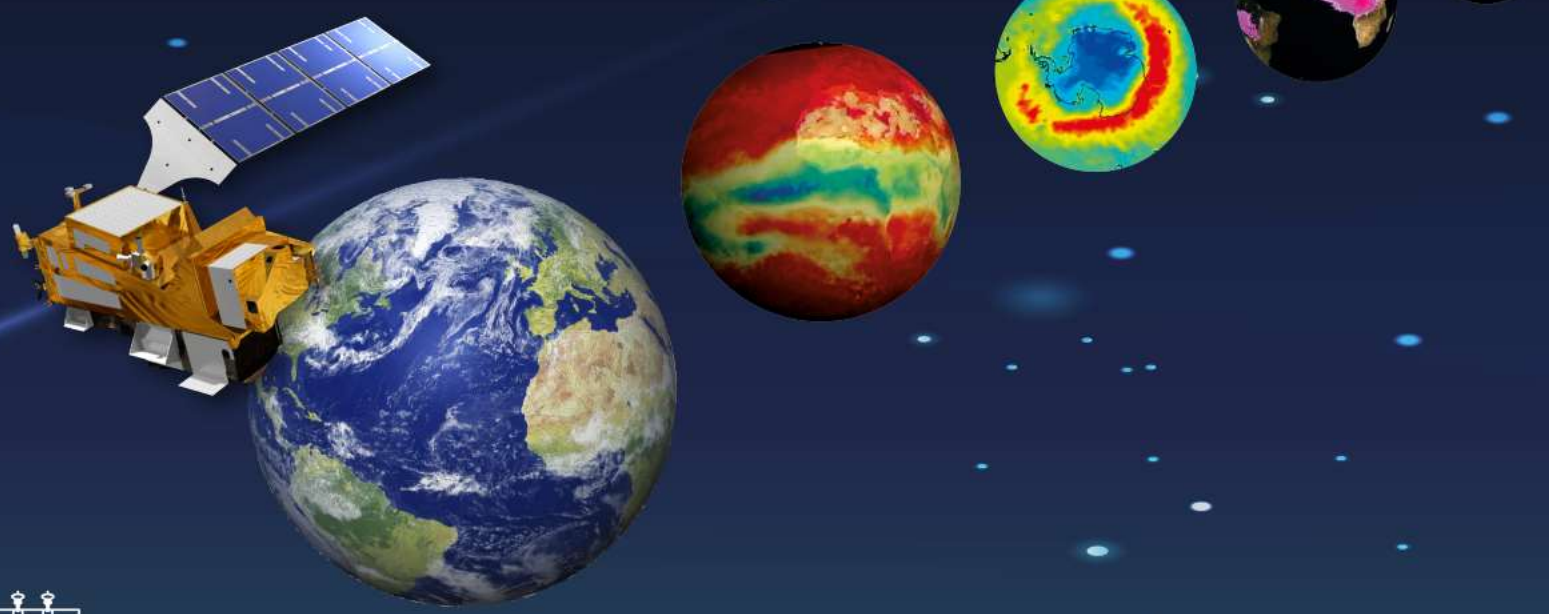
IASI 2024

December 02>06 2024

CONFERENCE



Nancy, France

cnes

EUMETSAT

Discussion session 3
Wednesday 4th December

- **Sessions of the day:**
  - **NWP**
    - Good progress in the difficult area of assimilation across earth system interfaces, specifically land/atmosphere.
    - It is very encouraging to see all-sky hyperspectral IR assimilation being tackled.
    - It is a positive result that the impact of the observing system is not saturated, and that we can expect positive impact from IASI-NG and future constellations in NWP.
    - Hyperspectral observations are showing value in measuring new variables such as, for example, water isotopologues for tracking moisture process.
  - **Aerosols and clouds**
    - A full database of volcanic ash optical properties covering the full contrast in composition is now available and use of Complex Refractive Indices improves aerosol retrieval
    - Latent and radiative flux and heating rates for mid-convective scale scenes
    - Observation of type 1a PSCs over ocean with a passive nadir sounder. Capability of IASI to study polar stratosphere.
    - Computation of IASI radiances in all-sky condition retaining the same speed efficiency.
  - **Atmospheric composition**
    - We are able to calculate the halogenated species radiative forcing with IASI.
    - IASI ozone hole monitoring provide a unique advantage with nighttime measurements
    - Negative and significative trends of carbon monoxide are recorded over China due to stricter air quality laws
    - Assimilating IASI and other satellite data decreases biases between NH3 assimilated and ground stations in the Netherlands
    - 2020 to 2023 we exceptional years for methane with a growth rate of 15 to 20 ppb/yr probably due to the decrease of OH concentrations globally

Discussion session 3
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- **Discussion points**
- **NWP**
  - Extension of earth system data assimilation to span interfaces (ocean/land/atmosphere) and include more chemical species.
  - PC assimilation. Challenges and opportunities. Plans? Will all-sky assimilation make this easier?
  - What aspects (if any) will prevent DA systems from moving to fully-AI algorithms?
  - Current thoughts on retrieval assimilation compared to direct radiance assimilation.
  - Should we encourage validation of simulation studies for future observations based on existing observations in order to better trust the techniques?
- **Aerosols/clouds**
  - What are the needs for (laboratories) measurements for aerosol/ice/cloud micro-physical properties for the future missions ?
  - Are there any (sub)-types missing?
  - Is the refractive index the best parameter to be distributed in database or is it too constrained by the microphysical properties (size distribution, shape..) of the measured sample? Are they representative enough to be used on general cases?
- **Atmospheric composition**
  - IASI nighttime data, when to use, how to optimize. Recommendation: look at the retrievals errors?
  - Synergy between different instruments (e.g TIR and SWIR): is the added value worth the trouble? How to overcome the challenges?
  - Assimilation/synergies are complex problems. Can AI help and how? How to deal with biases/different sensitivities among sensors?
  - IASI at high latitudes: lessons learned and how to apply to IASI-NG: can a better spectral resolution resolve some of today's problems with IASI?