



Overview of the activities within the International TOVS Working Group

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International TOVS Working Group

- Established in 1983 as a working group of the International Radiation Commission (IRC).
- Adopted in 2012 as sub-group of the Coordination Group for Meteorological Satellites (CGMS).
- Provides a forum where operational and research users of atmospheric infrared and microwave sounder data exchange information on:
 - Sensor and satellite status (particularly for new missions)
 - Processing methods and derived products (temperature, water vapor, trace gases...)
 - Sounder data use in Data Assimilation and Numerical Weather Prediction
 - Radiative transfer and surface properties
 - Climate studies
 - Real time sounder data reception, processing, and product

International TOVS Working Group

- ITWG = International TOVS Working Group
- TOVS = TIROS Operational Vertical Sounders
- TIROS = Television Infra-Red Observation Satellites

International TOVS Study Conference

- ITSC is held every 18-24 months; 24 conferences have been held since 1983.
- ITSC-24 was held in person in Tromsø, Norway, in March 2023
162 participants, 78 oral presentations, 92 posters, 17 NWP centre reports
- In-person conference spans 7 days:
 - 5 days are plenary session talks and posters (single track)
 - 1 day is for working group meetings
 - 1 day free
- Working groups meet for 2-4 hours to discuss progress on action items, new topics, and assign new actions and recommendations.
- Working group co-chairs present and write up a working group report.
- ITWG co-chairs present Recommendations to CGMS and IRC.

Working groups of ITWG

Working Groups

- Numerical Weather Prediction
- Radiative Transfer and Surface Property Modeling
- Advanced Sounders
- International Issues and Future Systems
- Climate
- Sounder Products and Software

Technical Sub-Groups

- RTTOV and CRTM
- Radio Frequency Interference

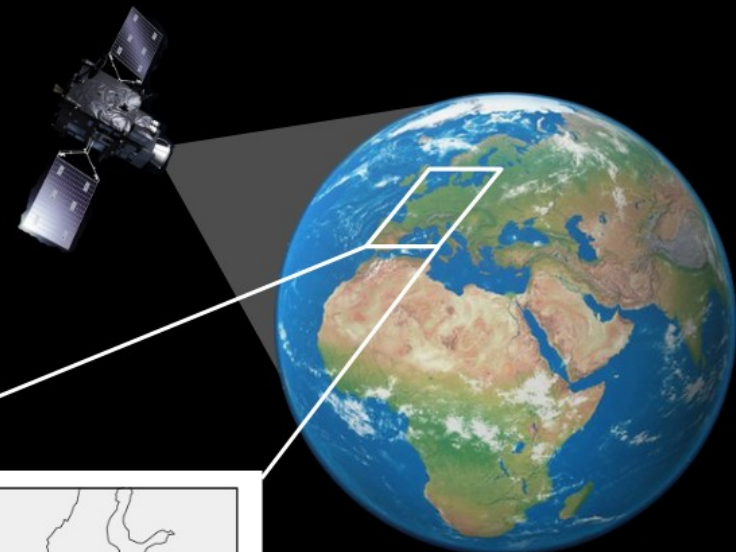
Example of studies conducted

Preparation for future systems



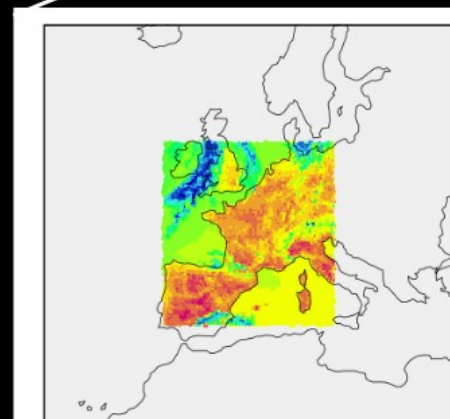
The future infrared sounder (IRS)

- Will be on board the future European geostationary satellite MTG (2024)
- Will be able to measure radiance at the top of the atmosphere using **1960** channels in the infrared between **680-1210 cm^{-1}** and **1600-2250 cm^{-1}**
- The IRS observations will provide information on atmospheric temperature and humidity, surfaces, winds, chemical composition of the atmosphere over Europe with high temporal frequency (**30 minutes**) and fine horizontal resolution (**4x7 km**)

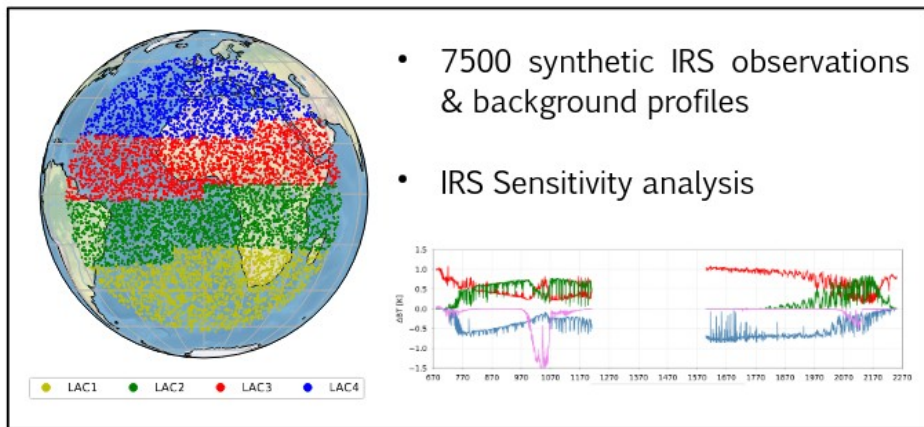


Objectives

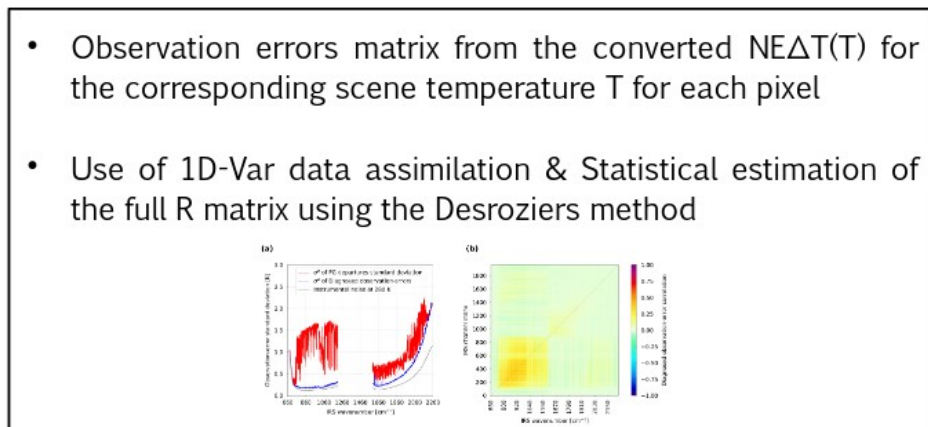
- Preparation of the assimilation of IRS for AROME
- Assessing the impact of IRS in the full system
- To be ready to assimilate real IRS data from day one!



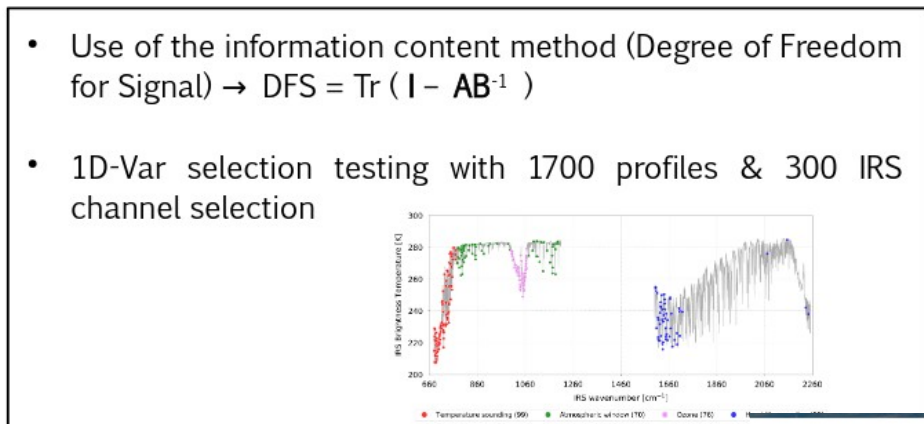
Creation of 1D database & sensitivity analysis



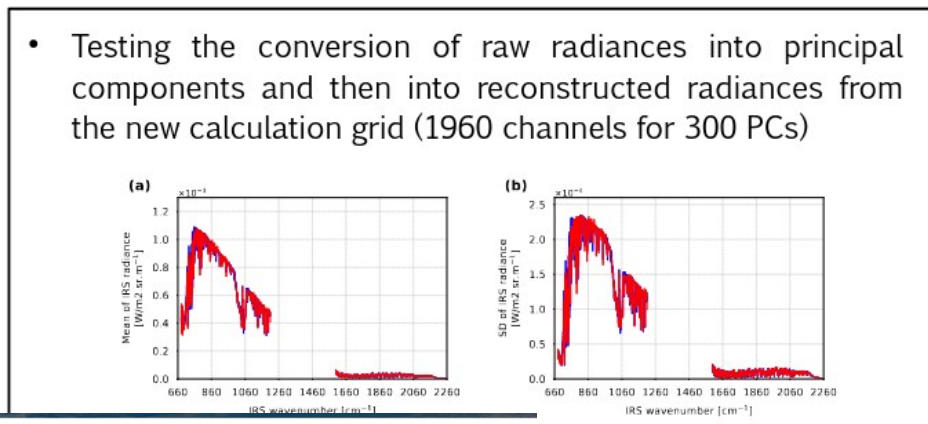
IRS Observation-errors

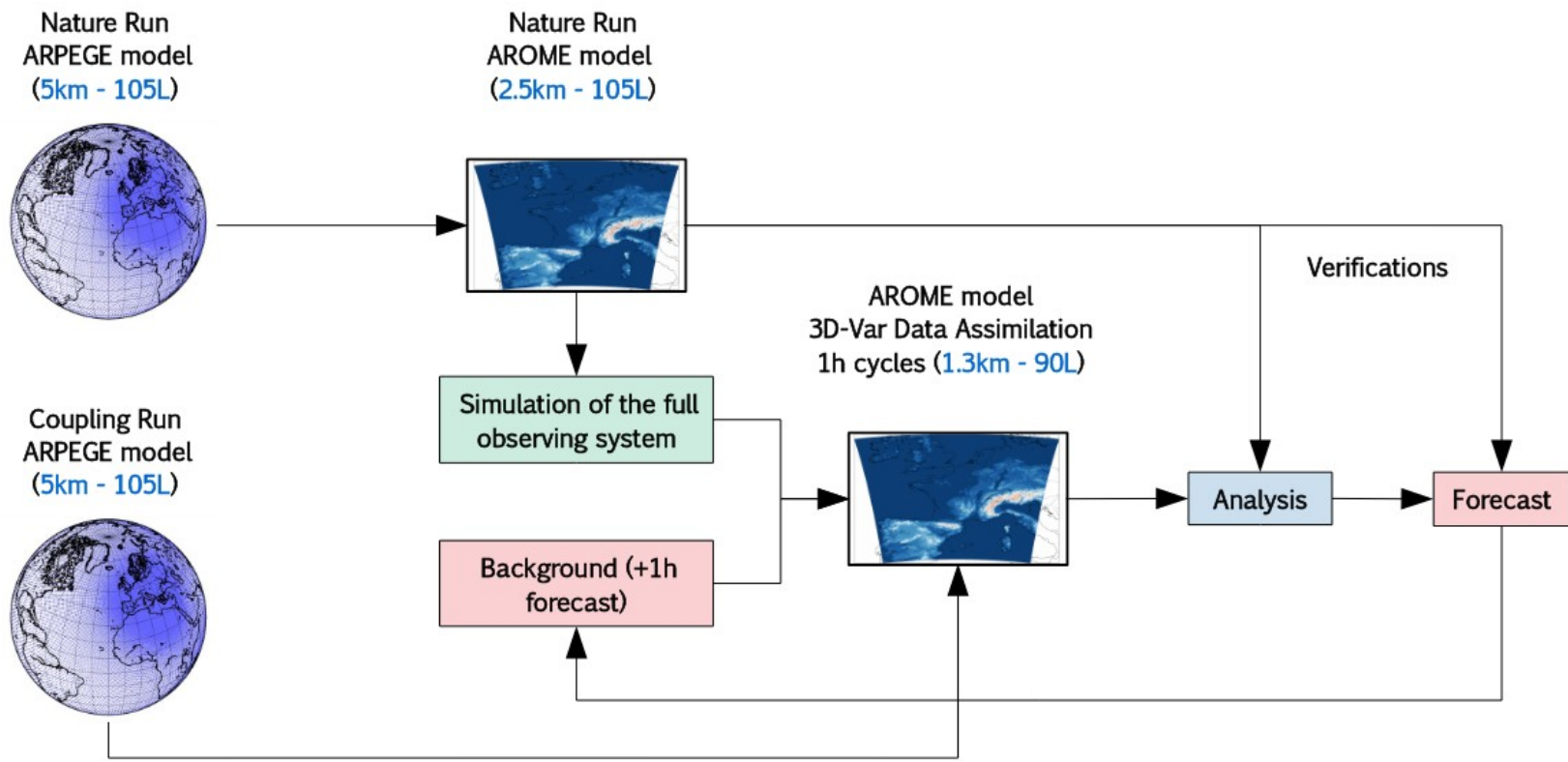


General IRS channel selection for NWP

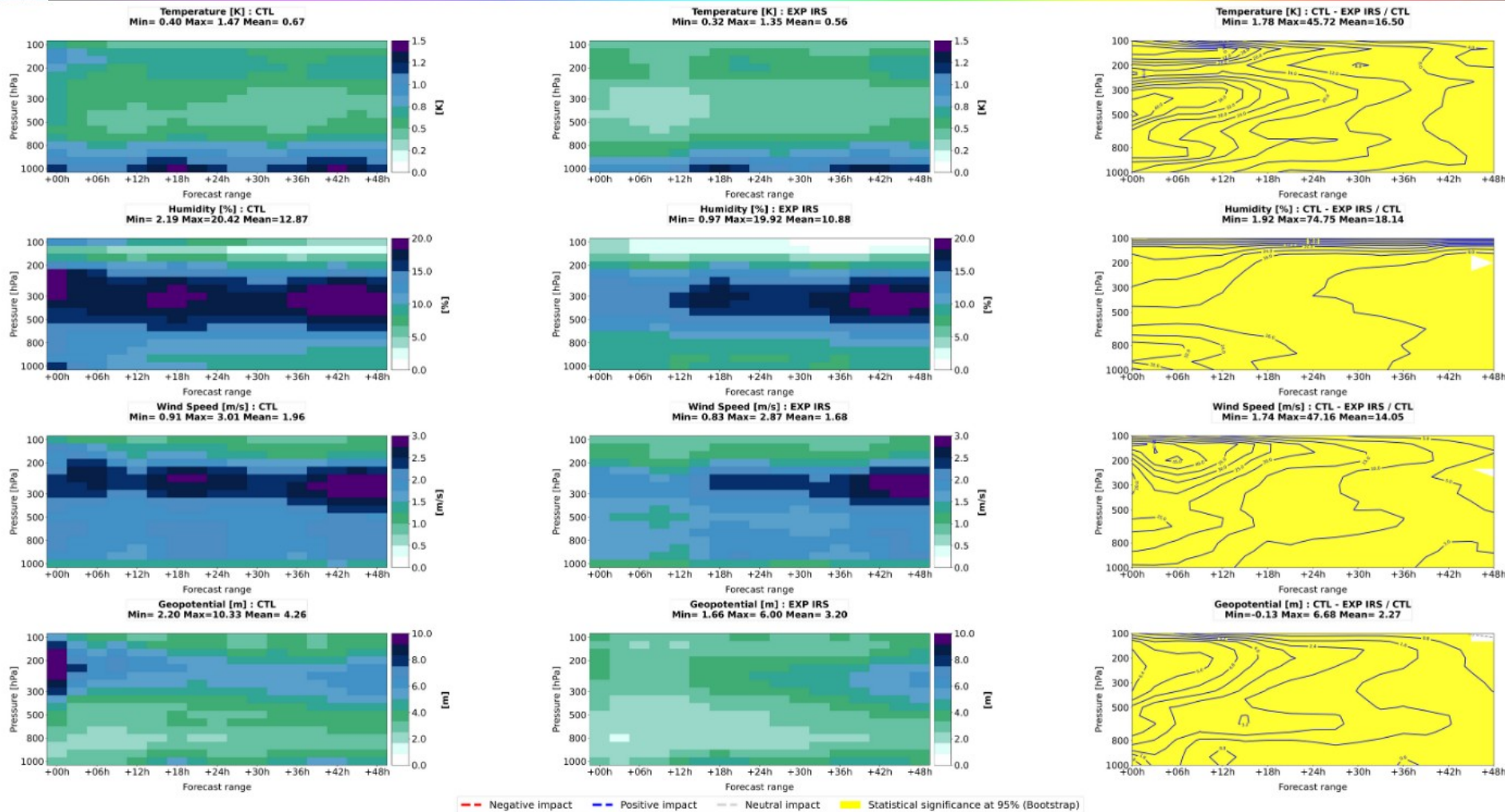


Principal component study





Scheme of OSSE framework for AROME 3D-Var data assimilation system



Example of studies conducted

Preparation for future systems

Radiative transfer model developments



All-sky Radiative Transfer Simulations based on the Advanced Radiative transfer Modeling System

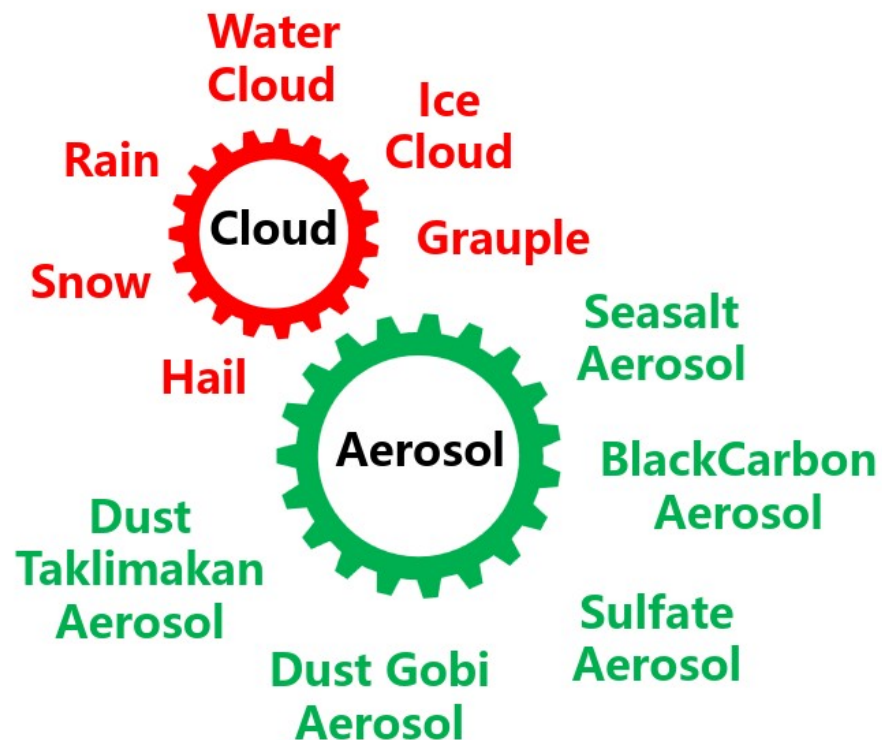
Yi-Ning Shi, Fuzhong Weng, Jun Yang, Yang Han, Hao Hu

CMA Earth Modeling and Prediction Centre
China Meteorological Administration (CMA)

Cloudy-Sky RT Simulation



- ARMS Particle Scattering (VIS/IR):
 - ARMS Team cooperate with Zhejiang University (Prof. Lei Bi) and Sun Yat-sen University (Prof. Bingqi Yi) for building Aerosol/Cloud Scattering properties Dataset.
 - Mie Scattering and T-Matrix is applied to handle spherical and non-spherical particle.



Cloudy-Sky RT Simulation



☐ All-Sky RT Simulations: Results

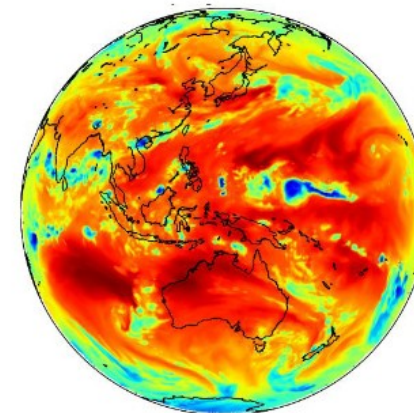
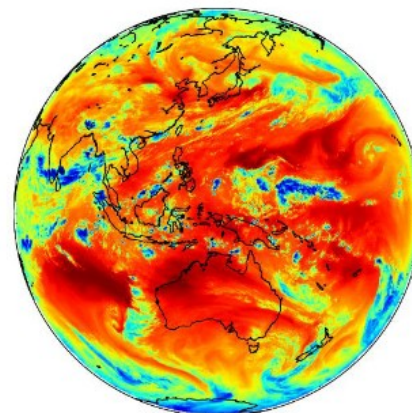
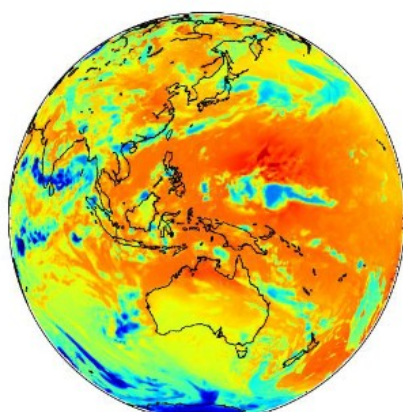
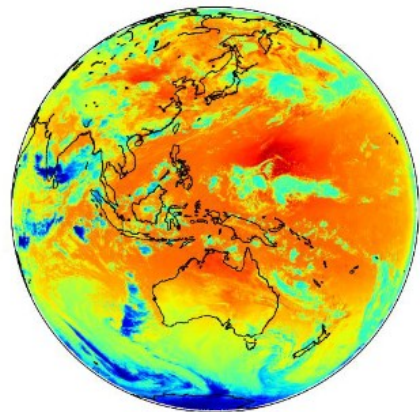
➤ FY4B AGRI IR Channel

Channel 8
observed BTs

Channel 8
simulated BTs

Channel 14
observed BTs

Channel 14
ARMS simulated BTs



BT (K)



BT (K)

Yi-Ning Shi, Fuzhong Weng, Jun Yang, Yang Han, Hao Hu

CMA Earth Modeling and Prediction Centre

Example of studies conducted

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**Many more! Join the conference to know!
or visit the website**

(new) <https://itwg.ssec.wisc.edu/>

(legacy) <http://cimss.ssec.wisc.edu/itwg/>

Example of WG outcomes

Recommendation from the Radiative Transfer and Surface Properties WG

- **Spectroscopy**

- Recommendation RTSP-5 to Spectroscopy Community

A strong emphasis should be put on the continuous support of theoretical and laboratory spectroscopic studies. It is crucial that a compilation of basic line parameters is maintained. In this regard, it is recommended to work more closely with the planetary/ astronomy community for knowledge of LBL / spectroscopy information.

Example of WG outcomes

Aerosols

- It was discussed that the RTTOV OPAC/CAMS database now includes the following species: volcanic ash, Asian dust and the ICON-ARTS species. There is concern by RTTOV developers that there are many users, but they do not know who they are nor their needs.
- Recommendation RTSP-6
Reach out to the aerosol community and survey their aerosol (physical) needs
- Recommendation RTSP-7 to aerosol community
The group encourages the publication of a literature review that includes new aerosol studies and challenges regarding VIS/near-IR aerosol sensitivities and spectral dependencies
- Recommendation RTSP-8 to aerosol community
The group continually supports field campaigns and the community to use field campaign data for validation studies. The group further recommends to connect aerosol FCs to RT evaluation

Co-chairs of ITWG

Outgoing co-chairs

- Vincent Guidard (Météo-France, France)
- Liam Gumley (CIMSS SSEC, USA)

New co-chairs

- Reima Eresmaa (FMI, Finland)
- Fiona Smith (BoM, Australia)



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