

# Advanced Sounders Working Group

*co-chairs: Dave Tobin and Dorothee Coppens*

ITSC-22

Saint-Sauveur, Canada

# Participants

## 56 Participants

Olivier Coopmann	Bryan Kurpowicz	Erin Jones	Maria Toporov	Franscesca Vittorio	Kirsti Salonen
Kozo Okamoto	Chawn Harlow	James Jung	David Duncan	Nadia Fourrie	Nigel Atkinson
Norio Kamekawa	Gu Songyam	Stephane Laroche	Hu (Tiger) Yang	Vincent Guidard	A. K. Sharma
Nancy Baker	Agnes Lim	Dieter Klaes	Eric Jurado	Clement Luitot	Junye Chen
Dan Zhou	Yong Chen	Alain Beaulne	Ruth Taylor	Bjorn Lambrigtsen	Lihang Zhou
Masami Moriya	Robin Faulwetter	Dimitry Gayfulin	Zhenglong Li	Louis Garand	Hee-Jung Kang
Chris Burrows	Qifeng Lu	Mitch Goldberg	Ricardo Todling	Xavier Calbet	Keyi Chen
Chris Barnet	Reima Eresmaa	Ryoying Yin	Zhipeng Xian	Christina Kopken-Watts	Thomas August
Eric Simon	Mathieu Asseray	Philippe Chambon	Karen St Germain	Andrew Collard	Liam Gumley
Heather Lawrence	Marc Pondrom				

# Planned sensors and data

There was discussion of the upcoming FY-3E and FY-4B launches in the next year. FY-3E will be in the early morning orbit and include an improved HIRAS with a 3x3 versus 2x2 FOV array and also possible removal of the FY-3E HIRAS spectral gaps. There was a request to have full spectral resolution (FSR) version of the HIRAS data available from the start of the operational mission. FY-4B will include an improved GIIRS, as compared to the research GIIRS on FY-4A. For both platforms, commissioning is expected to take 6 months and data available afterwards.

## **Recommendation ITSC22-AS-1 to Space Agencies (CMA)**

Disseminate the HIRAS and GIIRS data 6 months after launch if possible, and not only via EUMETCAST but also to the Global User Community.

## **Recommendation ITSC22-AS-2 to Space Agencies (CMA)**

Consider to make available as soon as possible the HIRAS spectra at full spectral resolution for all bands. This also applies to all future hyperspectral sounders.

**Action ITSC22-AS-1 to ITWG Co-chairs:** Bring these recommendations to the attention of Space Agencies at CGMS

# Planned sensors and data

Discussion on IKFS-2 data and the possibility to have a direct broadcast. Only for the one from 2025 on, we could have direct broadcast.

→ We will keep the recommendation from ITSC-21

## **Recommendation ITSC22-AS-3 to Space Agencies (Roshydromet and Roscosmos)**

ASWG recommends establishing a Direct Broadcast capability for the data on the Meteor-M satellite, in particular for the hyperspectral IKFS-2 data.

**Action ITSC22-AS-2 to ITWG Co-chairs:** Bring this recommendation to the attention of Space Agencies at CGMS.

Discussion on Meteor-M N2-2 launched in July 2019 → data will be released in 2 or 3 months (probably in January 2020).

**Action ITSC22-AS-3 to ASWG co-chairs** to follow the data release date and circulate the information at ASWG.

# Planned sensors and data

Presentation on MTG-IRS, showing the interest of such mission. GEO hyperspectral sounders are providing high spatial and temporal resolution and coverage, an unique dynamic view of the atmosphere, 3D winds, important for NWC and NWP. It supplements the forecasts, independent observations, gain precision and lead-time in issuing warnings.

Discussion on the amount of data it implies in terms of downlink and dissemination. The dissemination will be done in Principal Component with a new methodology discussed later during the meeting.

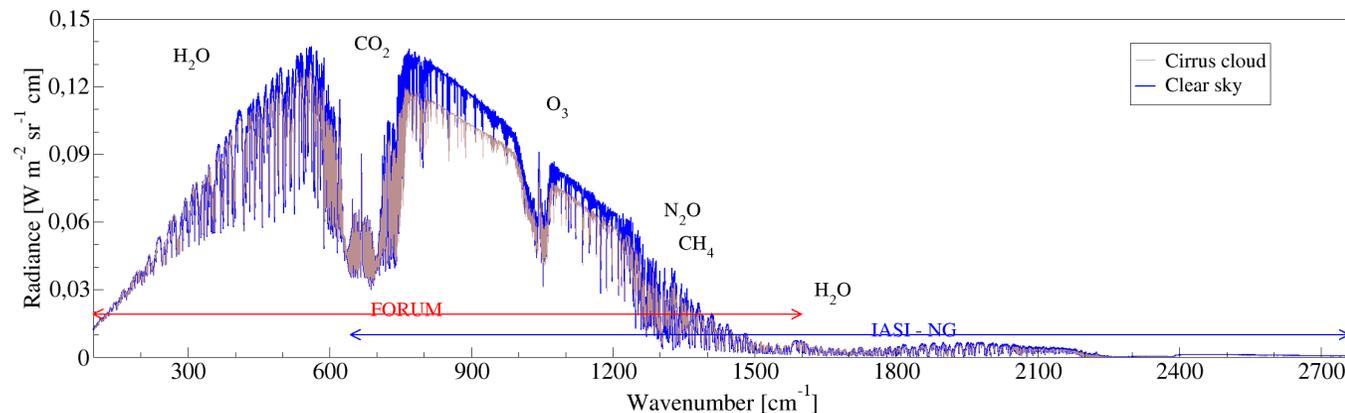
## **Action ITSC22-AS-4 to ASWG co-chairs:**

To circulate to ASWG the information to the bandwidth for the MTG IRS L1 PC dissemination as soon as it is available.

# Planned sensors and data

The future mission FORUM (Far-infrared Outgoing Radiation Understanding and Monitoring) was presented and discussed.

- ✓ ESA Earth Explorer 9 – 3-year lifetime mission
- ✓ 100-1600  $\text{cm}^{-1}$ : highly sensitive to upper tropospheric water vapour and to cirrus cloud
- ✓ Nadir viewing only
- ✓ sun-synchronous orbit at an altitude of about 817 km, flying in tandem with IASI-NG
- ✓ Ground footprint is a single pixel of about 15 km



**No specific action or recommendation**

Updated status to be presented in future ITSC

# Next generation sensors and data

NOAA is moving forward with the pre-phase A for new missions. Dedicated study on what NOAA could have with LEO/GEO orbits, trying to identify mixed-capabilities and Tundra orbit.

Presentation from NOAA on their view: constellation with mission in Tundra orbit, GEO ring, NOAA imagers. GOES-R series and JPSS: same instruments until 2035. No evolution in terms of instrument improvement.

GEO-LEO trade-off. NOAA is looking at the minimum of importance for the applications to decide what to do. Currently the "reference constellation" includes East and West GEO platforms with Imagers, and LEO "Sounder Sats" (IR + MW). The US is thinking of quantity (Several small LEO instruments), versus Quality. This is mainly for NWP applications. The typical useful lifetime of small satellites is based on 3 years of design life.

A particular attention has been put on having IR+MW sounders on the same platform, the imagers could be on another one.

Inter-satellite calibration and consistency are very important for both IR and MW

# Next generation sensors and data

**Action ITSC22-AS-5 to Karen St Germain** to provide information on the new NOAA trade study mission

**Action ITSC22-AS-6 to ASWG Co-chairs** to organize ASWG members and provide feedback to NOAA on all aspects of the proposed mission(s)

**Recommendation ITSC22-AS-4 to space agencies** to keep IR and MW sounders together on the same platform.

**Recommendation ITSC22-AS-5 to space agencies** to study whether to have or not the imager on the same platform

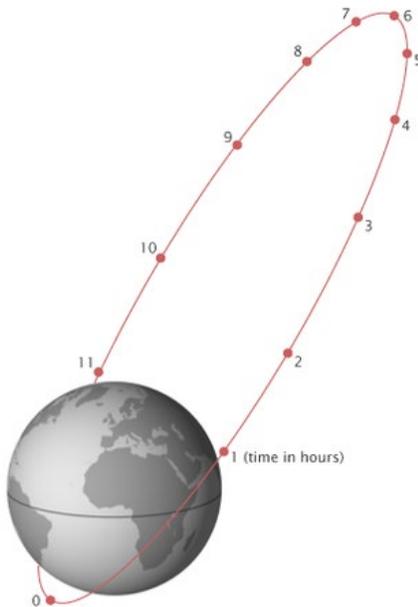
**Recommendation ITSC22-AS-6 to space agencies** to keep inter-satellite good calibration and consistency for both IR and MW.

**Action ITSC22-AS-7 to ITWG Co-chairs:**

Bring these recommendations to the attention of Space Agencies at CGMS.

# Next generation sensors and data

For the Tundra orbits, ECCC has studied largely those orbits, and they are considered as a good option but they are not the preferred option.



## Combination of LEO/GEO

- ➔ With 2 satellites, it covers down to 58 degrees latitude
- ➔ With 3 satellites, it covers down to 40 degrees latitude.

**Action ITSC22-AS-8 to Louis Garand to send documentation on those studies to ASWG**

# Efficient dissemination of Hyperspectral IR data

*From CGMS: Develop efficient standardized data handling for high-resolution imaging and hyperspectral instruments, employing novel methods like dissemination of hyperspectral infrared data based on Principal Component Analysis*

Presentation from EUMETSAT on the new hybrid PC methodology for MTG-IRS L1 products to address all user needs (including Atmospheric Composition). EUMETSAT reported that they have initiated several studies with NWP centers to assimilate PC. DWD and Meteo-France have observed no difference when using PC in comparison with original radiances. More study results are expected from the Atmospheric Composition user community.

The hybrid method of EUMETSAT has already been endorsed by NWP WG at ITSC-21

Discussion on noise when using PC: Observation error matrices can and should be constructed in the same way as done empirically when using original radiances. i.e. to include error correlations coming at least from the forward modelling.

**Recommendation ITSC22-AS-7** to ASWG to look at available PC and give feedbacks to ASWG co-chairs.

**Recommendation ITSC22-AS-8** The hybrid method of EUMETSAT should be taken as the best practice to establish PC for IRS on MTG

# ASWG webpage

**Action ITSC22-AS-9 to ASWG Co-chairs:** to update the webpage and redesign it to include a forum for discussion and exchange.

# Re-iterating previous high priority ASWG recommendations:

**Recommendation to Satellite Agencies (NOAA, JAXA):** Consistent with numerous previous ITWG and ASWG recommendations, and consistent with the WMO Integrated Global Observing System (WIGOS) Vision for the Global Observing System in 2025 and 2040, the ASWG strongly recommends that space agencies develop and implement plans to fill the gaps in IR hyper-spectral sounding within the Geostationary constellation.

**Recommendation to Satellite Agencies:** The constellation of at least three polar orbits (early morning, morning, and afternoon), each with full sounding capabilities (IR and MW), should be maintained. The overpass times of operational satellites with sounding capability (IR and MW) should be coordinated between agencies to maximize their value.

**Recommendation to Satellite Agencies:** Implement high spatial resolution and contiguous sampling detector arrays in future hyperspectral infrared sounding instruments.

**Recommendation to Satellite Agencies:** To develop, test, and implement an SI-traceable radiometric standard in space as soon as feasible.

**Action to ITWG Co-chairs:** To re-iterate these recommendations to Space Agencies via CGMS.