

Preparation for the assimilation of the future IRS sounder @Météo-France

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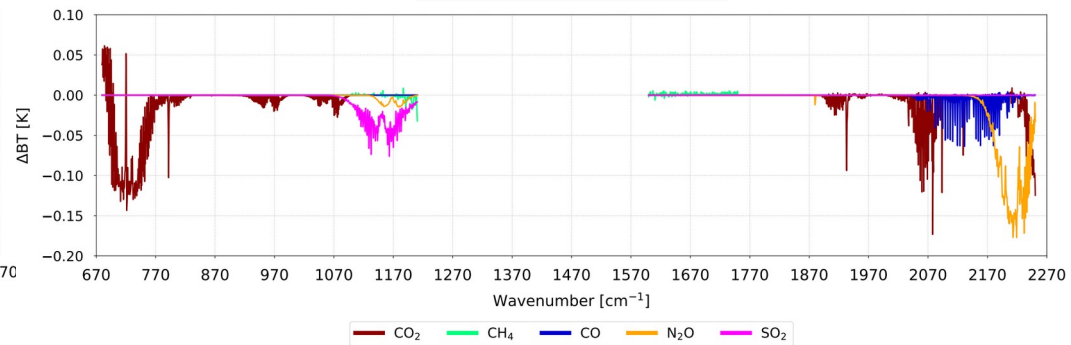
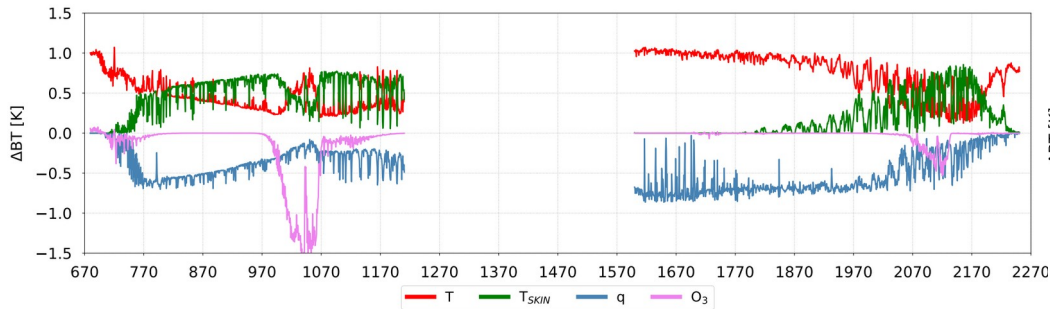
With the participation of Philippe Chambon, Pierre Brousseau, Vincent Guidard and Jérôme Vidot



IRS MAG 8 June 2021

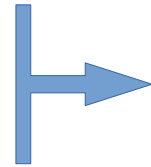


Sensitivity analysis of IRS channels (1960)

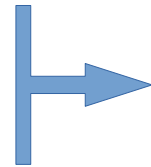


Sensitivity of the IRS spectrum to :

- Temperature
- Humidity
- Ozone
- Carbone monoxyde



Impact in NWP models : AROME
O Coopmann EUMETSAT Fellowship



Impact in chemistry transport models : MOCAGE
F Vittorioso PhD funded by TAS/MF

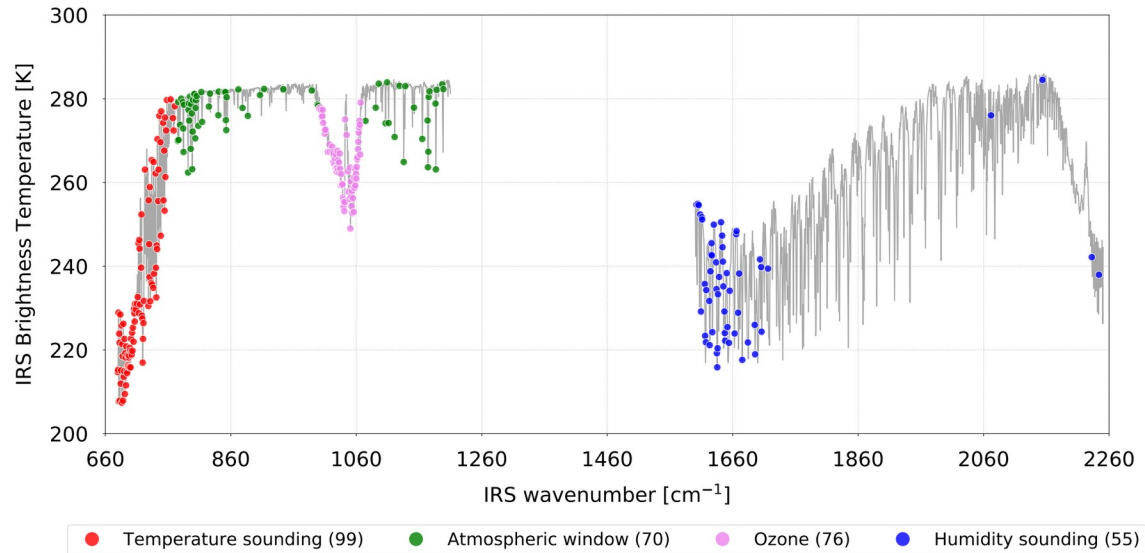
Objectives:

- Preparation of the assimilation of IRS for AROME
- Assessing the impact of IRS in addition to radars
- To be ready to assimilate real IRS data from day one!

Tools:

- A framework for the assimilation of IRS
- A selection of information for its assimilation

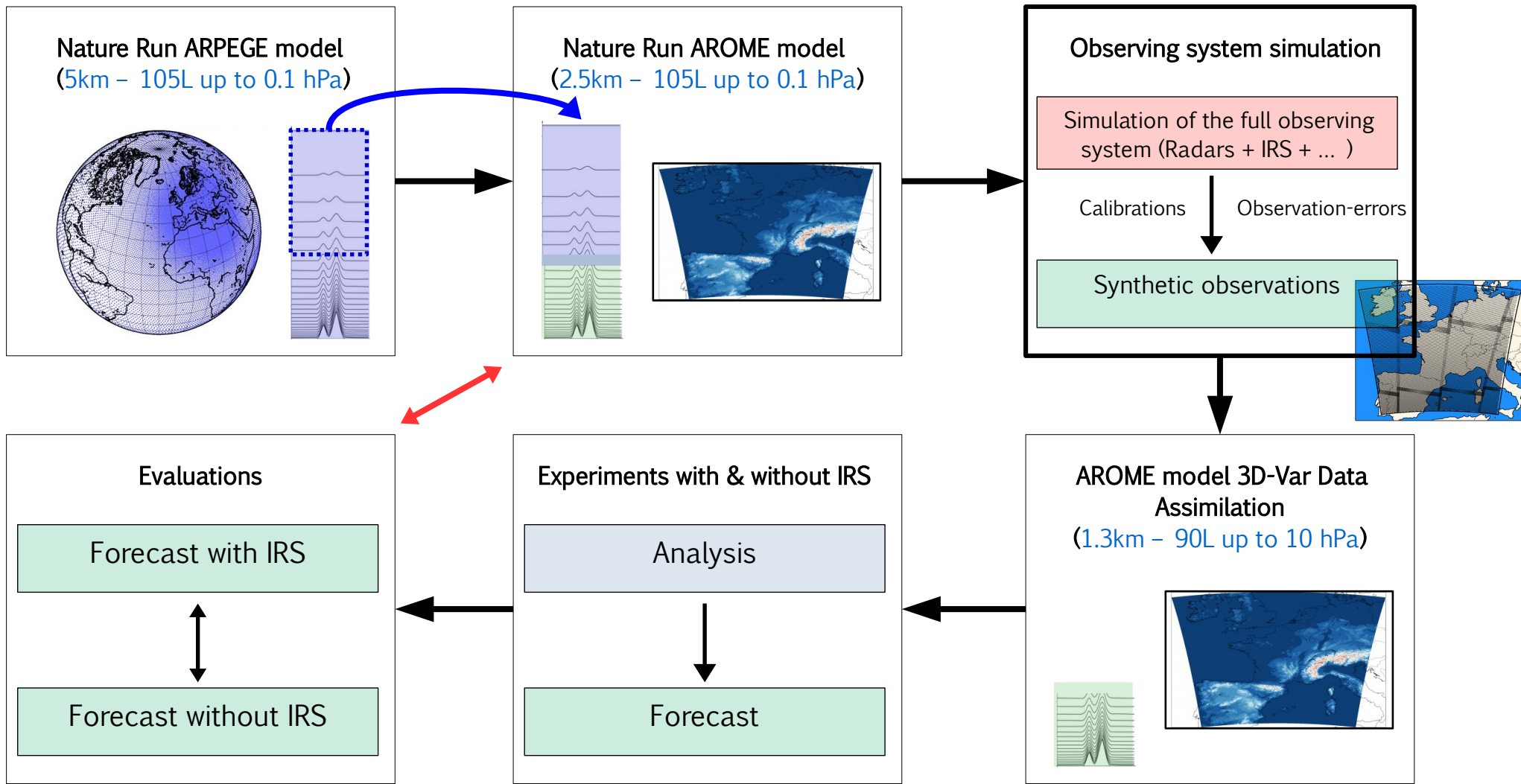
General selection of 300 IRS channels for the NWP



- Selection among 60 profiles representative of the atmospheric variability
- Use of the information content method (Degree of Freedom for Signal)

$$\text{DFS} = \text{Tr} (\mathbf{I} - \mathbf{A}\mathbf{B}^{-1})$$
- Total DFS including the DFS of T, q, O₃ and T_{skin} as a figure of merit
- **Need of the instrumental noise for all channels (1960).**

Observing System Simulation Experiment framework



- Channel selection:**
- General selection of **300** IRS channels for NWP
 - **Need of the noise for all the 1960 channels (currently extrapolation from 1738 to 1960)**

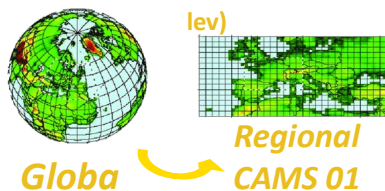
- OSSE framework:**
- The NR ARPEGE and AROME show realistic forecasts compared to the operational forecasts
 - Simulation of the full observing system : **PCA for the 1960 channels are necessary to continue the study.**

ARPEGE
OPER



Strong apodisation is mandatory for the radiative transfer simulation (light apodisation → negative transmittances sometimes).

CR MOCAGE (60 lev)



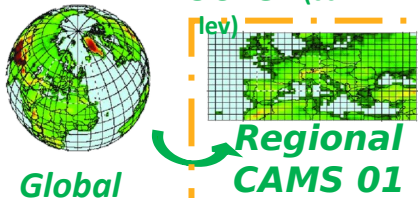
With modulated emissions

Assimilation Run (AR):

realized with the same configuration as CR, by assimilating the synthetic observations created from the NR.

ASSIMILATION of independent obs.
(IASI, CrIS, others)

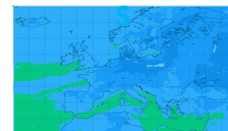
NR MOCAGE (60 lev)



Surface emissivity from CAMEL and UW

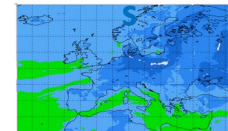
Observation Simulator (RTTOV - v12)

Perfect Observation



Instrument Noise

Synthetic Observation



Thank you for your attention

