



Evaluating the use of IASI hyperspectral sounder data for severe storm forecasting at the ESSL Testbed

**Metop satellite
carrying IASI**

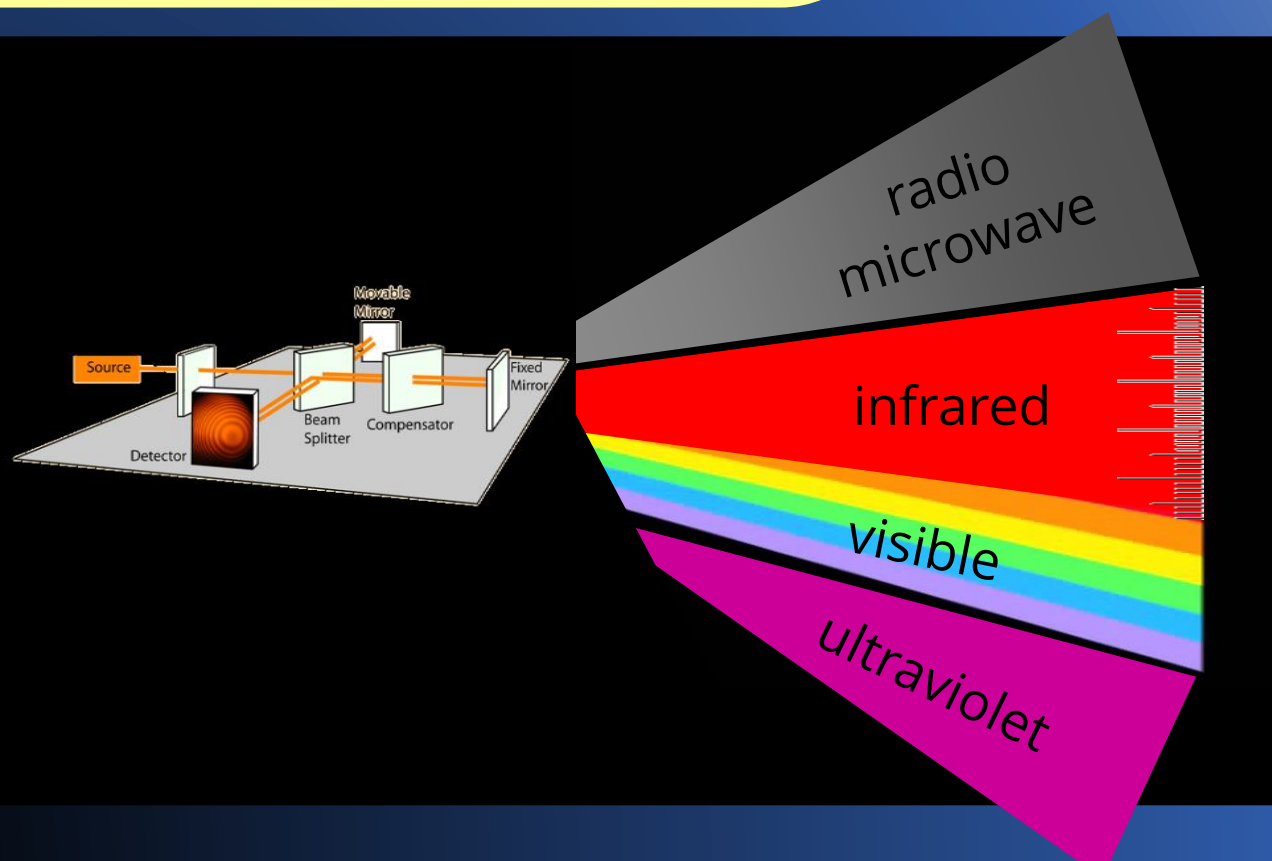
Infrared Atmospheric
Sounding Interferometer
(IASI)



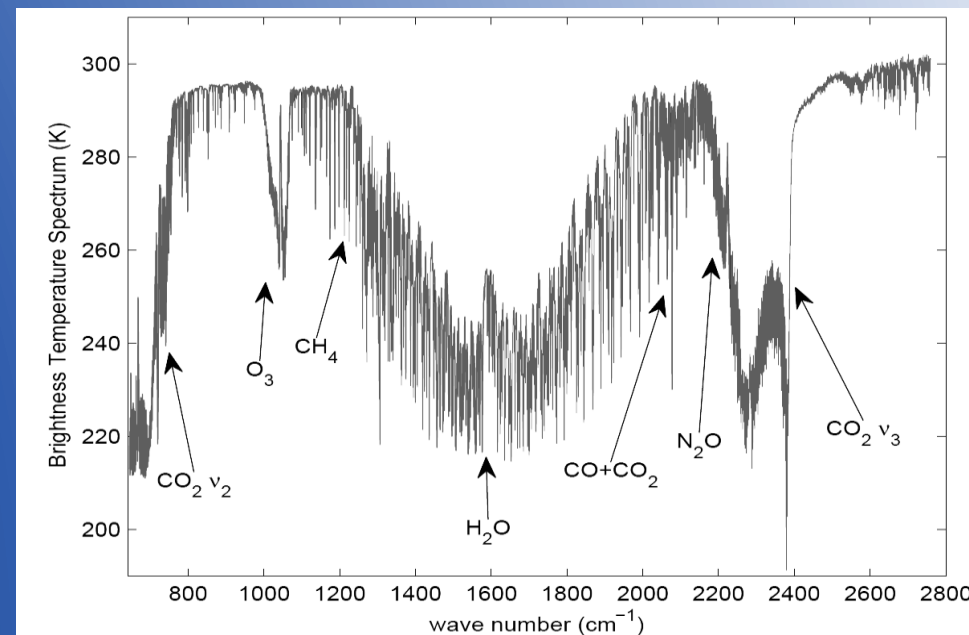
**Pieter Groenemeijer, Tomáš Púčik (ESSL)
Thomas August (EUMETSAT)**

IASI Instrument

The IASI sounder measures infrared radiances ...



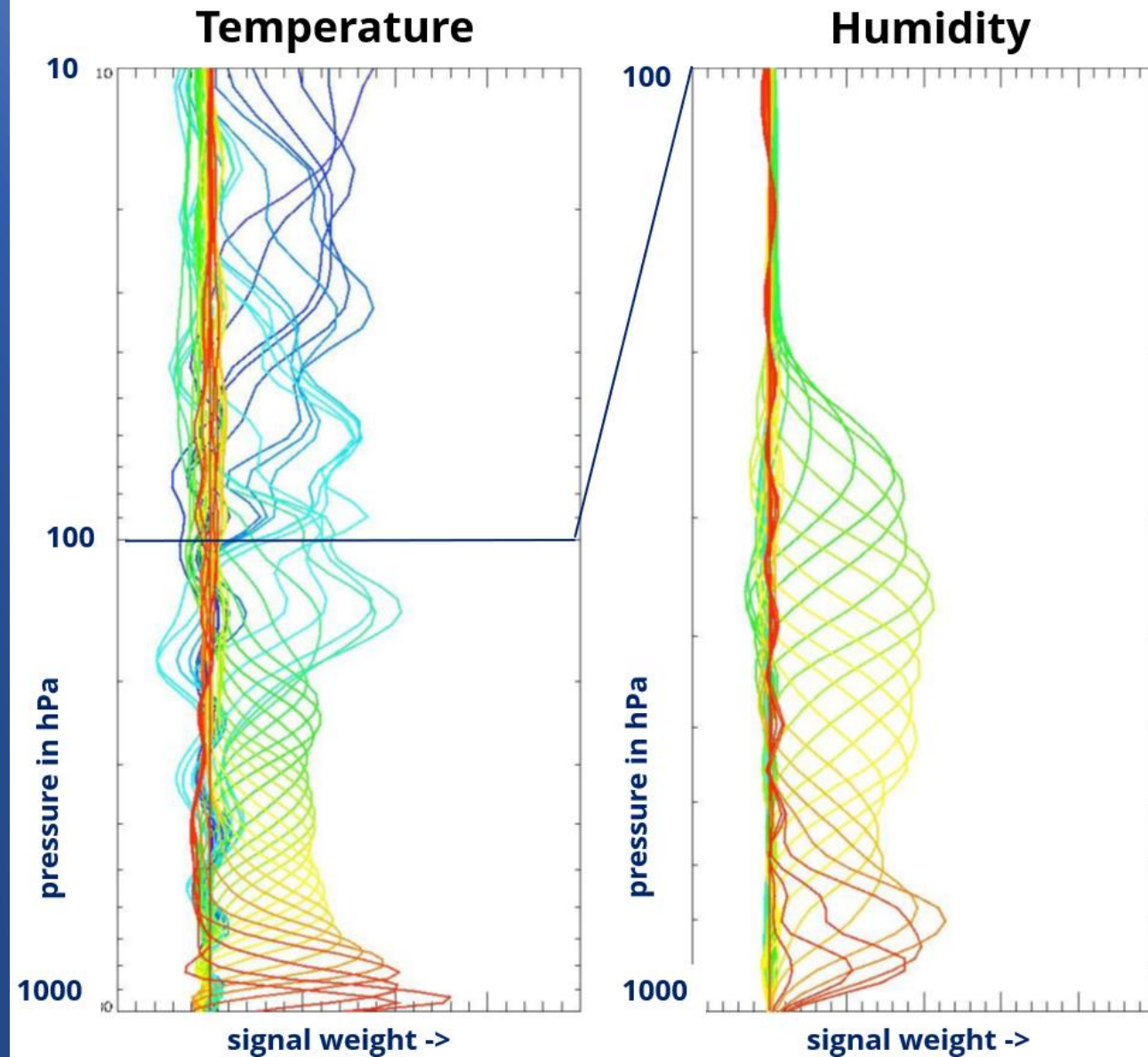
IASI: 8461 channels



Vertical Profiles

The IASI sounder measures infrared radiances ...

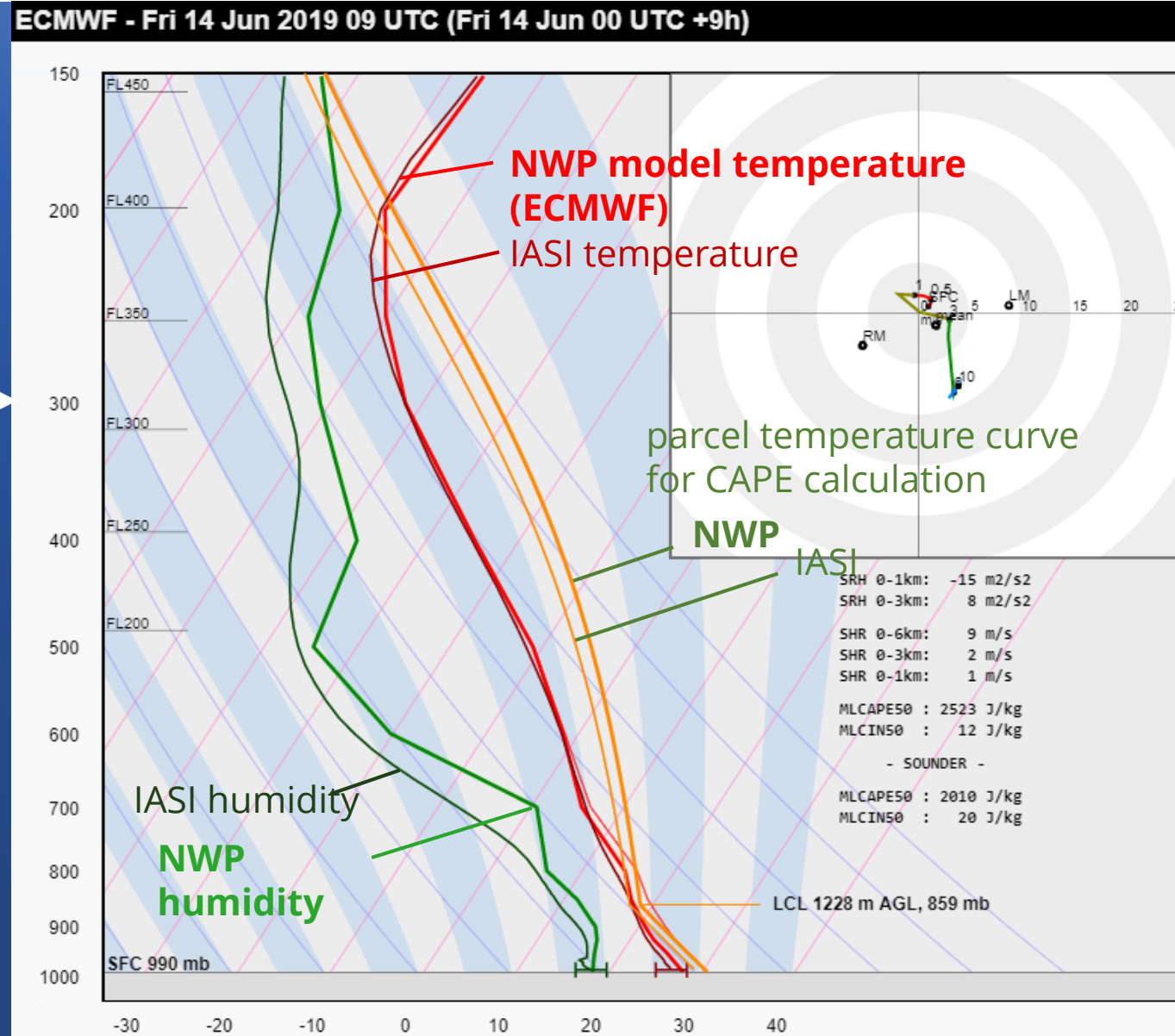
... from which vertical temperature and humidity profiles can be derived:



Comparison with NWP

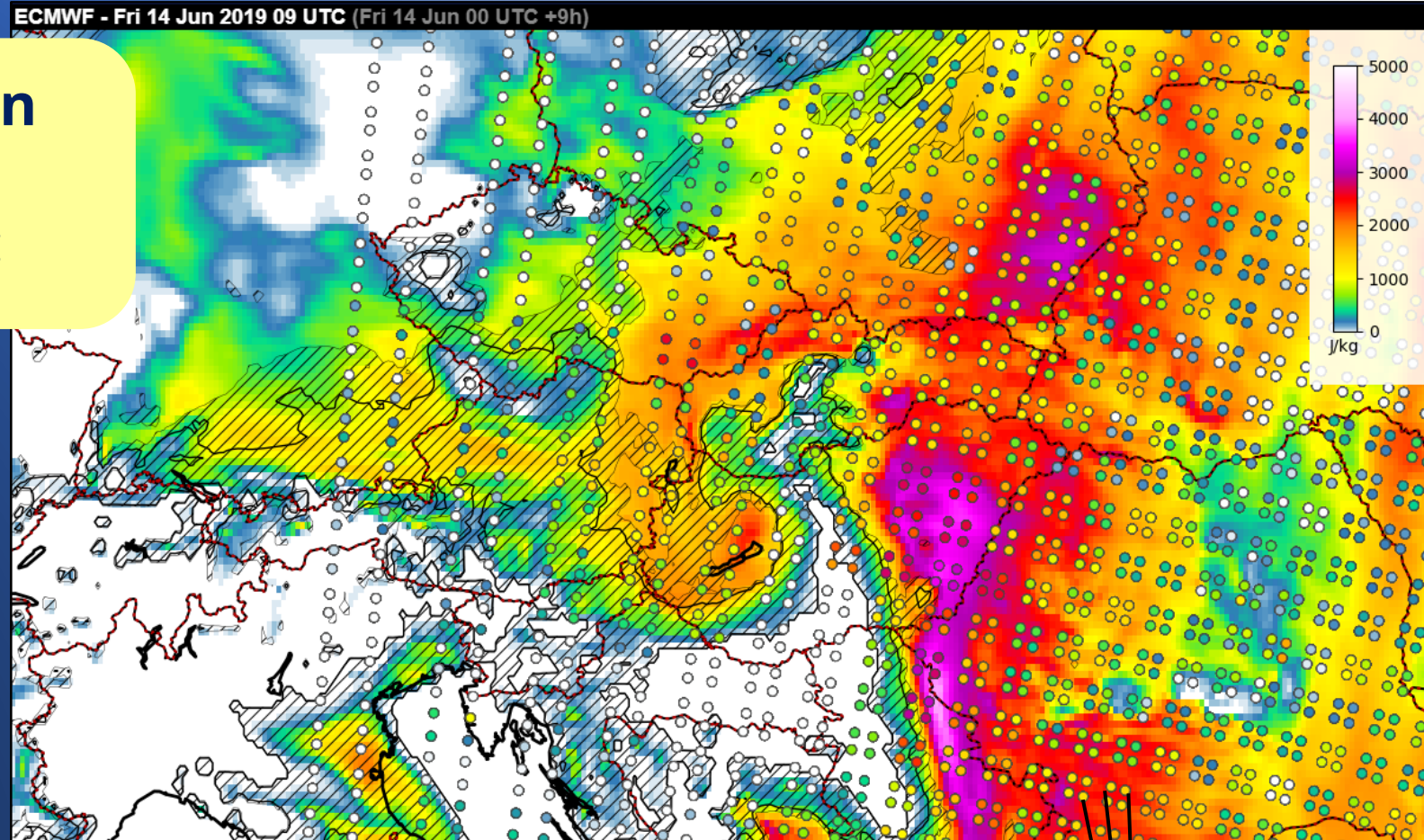
We can compare them with numerical weather predictions

“Roaming sounding” diagram from the Testbed data interface



Comparison of convective parameters

From those profiles, we can compute convective parameters, such as CAPE:



50 mb mixed-layer CAPE

background: values derived from +9 h model forecast (ECMWF IFS)

dots indicate IASI-derived values

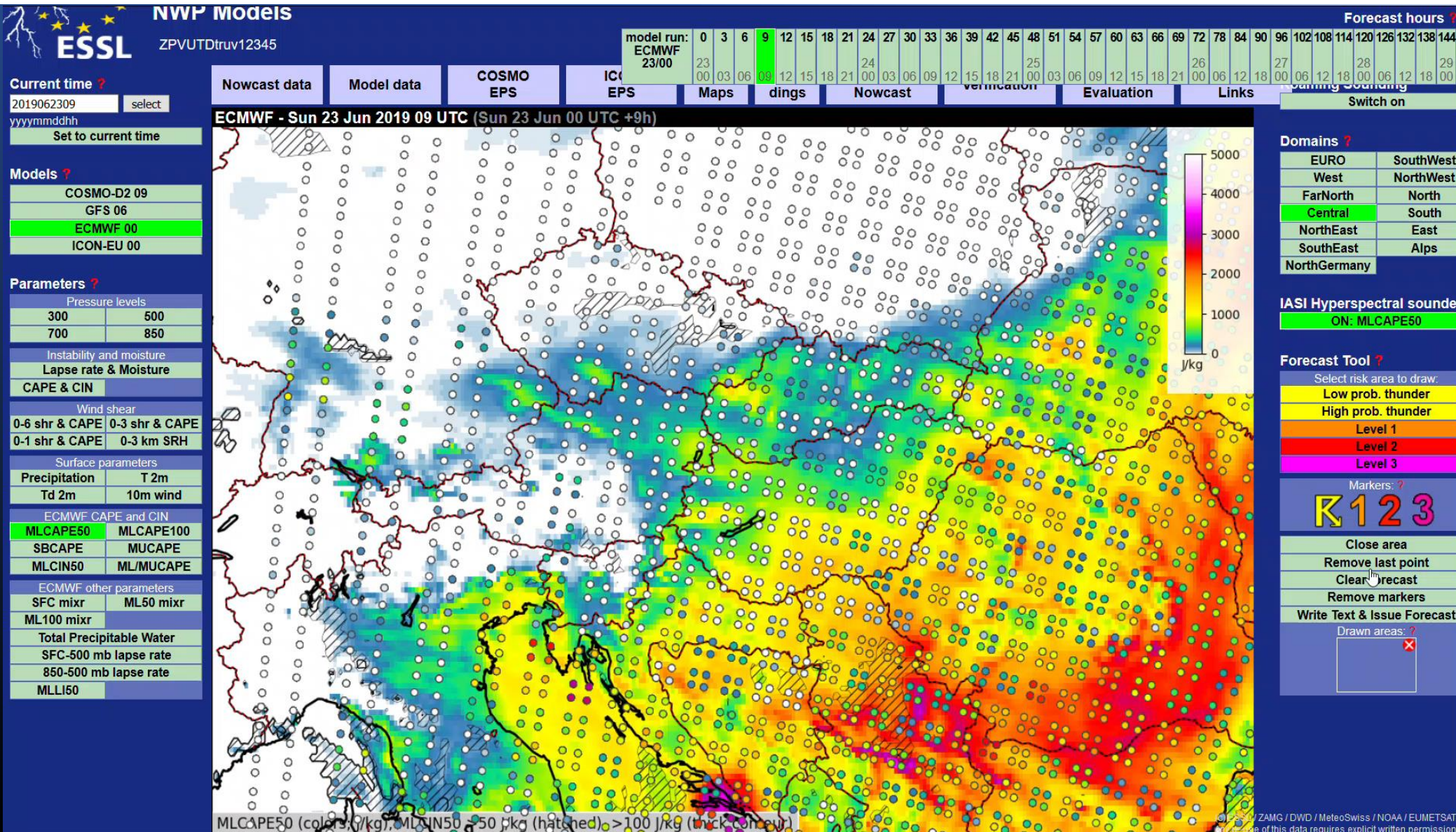
Testbed evaluation



In June and July 2019, over 40 Testbed participants worked with IASI profiles and parameters to make experimental nowcasts and forecasts for severe convective storms



Testbed evaluation



Testbed



Testbed evaluation



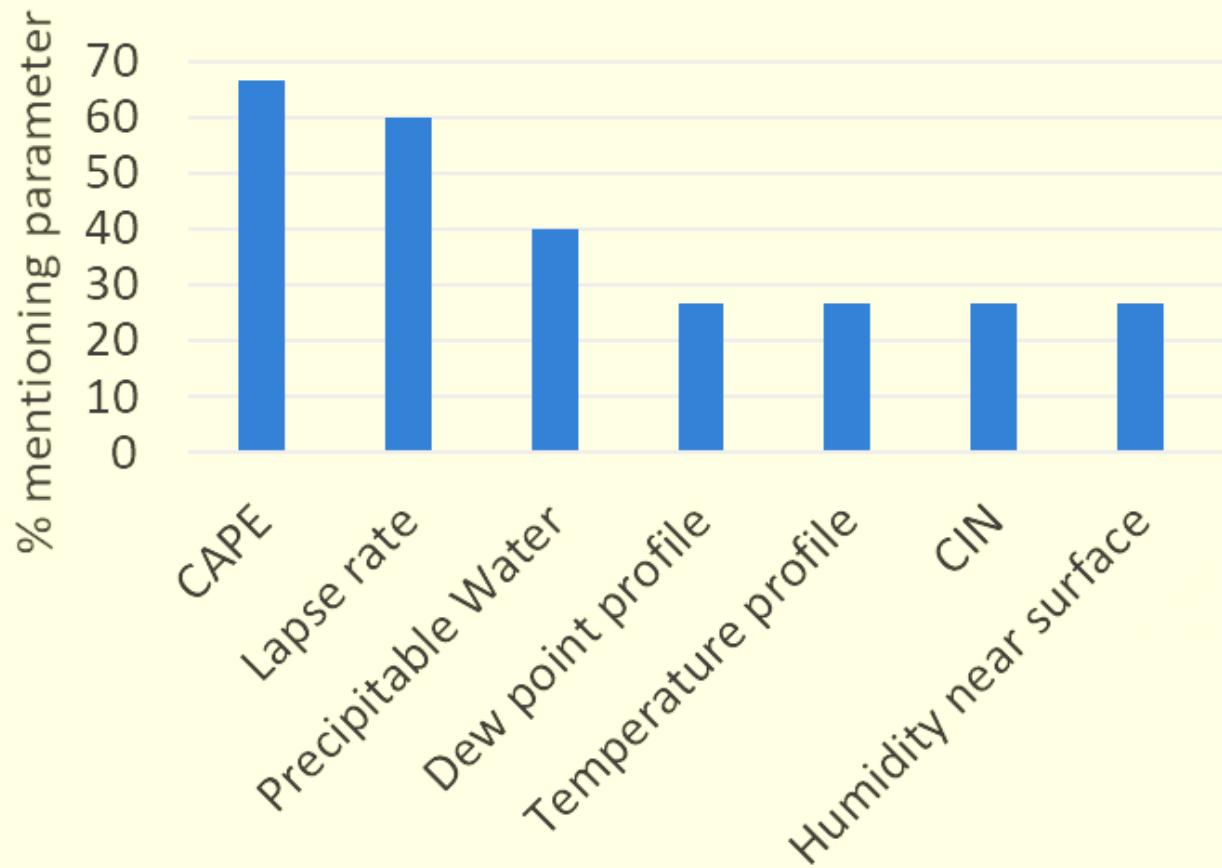
Main outcomes:

- almost all participants found the type of data useful
- forecasters would like to have a higher (spatio-) temporal availability
- IASI profiles should stay completely independent of the model data
- forecasters found greatest discrepancies between IASI and NWP in the near-surface humidity



Testbed evaluation

Preferred IASI-derived parameters according to Testbed participants

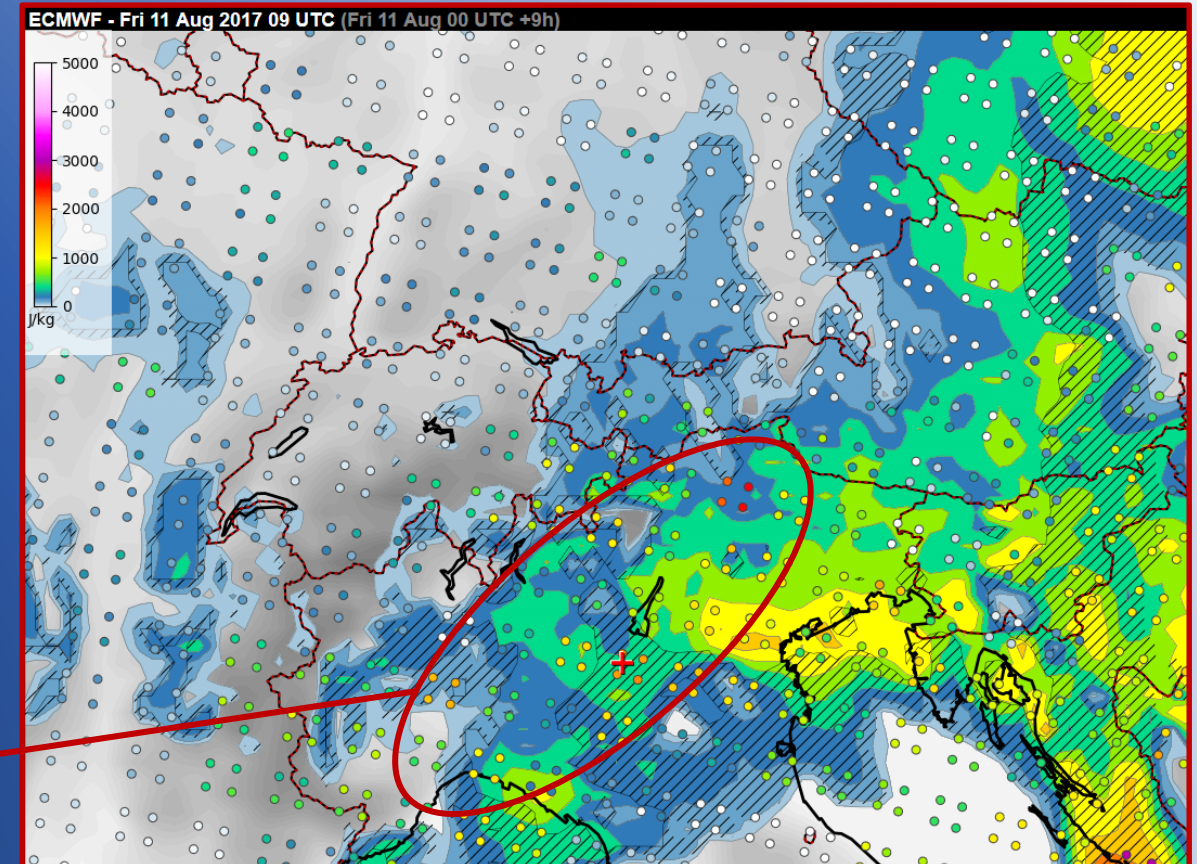


Studies of past cases

ESSL studies past cases of severe convection that were impactful or not well anticipated by numerical weather prediction.

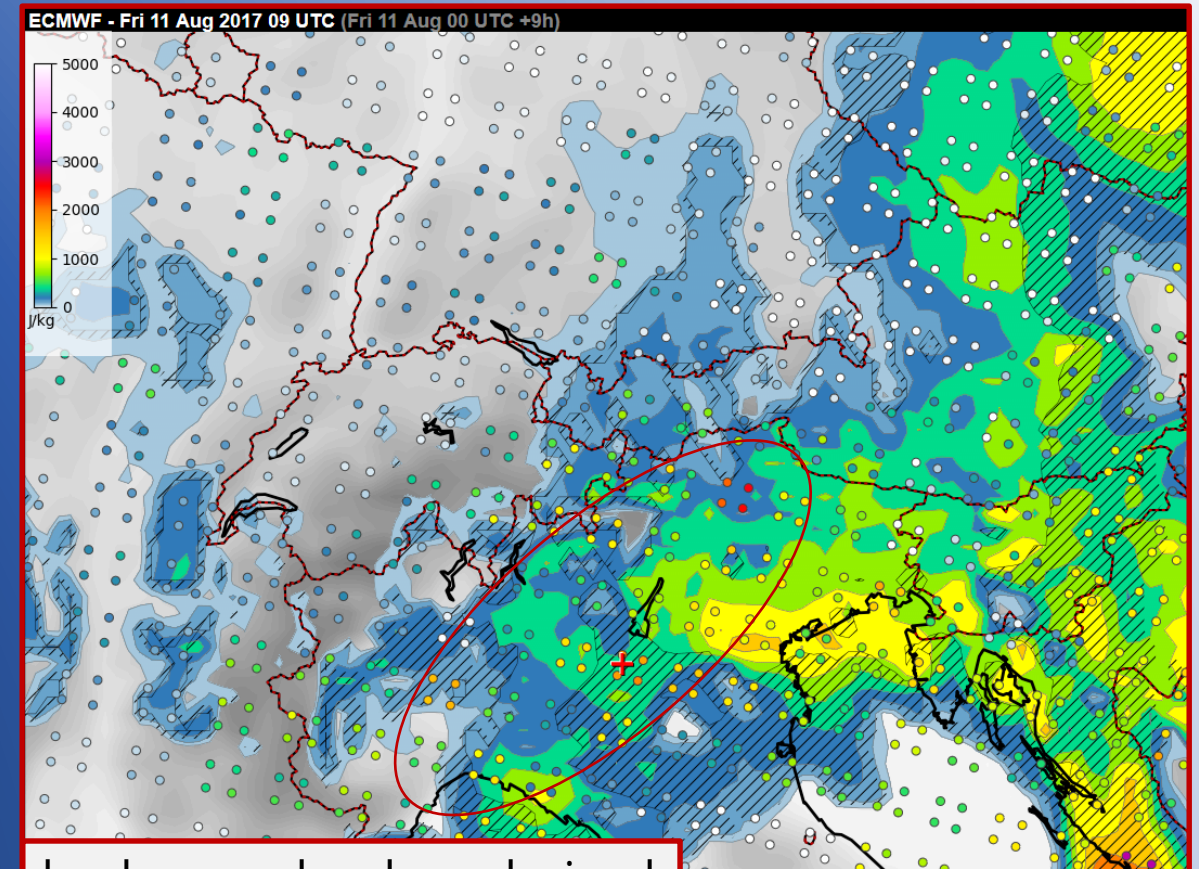
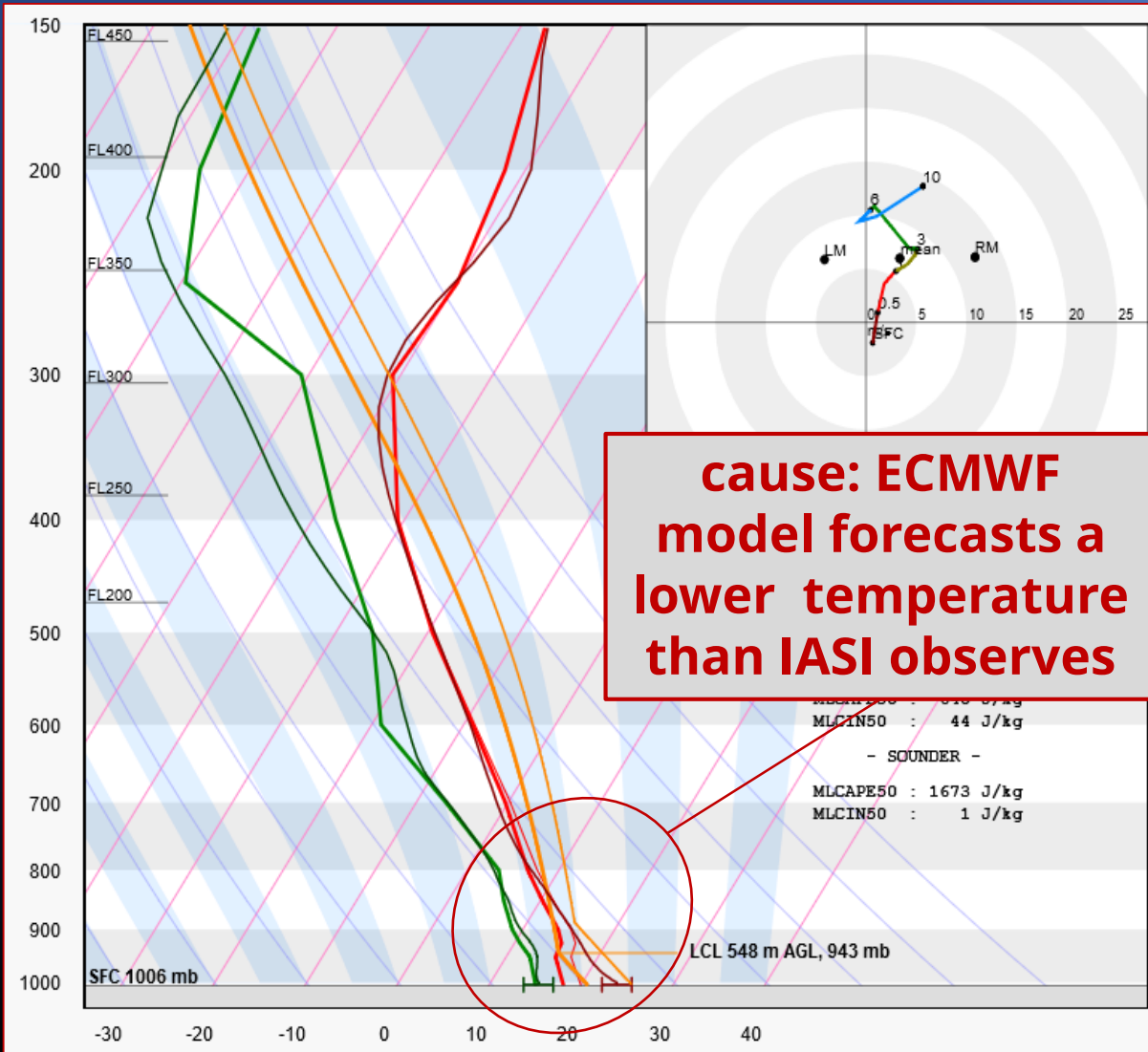
An example...

**area with higher
CAPE according to
IASI than in the
ECMWF model**



background: values derived from +9 h model forecast (ECMWF IFS). Dots indicate IASI-derived values

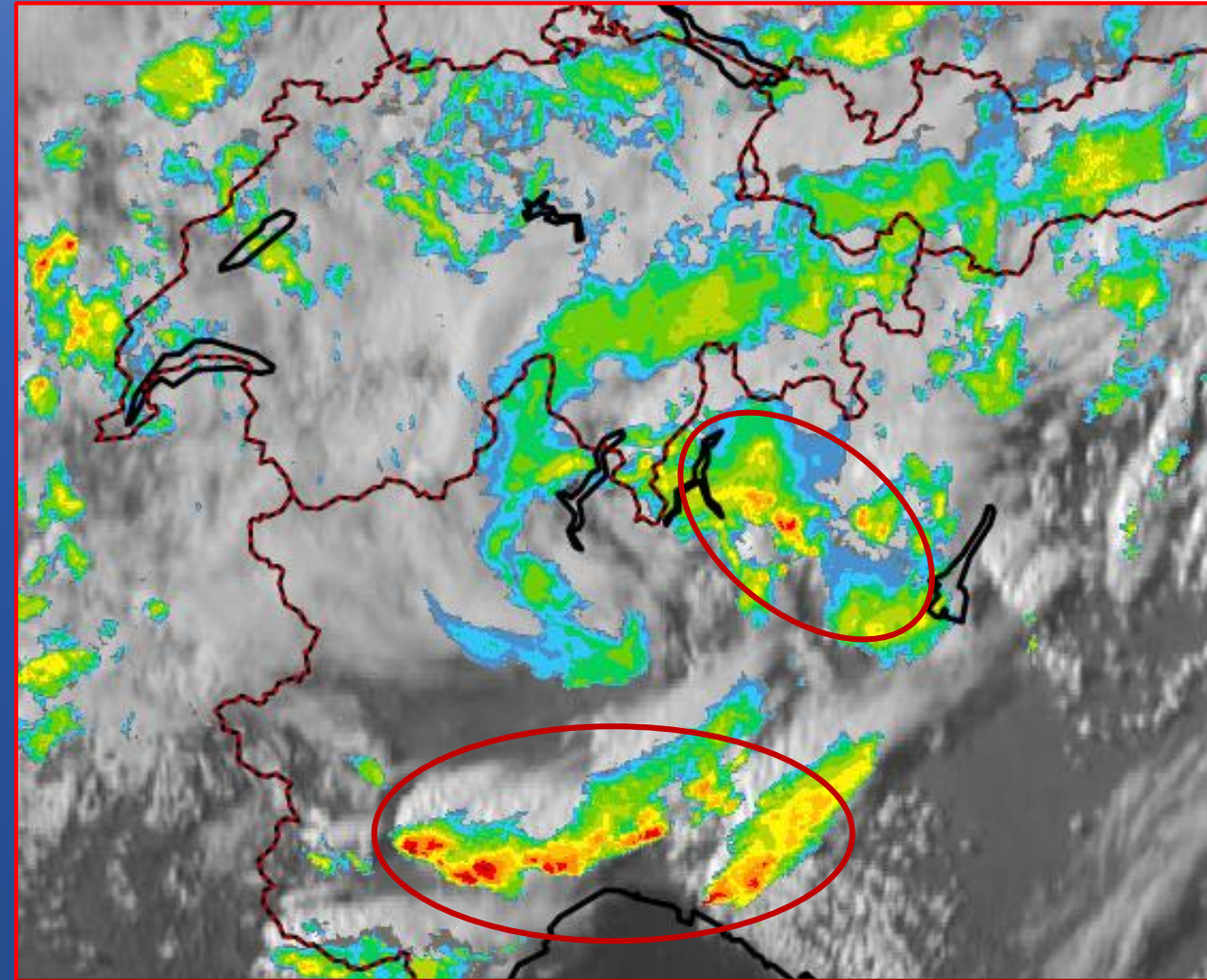
Studies of past cases



background: values derived from +9 h model forecast (ECMWF IFS). Dots indicate IASI-derived values

Studies of past cases

widespread
convective storm
development by 1500
UTC



radar and VIS satellite at 1500 UTC

The IASI service



Operational IASI Infrared Atmospheric Sounding Interferometer

- flies on polar satellites Metop-A/-B/-C launched 2006, 2012, 2018
- has a pixel size of 12 km at Nadir – 2000km swath
- Two overpasses per day across central/southern Europe, in the morning and evening
- More frequent overpasses in northern Europe

Metop satellite carrying IASI

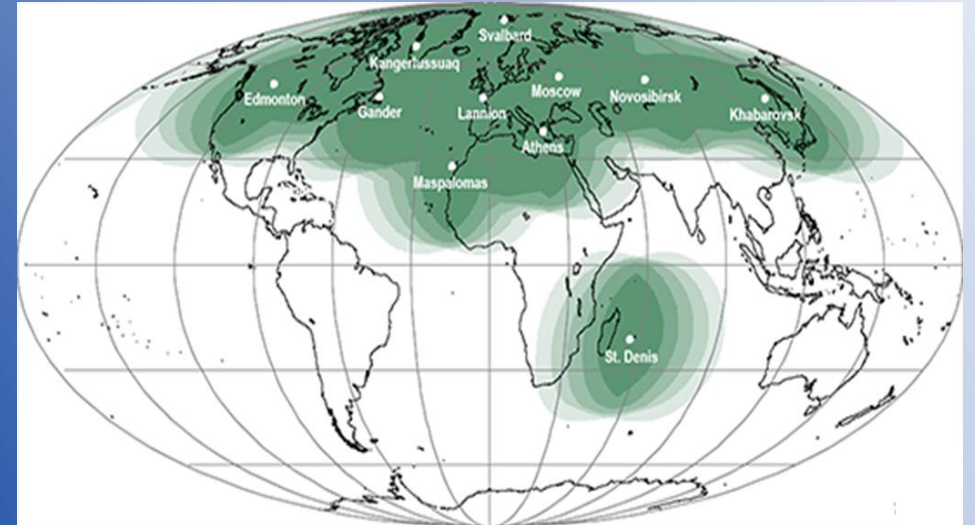


The EARS-IASI service

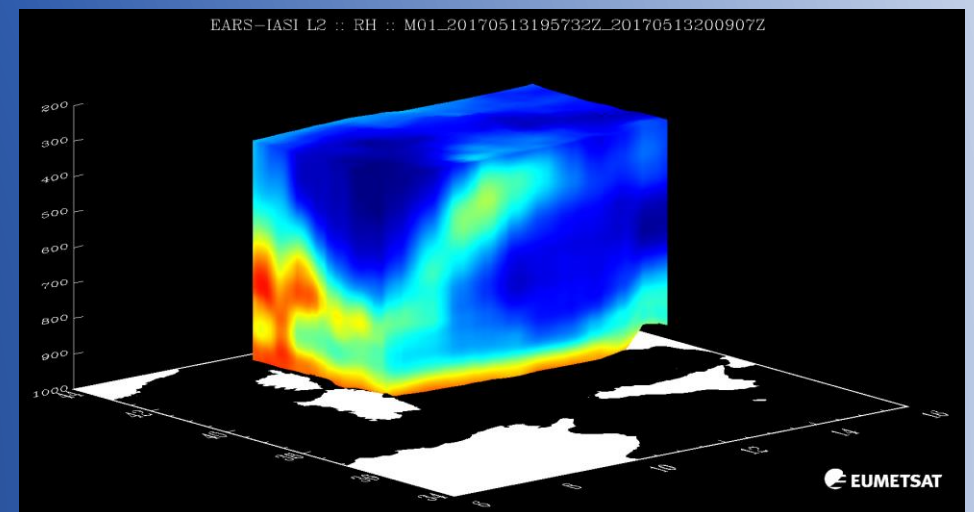


EARS-IASI L2 service

- routinely provides temperature and humidity soundings within 30 minutes from sensing
- available through the EUMETCast service, for the areas covered by the local receiving stations of the EARS-IASI network
- exploit the MW companion instruments, hence data is also provided in most cloudy regions
- fully independent from numerical weather forecasts



3-dimensional retrieved relative humidity:



The future



MTG-IRS

Meteosat Third Generation – InfraRed Sounder

**coming
soon...**

- will fly on the geostationary Meteosat Third Generation
- Similar sounding data to IASI, but **every 30 min** and with a pixel size of **7 km**

The first MTG sounder satellite is scheduled to be launched in **2023**.

IASI-NG

IASI-Next Generation

**coming
soon...**

- uses 17000 channels (IASI: 8461)
- will have the same coverage but **improved** sounding performance