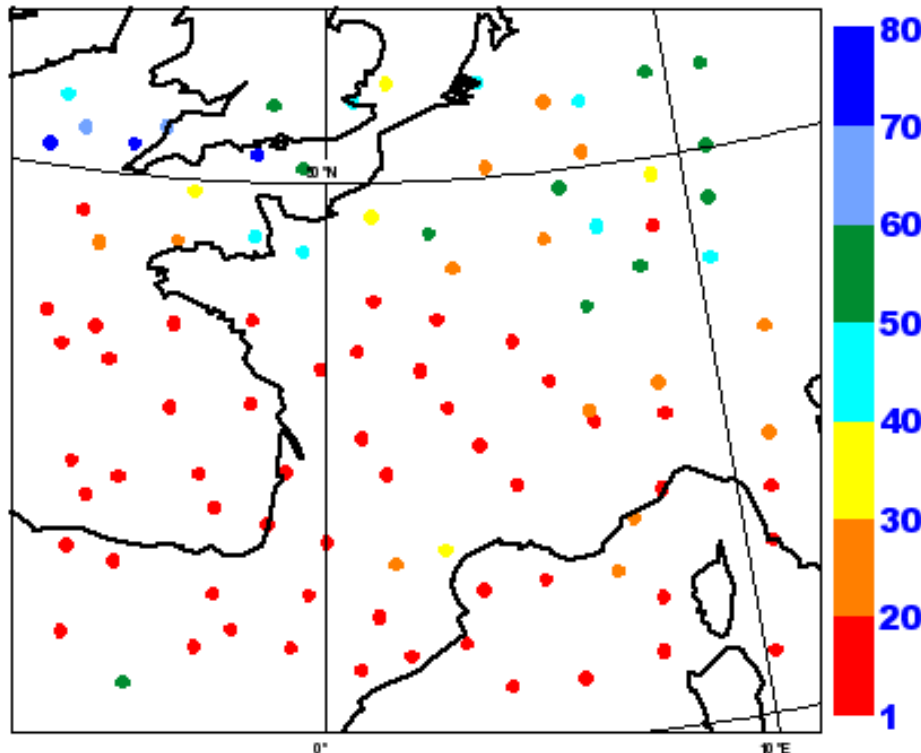


Zoom over Antarctica

# 1. IASI in NWP models: data usage in AROME

- Number of assimilated channels per profile for a typical 3-hour assimilation window

example for 27<sup>th</sup> February 2010 @ 09 UTC assimilation time



Such a coverage only twice a day

# 1. IASI impact in AROME

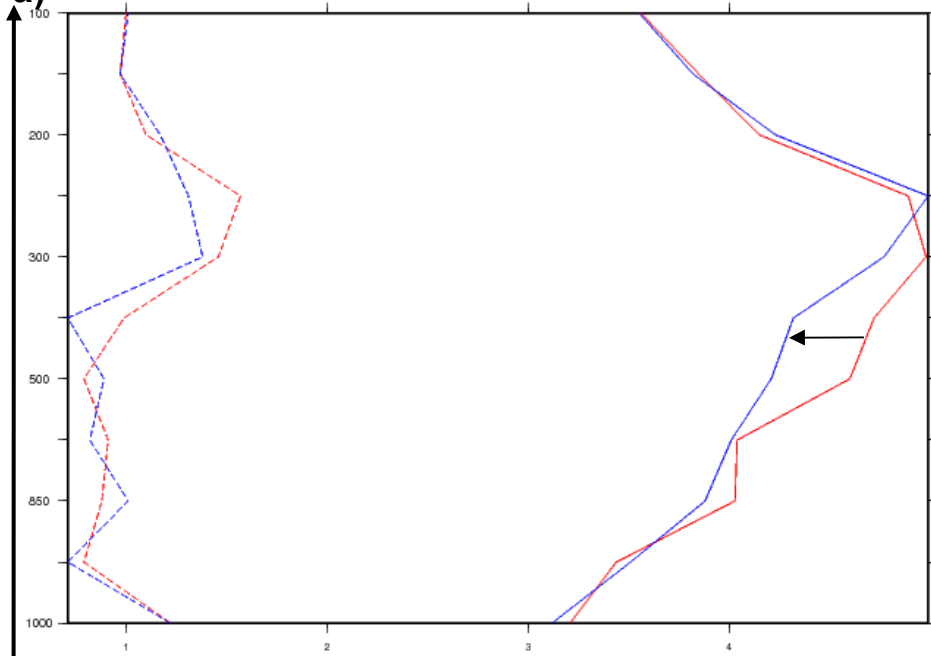
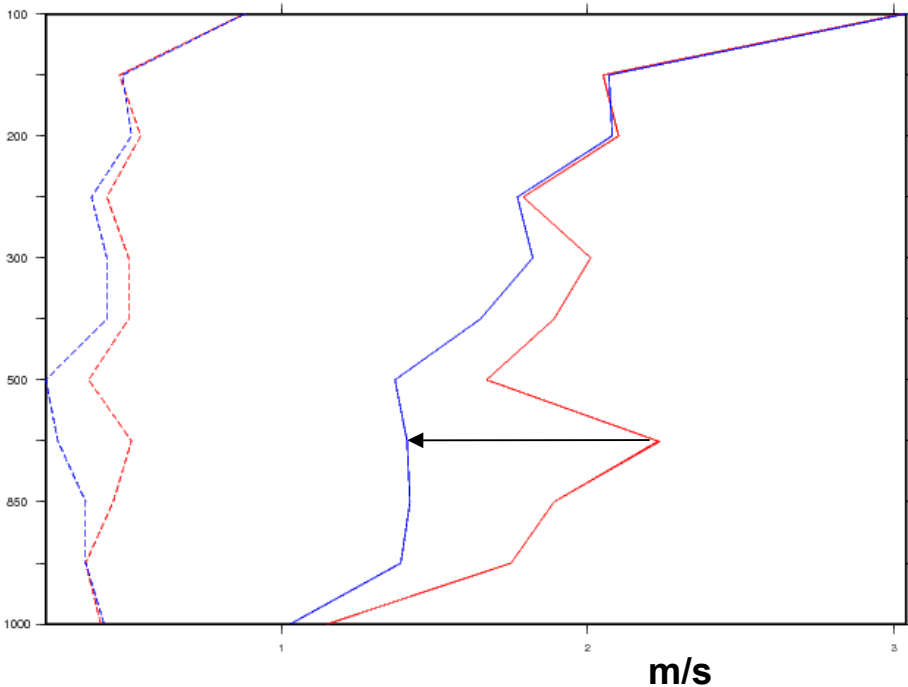
## ■ Impact on wind field

biases (dashed) and RMSE (solid) wrt radisoundings reference (**no IASI, in red**), first attempt (**with IASI, in blue**) averaged over a 3-week period in May 2009

### analysis

Altitude  
(hPa)

### 12h forecast range



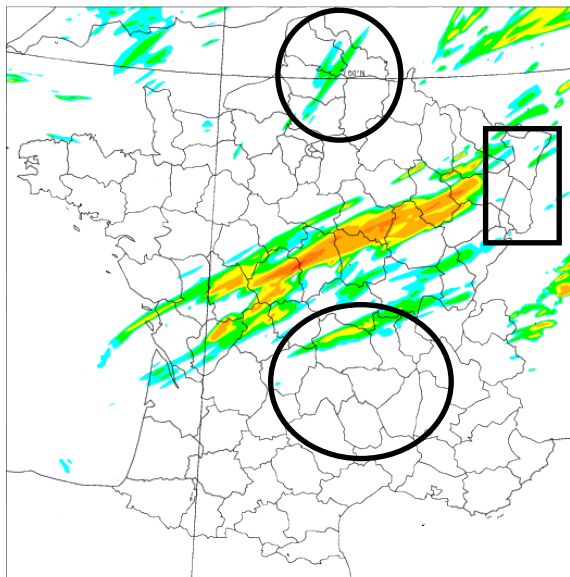
m/s

# 1. IASI impact in AROME

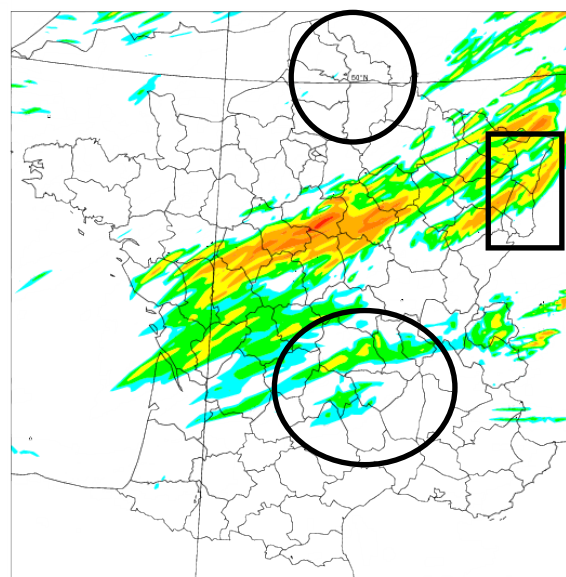
- Impact on precipitation prediction

example of 12h precipitation between 00 and 12UTC on 21 May 2009

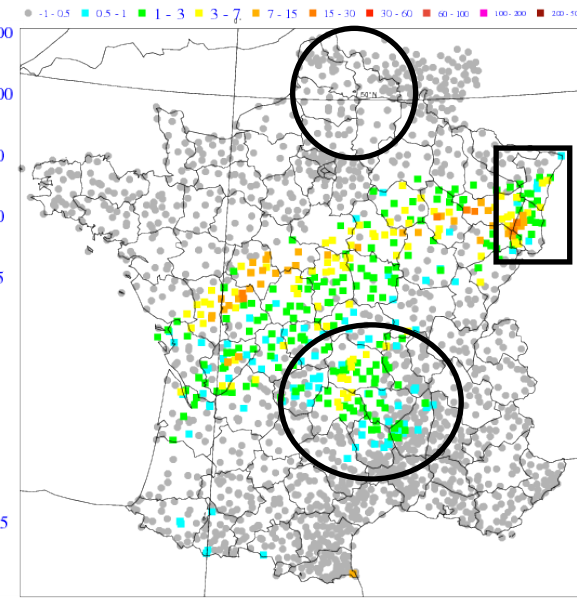
12h forecast range



Reference: no IASI



First step: IASI 125km

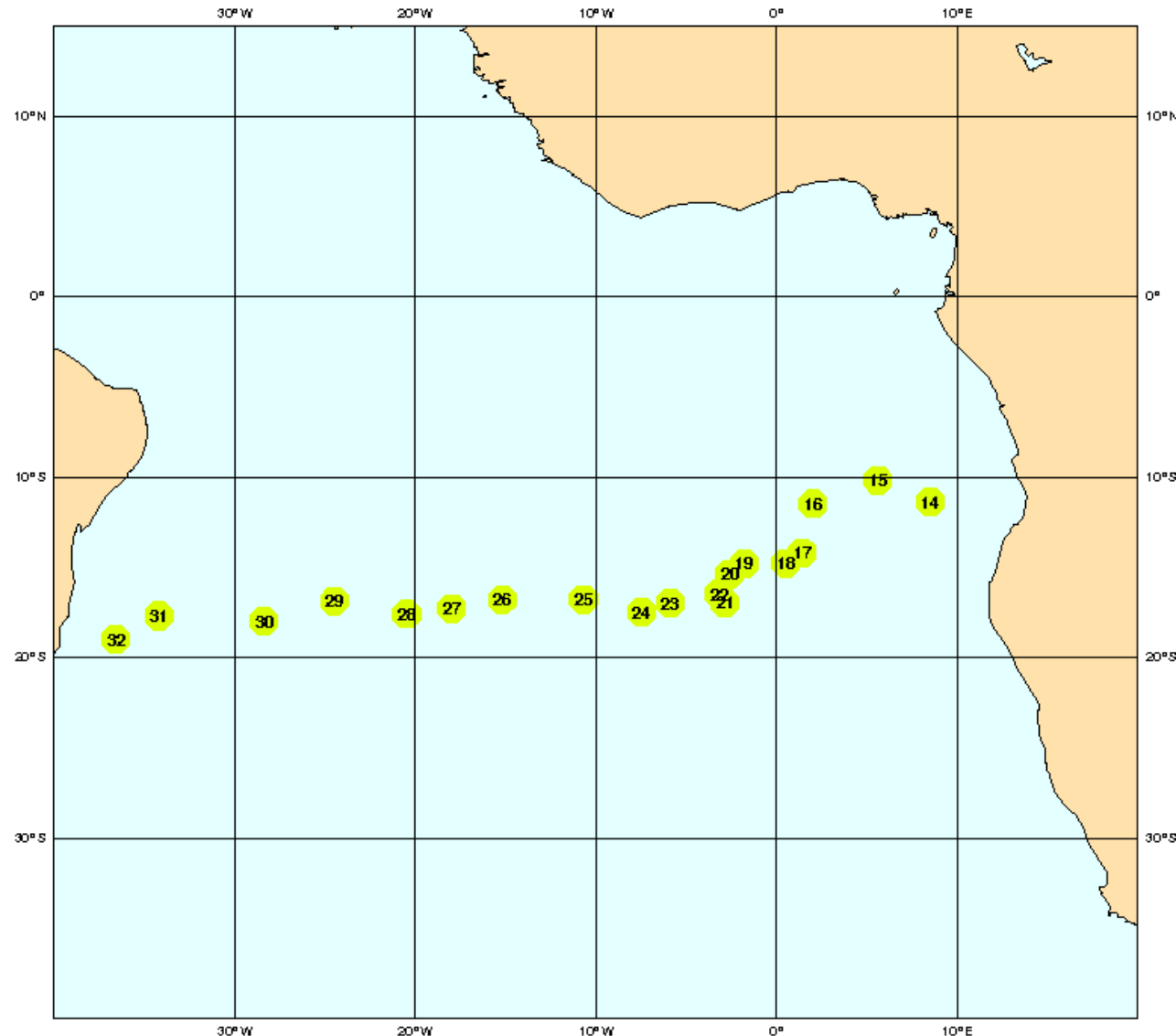


Verif.: Rain gauges



## 2. Processing the data from the pre-Concordiasi campaign in the Tropics

- Focus on dropsondes during MSD2 flight over the Atlantic Ocean



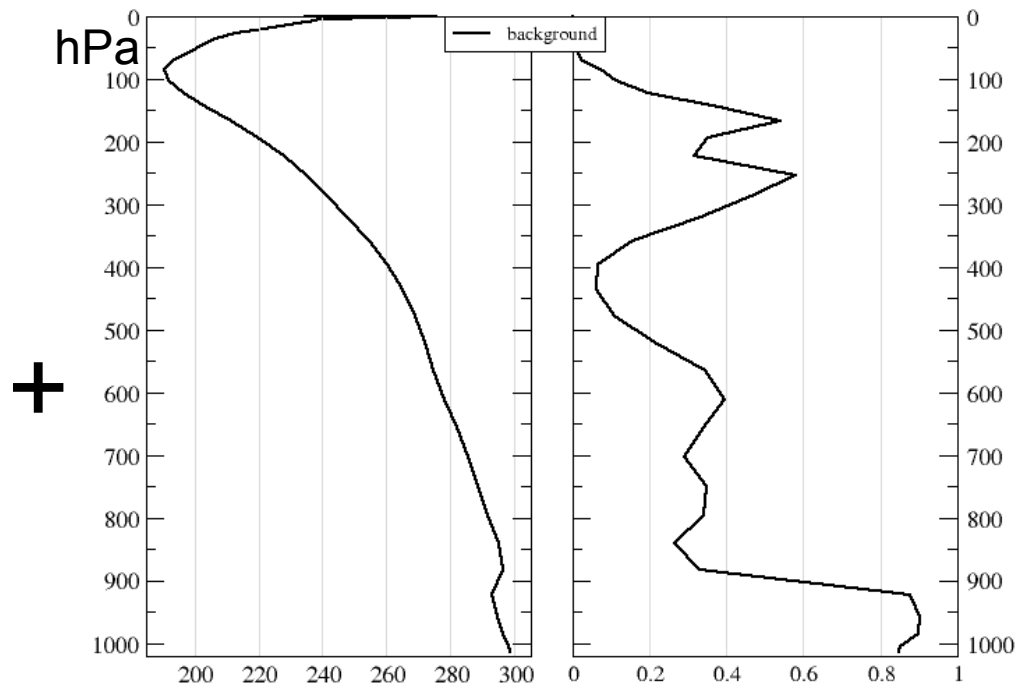
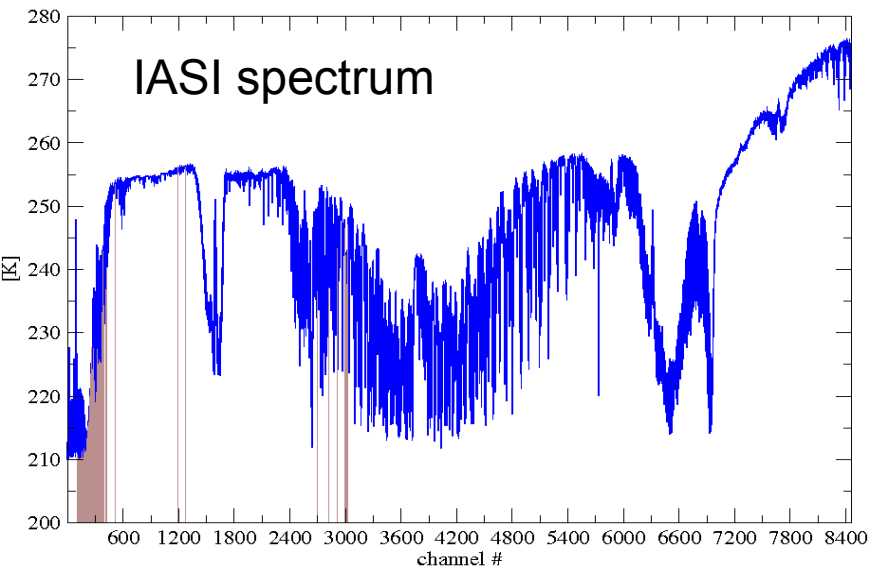
Position of dropsoundings

using NCAR numbering

from MF drop #14  
to MF drop #32

## 2. Temperature and humidity retrievals (1D-VAR)

- Inputs:



- Description of the errors of the inputs (=> weight for each input)

For IASI data:

R Matrix

new matrix including inter-channel correlations

For background data from model:

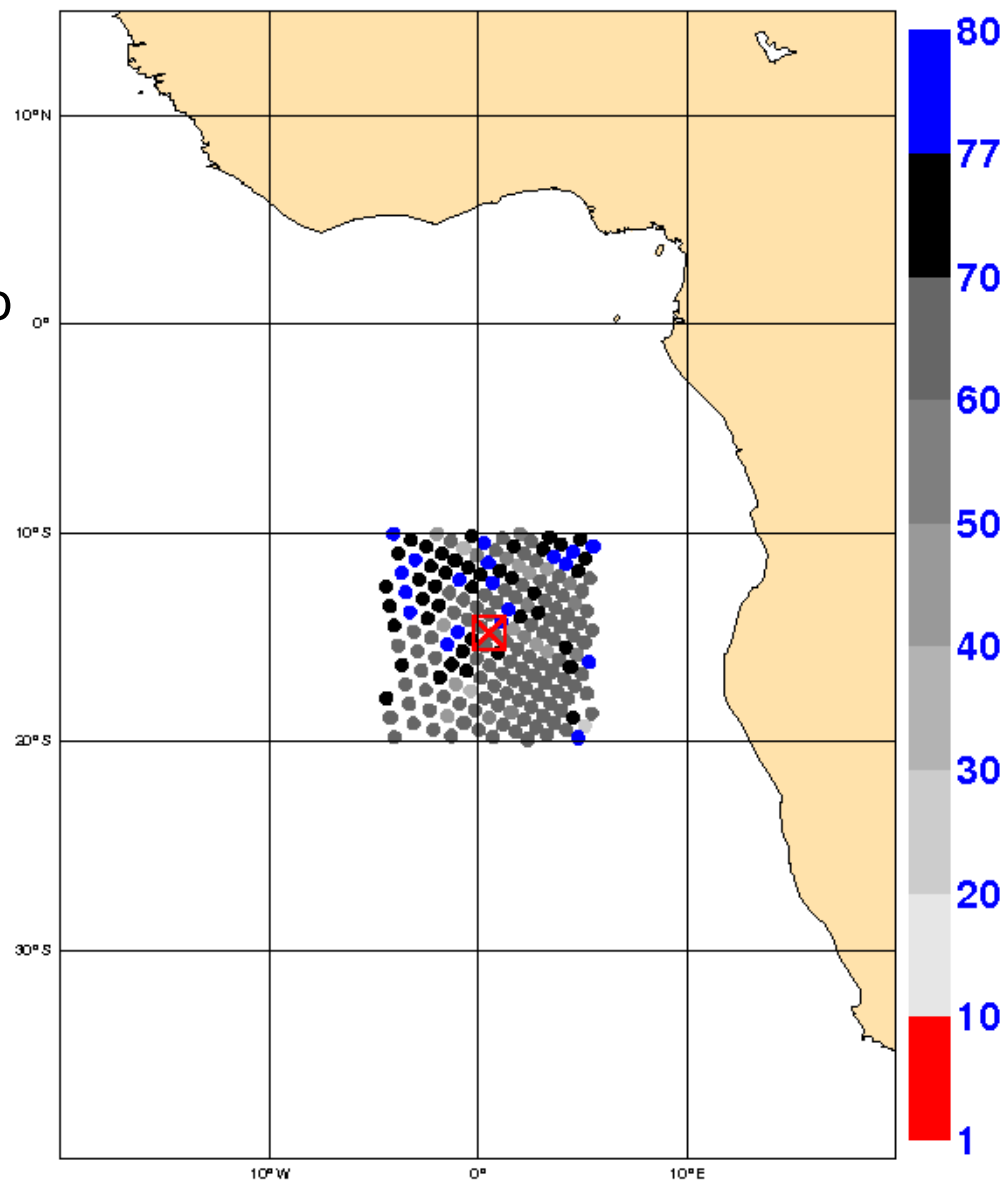
B Matrix

## 2. Case of MF drop #18 - location

- Position of the drop (red cross)
- Sub-sample of IASI measurements close to the drop

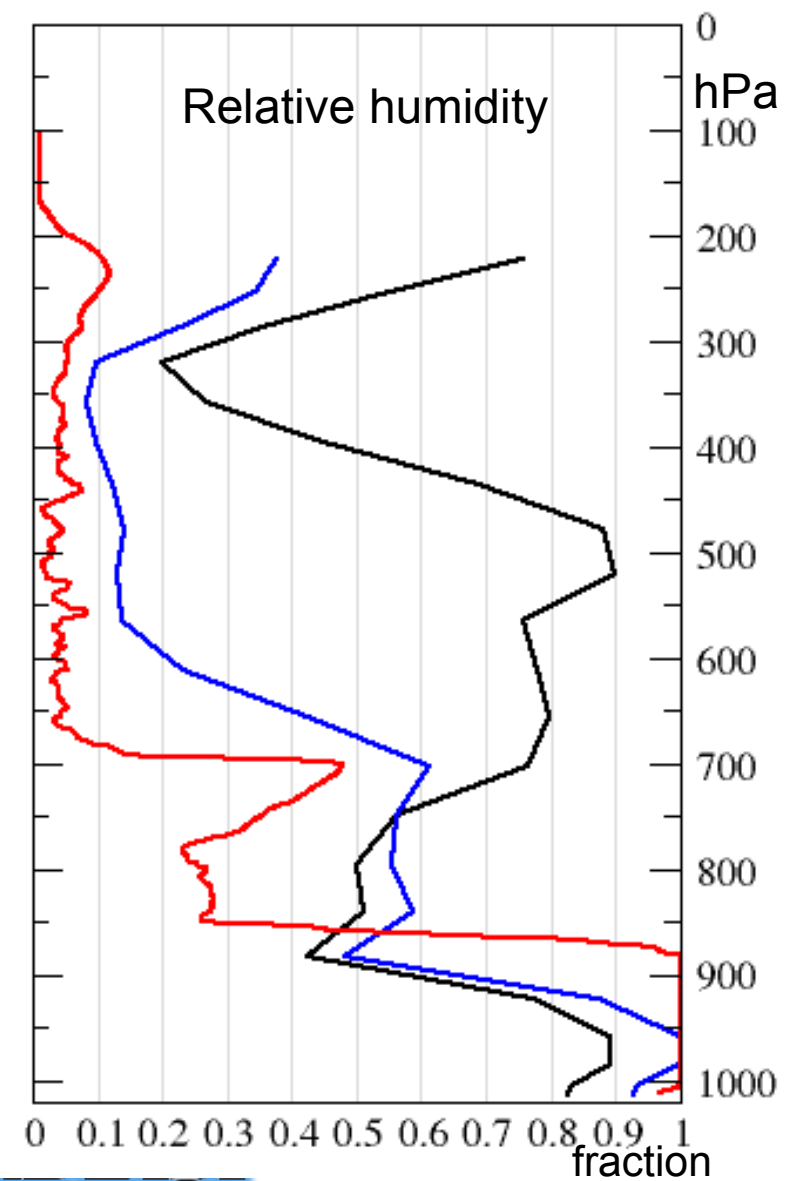
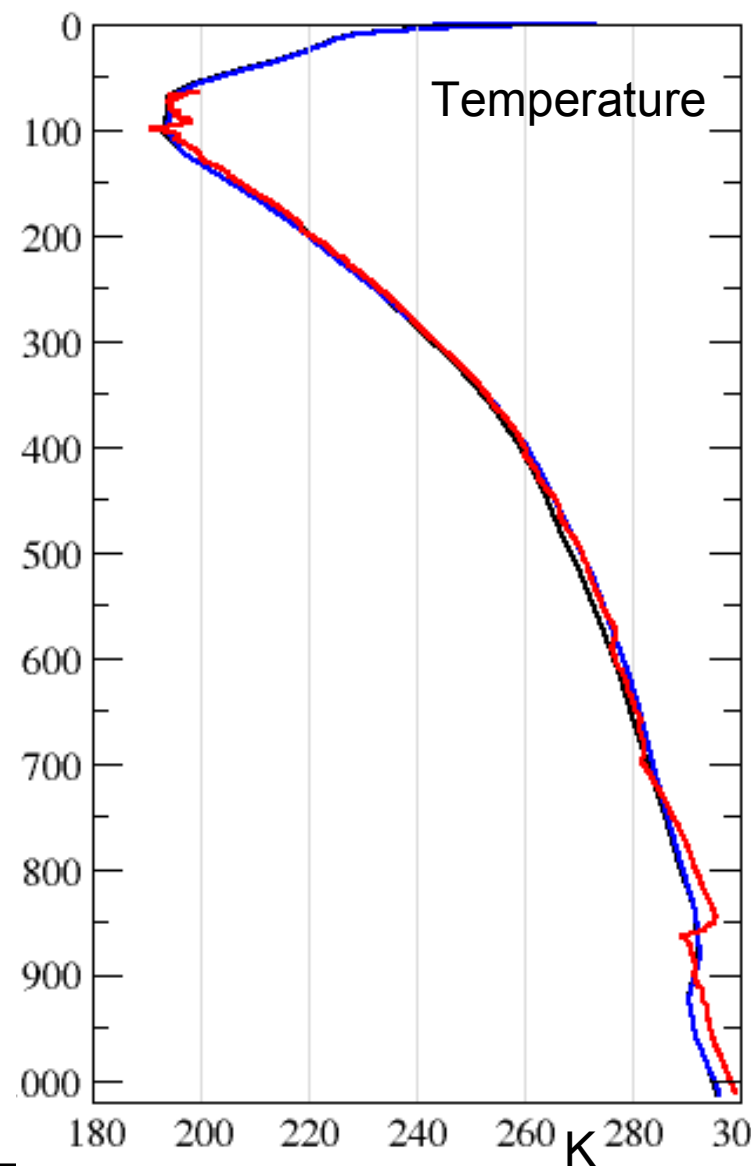
Colour indicates the number of clear channels in each IASI profile (maximum is 77, in blue dots).

- Released on 9 March 2010 @ 20:49 UTC



## 2. Case of MF drop #18

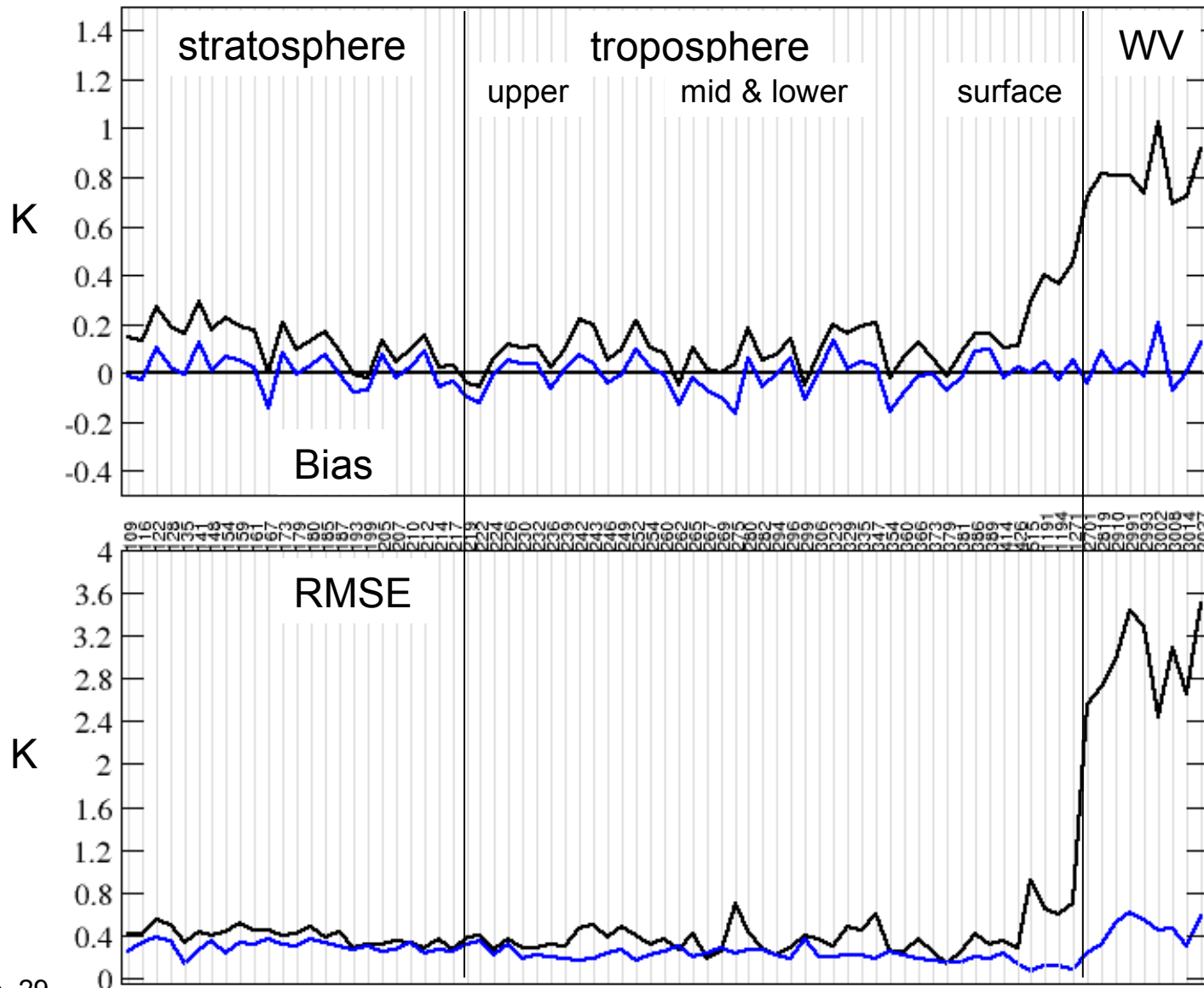
**Background**  
**Retrieval**  
**Dropsonde**



## 2. Statistics over 18 cases – Brightness Temperatures

**IASI BTs  
minus  
simulations from  
Background**

**IASI BTs  
minus  
simulations from  
Retrieval**

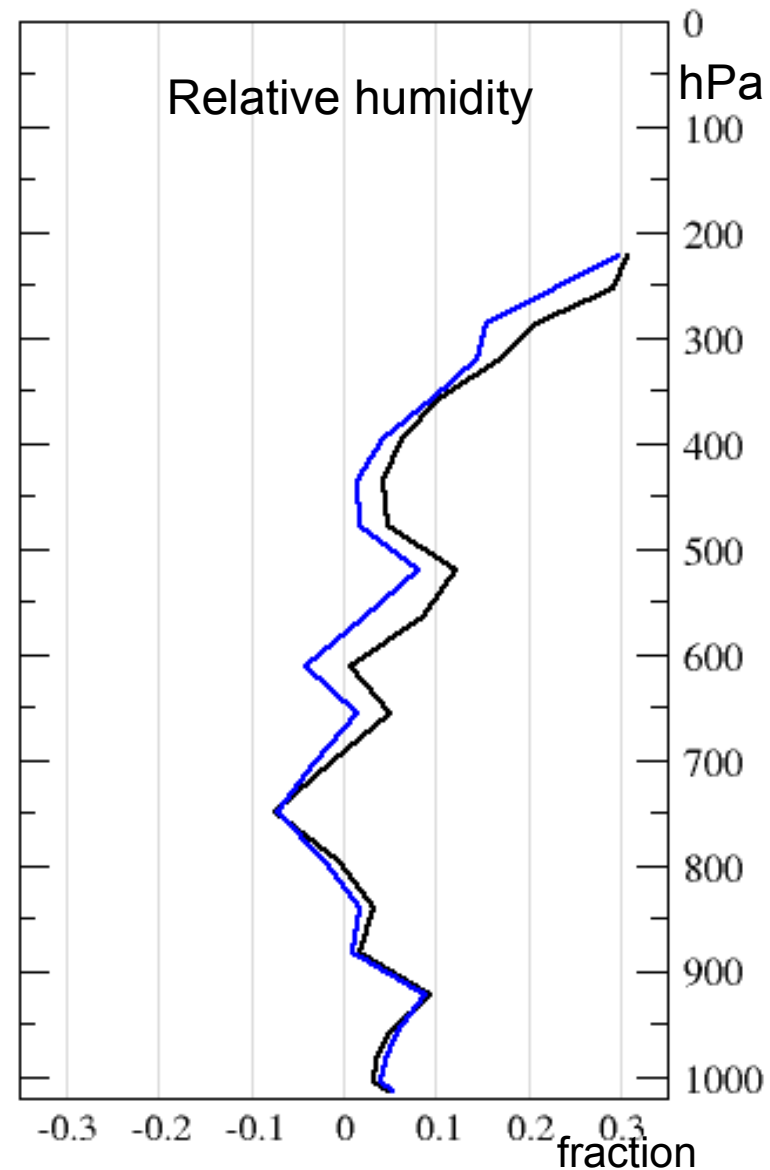
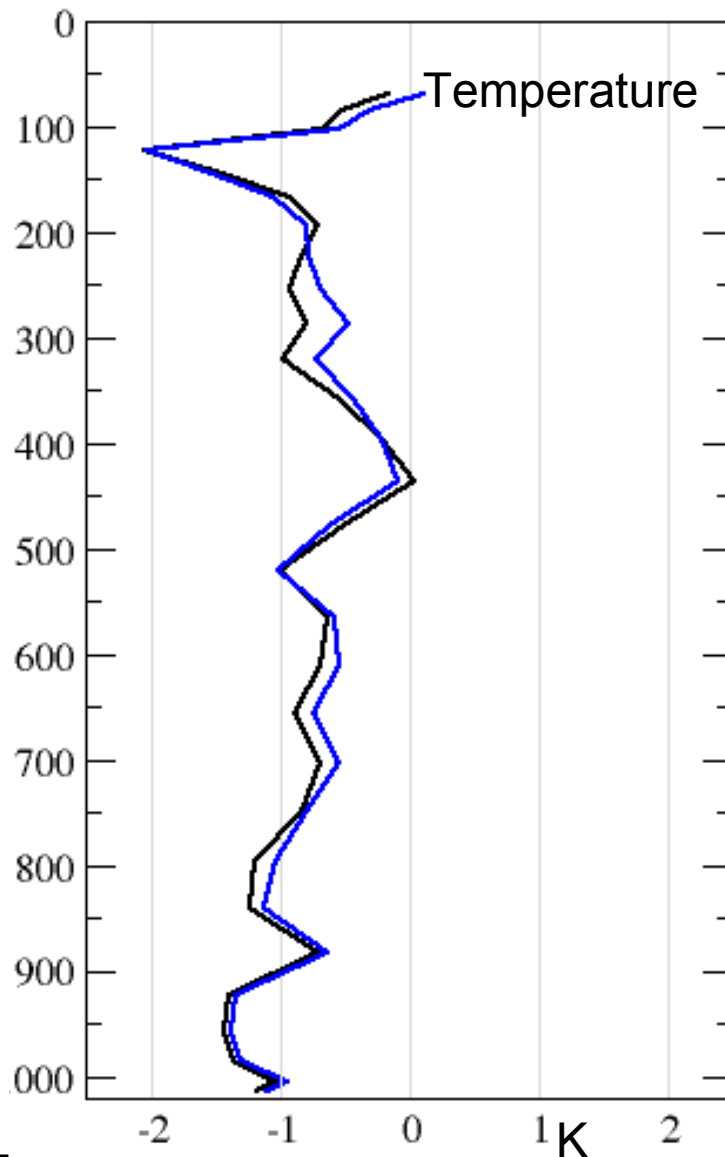


## 2. Statistics over 18 cases - Bias

Average of:

**Background  
minus  
Dropsonde**

**Retrieval  
minus  
Dropsonde**

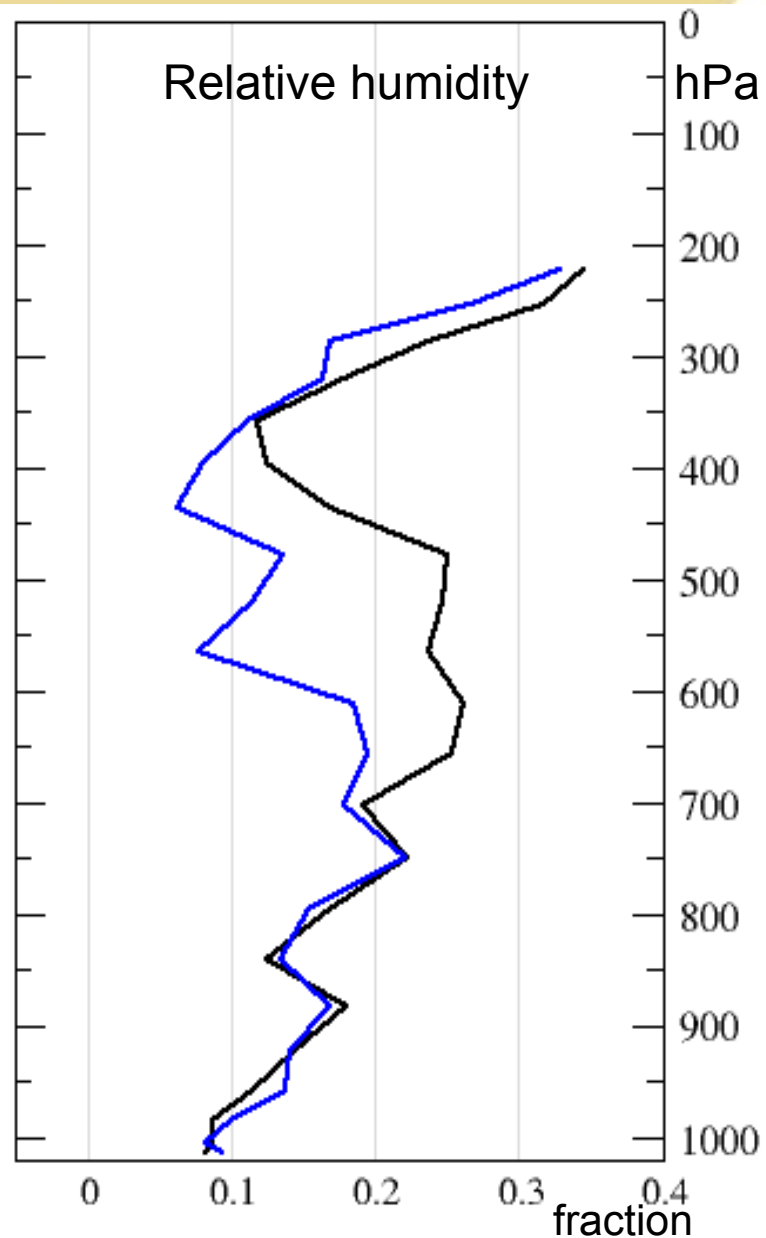
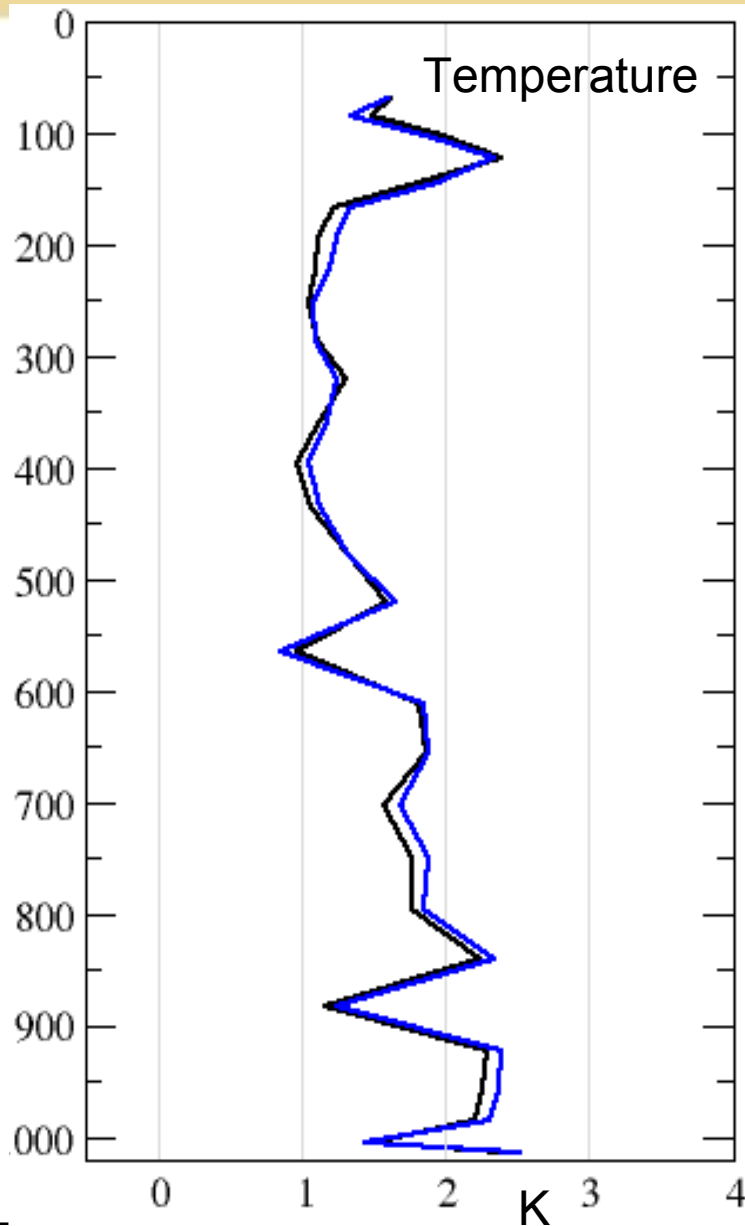


## 2. Statistics over 18 cases - RMSE

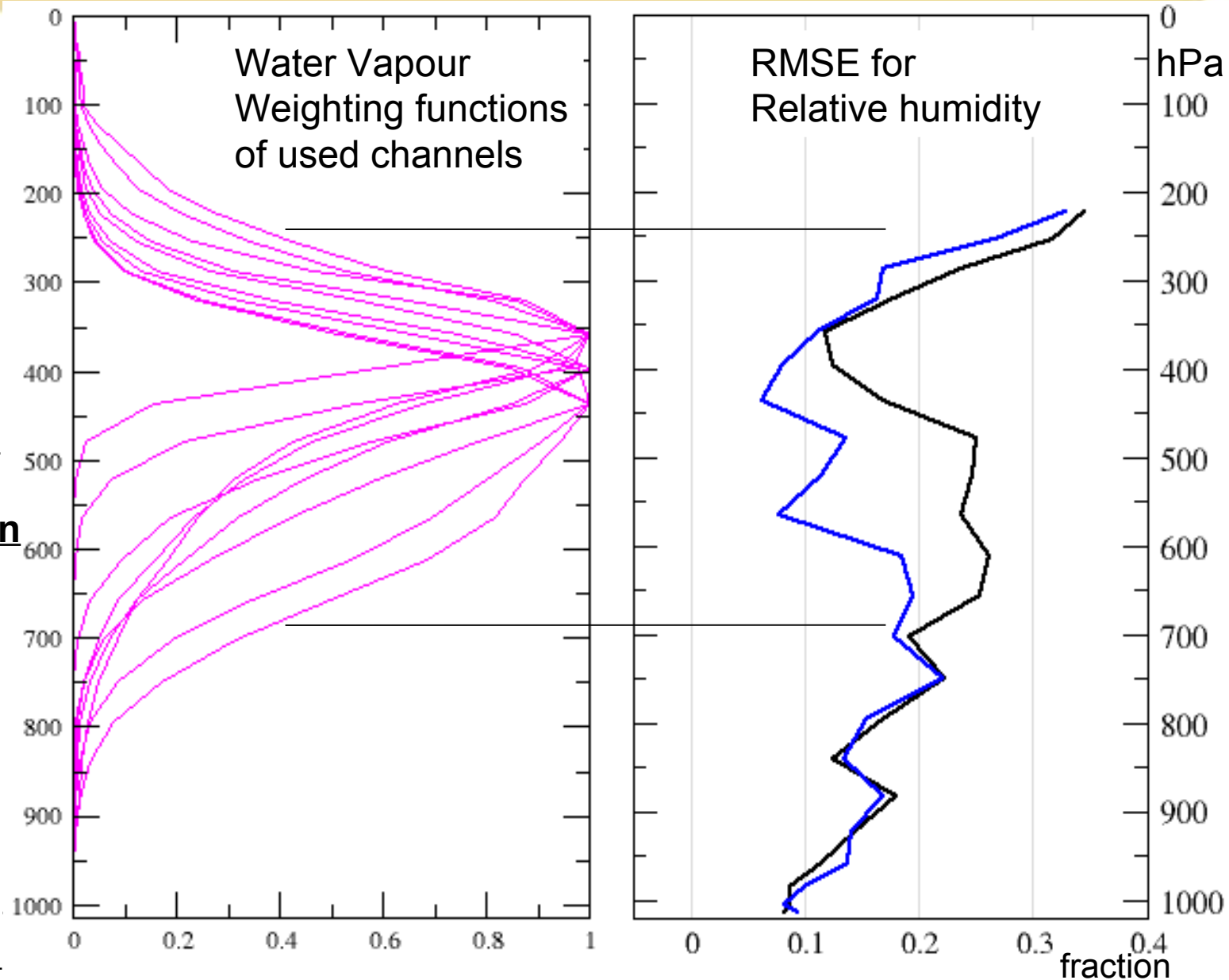
RMSE of:

**Background  
minus  
Dropsonde**

**Retrieval  
minus  
Dropsonde**



## 2. Dropsonde exploitation: 1<sup>st</sup> lesson



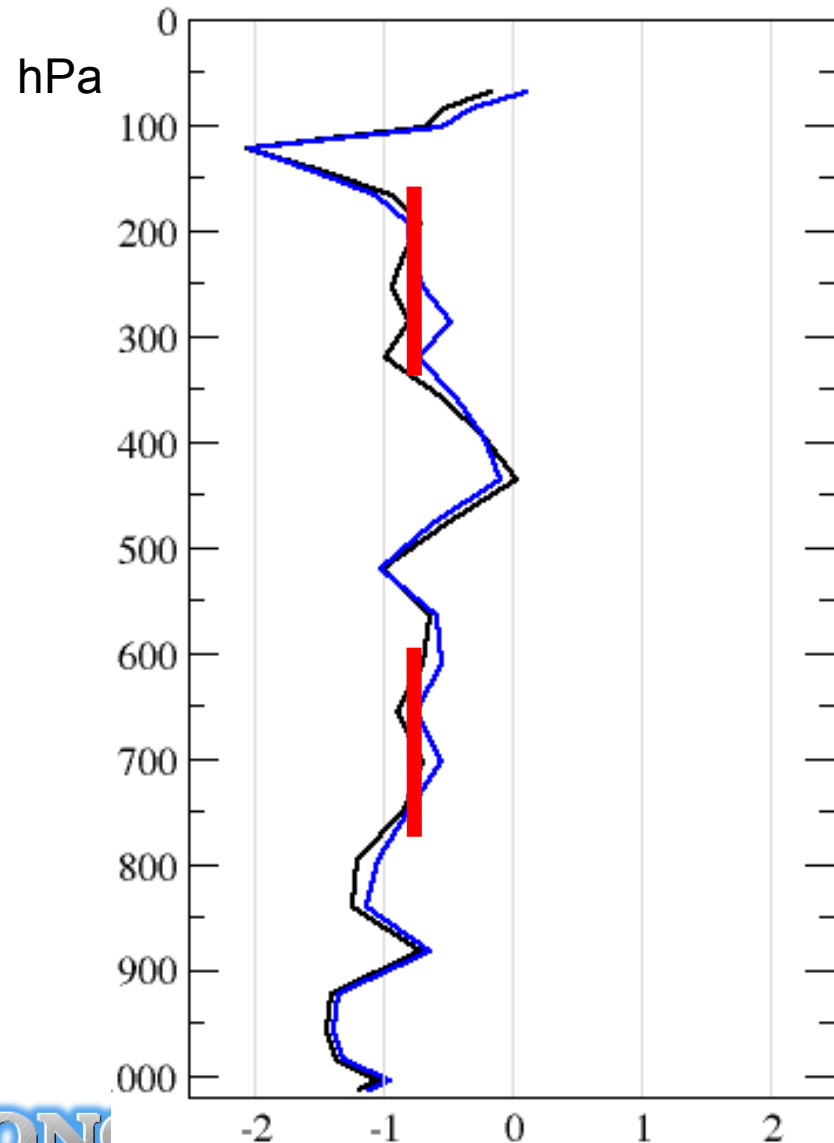
RMSE for **RH**  
**is decreased**  
 at levels **where**  
 we assimilate  
**WV information**  
**from IASI** data



## 2. Dropsonde exploitation: 2<sup>nd</sup> lesson

Dropsondes seem to have a **~1 K bias in temperature**, at least at levels upper than 300 hPa

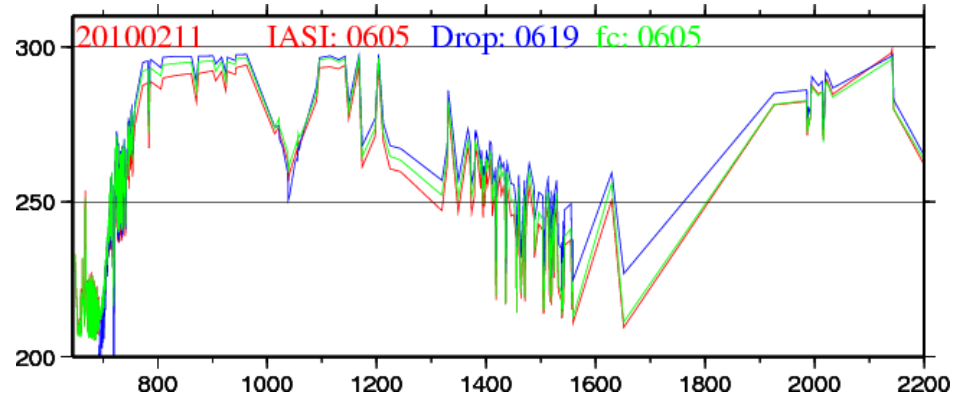
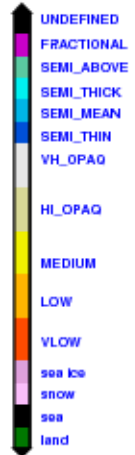
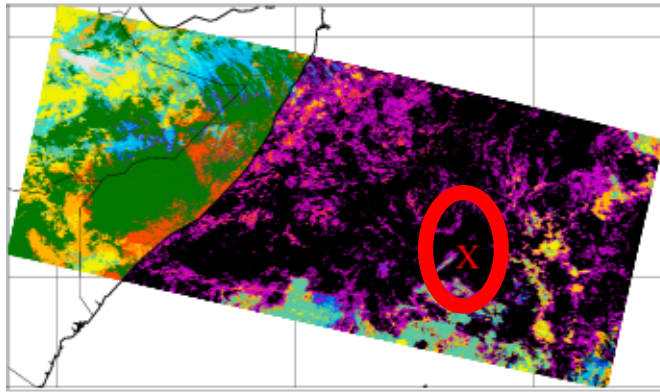
Lydie Lavanant  
(Météo-France / CMS)  
finds similar conclusions  
for data over the Indian Ocean  
with different tools



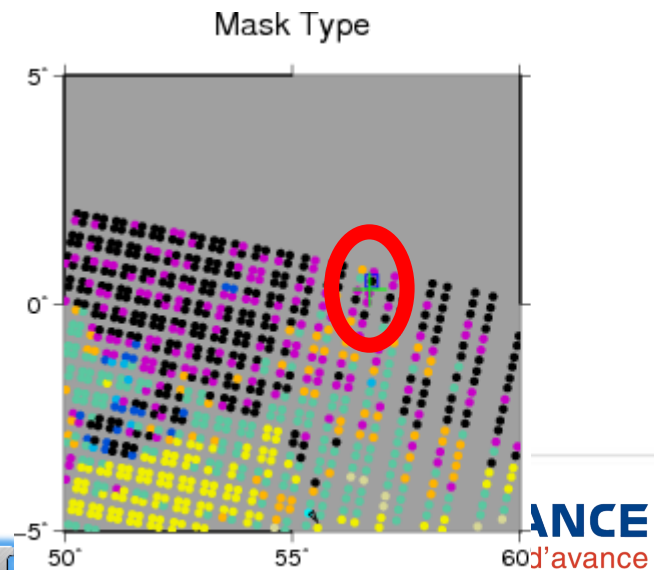
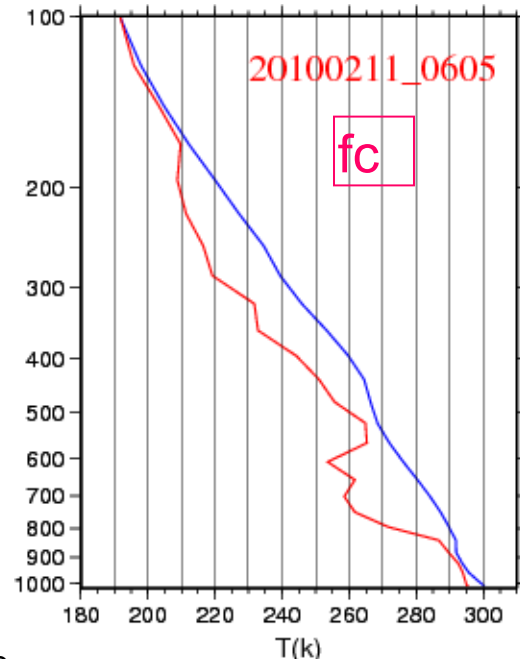
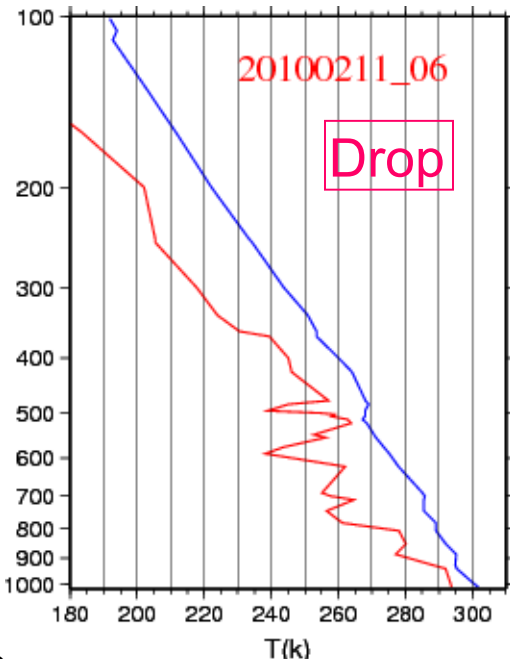
# Contribution from L. Lavanant: MSD1 - MF drop #1 11/02/2010 . 06h19 . Lat 56.71 . Lon 0.31

AVHRR

Classif ; 20100211 0604



IASI:  
Lat 56.75 ; lon 0.49 ; Dx 21km  
Clear

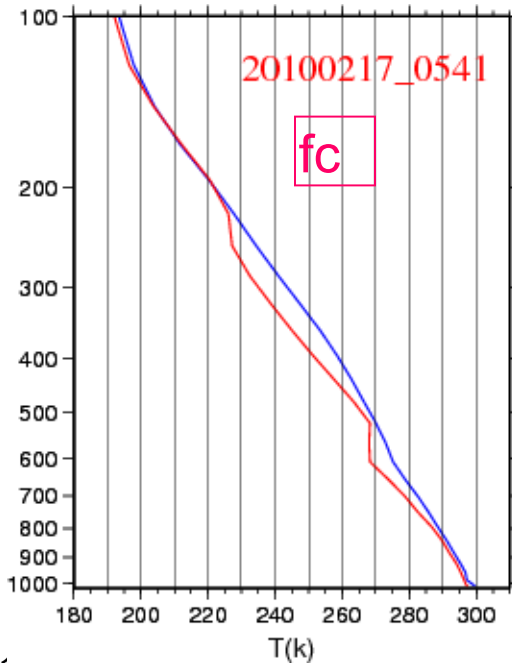
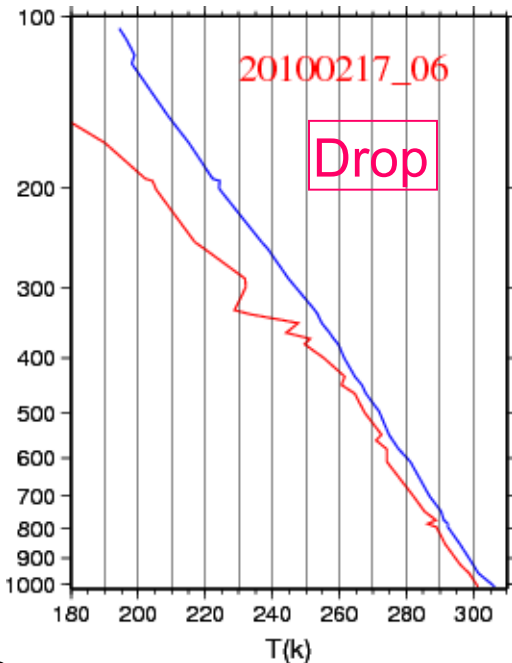
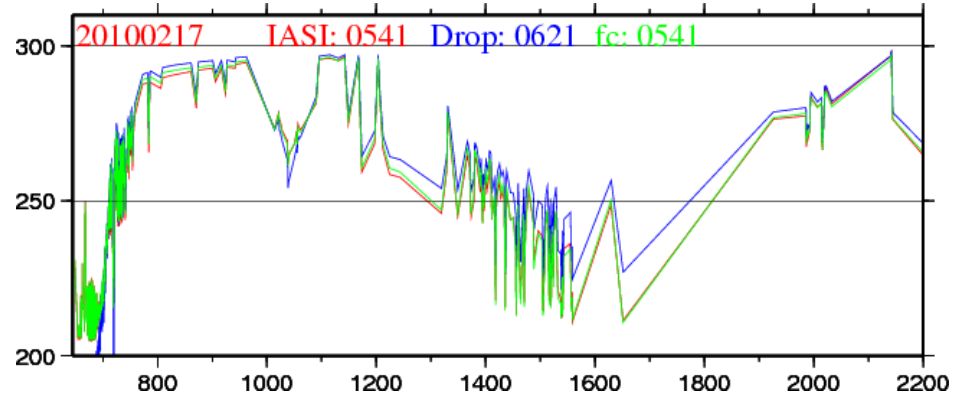
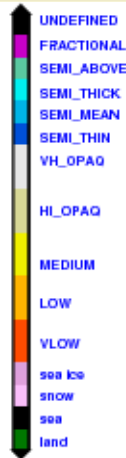
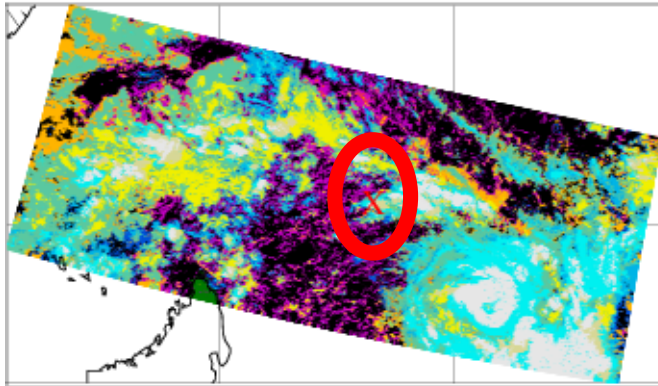


# Contribution from L. Lavanant: MSD1 - MF drop #11

17/02/2010 . 06h21 . Lat 56.0 . Lon -9.53

AVHRR

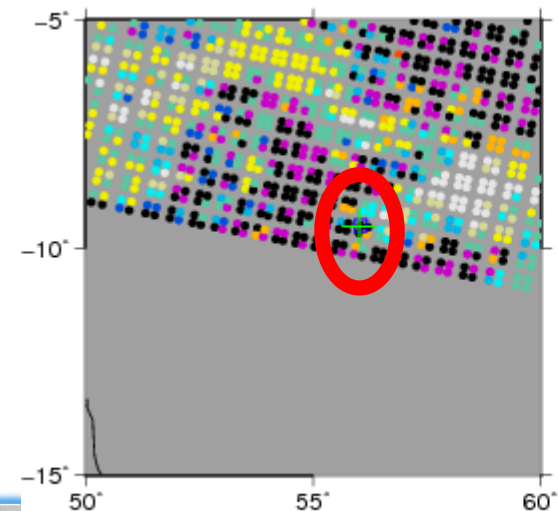
Classif ; 20100217 0543



IASI:

Lat 56.04 ; lon -9.52 ; Dx 4.1km  
99% clear. 1% Pclld 837.2

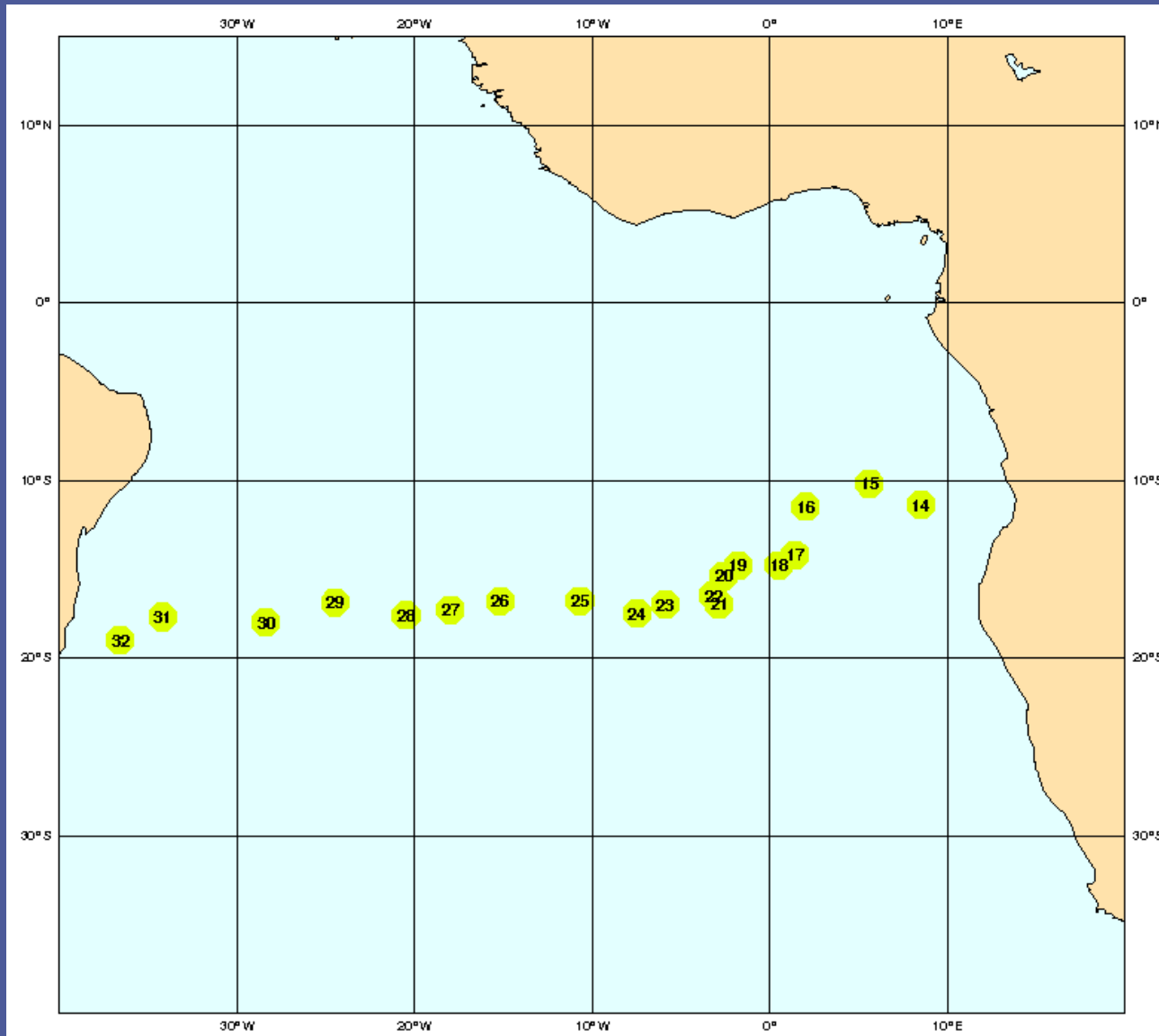
Mask Type



# Conclusion

- IASI has a positive impact both in global and convective-scale NWP  
More data will be used (more channels, higher horizontal resolution)
  
- Pre-Concordiasi campaign in the Tropics
  - provided a lot of valuable data, including T and RH in-situ soundings (we now have an idea of the quality of the sondes)
  - is the opportunity to evaluate recent developments e.g. modification of observation errors description (full R matrix)
  
- Other challenging issues will be addressed thanks to Concordiasi:
  - Retrievals over Antarctica  
→ talk by [Aurélie Bouchard](#)
  
  - Cloud-affected radiances assimilation  
→ talk by [Nadia Fourrié](#)

Thank you for listening !



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