

Key IWWG outcomes and recommendations to CGMS plenary

Presented to CGMS-49 Plenary

Co-Chairs: Régis Borde (EUMETSAT)
Steve Wanzong (CIMSS)

Rapporteur: Jaime Daniels (NOAA/NESDIS)

Executive summary of the WP

This presentation presents the activities and recommendations from the IWWG since the CGMS-48 meeting, the 15th IWW and the CGMS-49 WG2 meeting. It includes a brief summary of the IWW15 and recommendations for consideration by the CGMS Plenary from the IWWG and the possible Ocean Surface Wind Task Group (OSW TG).

Introduction

15th INTERNATIONAL WINDS WORKSHOP

Held virtually from April 12-16, 2021.

Hosted by Ad Stoffelen and KNMI.

Conference web page available at
<https://www.ssec.wisc.edu/meetings/iwwg/2021-meeting/>

Increase (2x) in participation from previous meetings.

25 more presentations from IWW14 in half the time. 10-minute talks, 5-minute posters.



IWW15 Highlights

15th INTERNATIONAL WINDS WORKSHOP

Presentations: 71 (59 oral talks, 12 posters)

Key Topic Highlights:

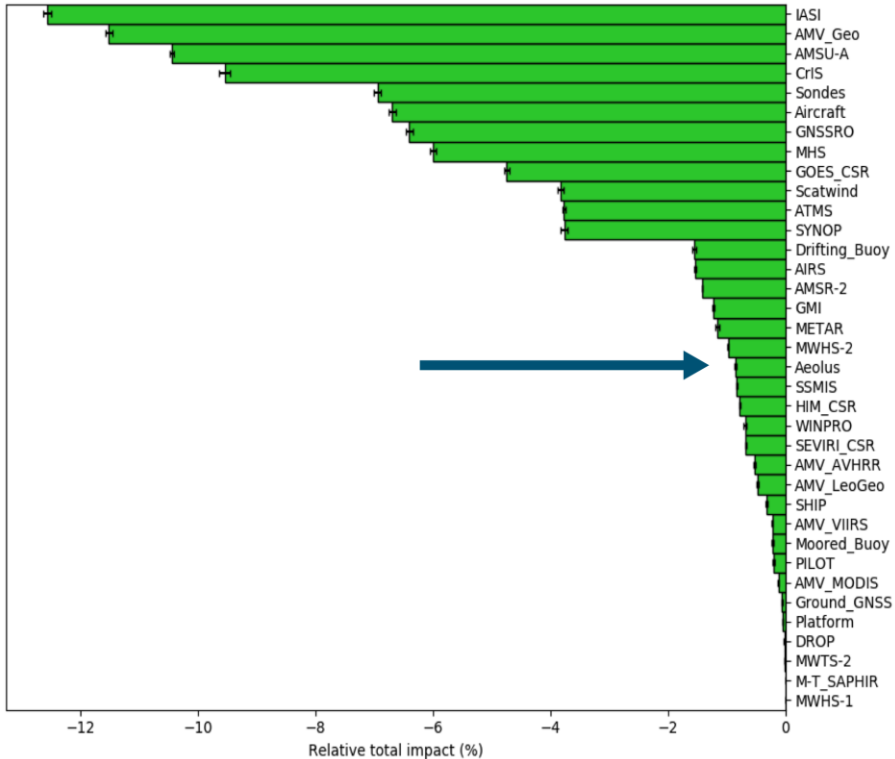
- Aeolus winds (NWP impacts, validation studies, comparisons to AMVs).
- NOAA Stereo winds and dense optical flow.
- Inter-comparison study plans with ICWG. Key areas to explore, golden day data, etc.
- AMV Reprocessing within JMA, EUMETSAT.
- Cloud height estimation and AMV generation with Machine Learning.
- OSW error analysis and assimilation.
- Use of satellite-derived winds in Numerical Weather Prediction (NWP).

To be considered by CGMS:

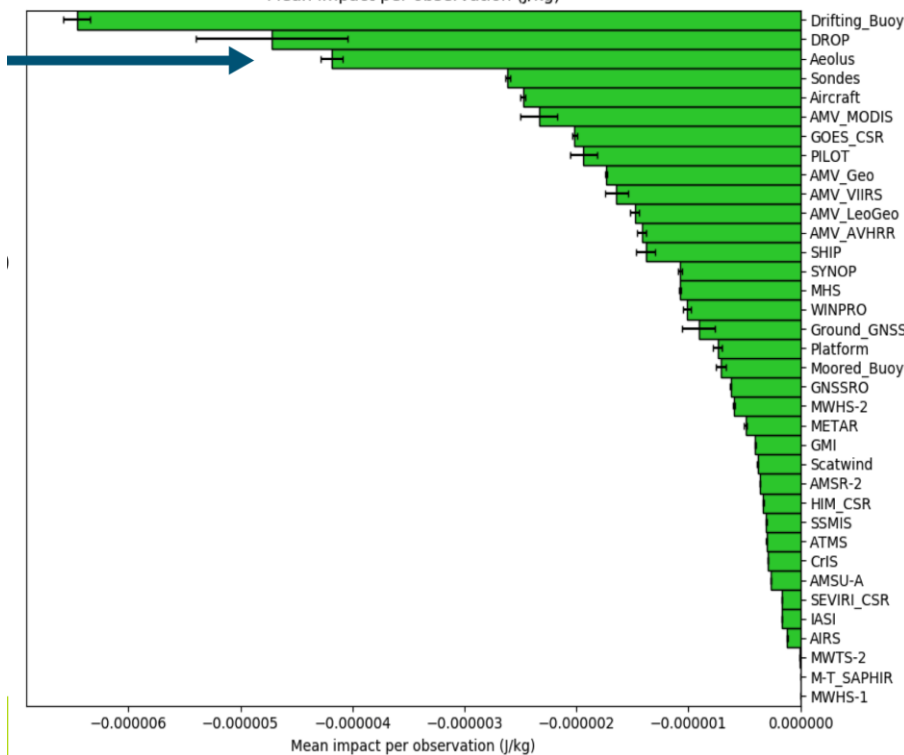
- **Recommendation 1: For consideration by CGMS Plenary the IWWG recommends space agencies to address the gap of global 3D wind profile observations with high priority. Based on the Aeolus experience, a combination of lidar & IR missions can provide complimentary wind observations which look to be very promising.**
- Aeolus shows significant positive impact on global NWP models as shown by ECMWF, Météo-France, Met Office, DWD, NOAA, JMA, NCMRWF and ECCO and is better than expected prior to launch.
- Operational assimilation at ECMWF, Météo-France, DWD and the Met Office.
- Strength within the entire assimilation scheme.
- Valuable as an AMV intercomparison dataset.

FSO Scores for Met Office Global Model

Relative total impact (%)



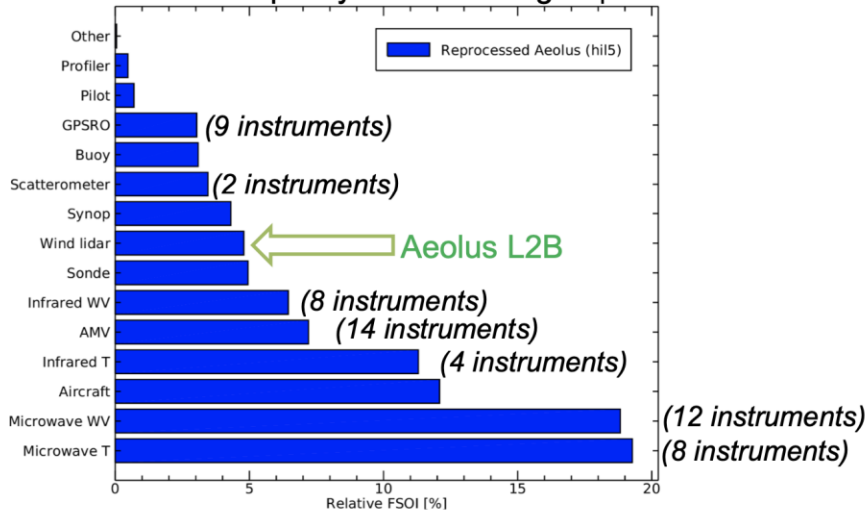
All observations / 20201209T0000Z-20210120T1800Z
Mean impact per observation (J/kg)



FSOI Scores showing impact of Aeolus at ECMWF

FSOI for reprocessed L2B data period (3 July to 27 Sept 2019)

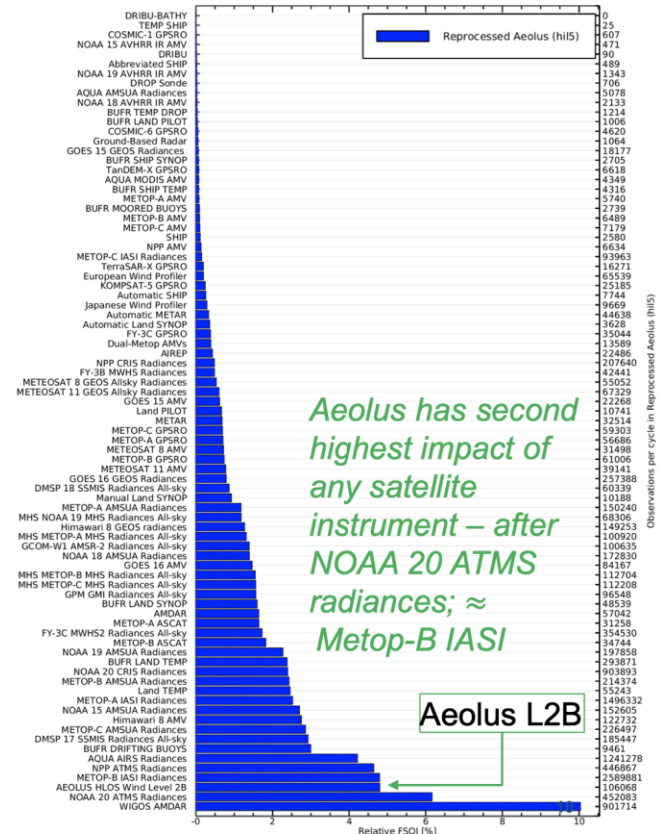
FSOI split by observation group



- **For this period with good atmospheric signal and reprocessing, Aeolus provides 4.8% relative FSOI – compare this to ~3.2% for first half 2020 operations**
 - Aeolus ≈ radiosondes, > scatterometer & GPSRO
- **Shows the importance of DWL in NWP**
 - ... even with less useful signal than expected pre-launch



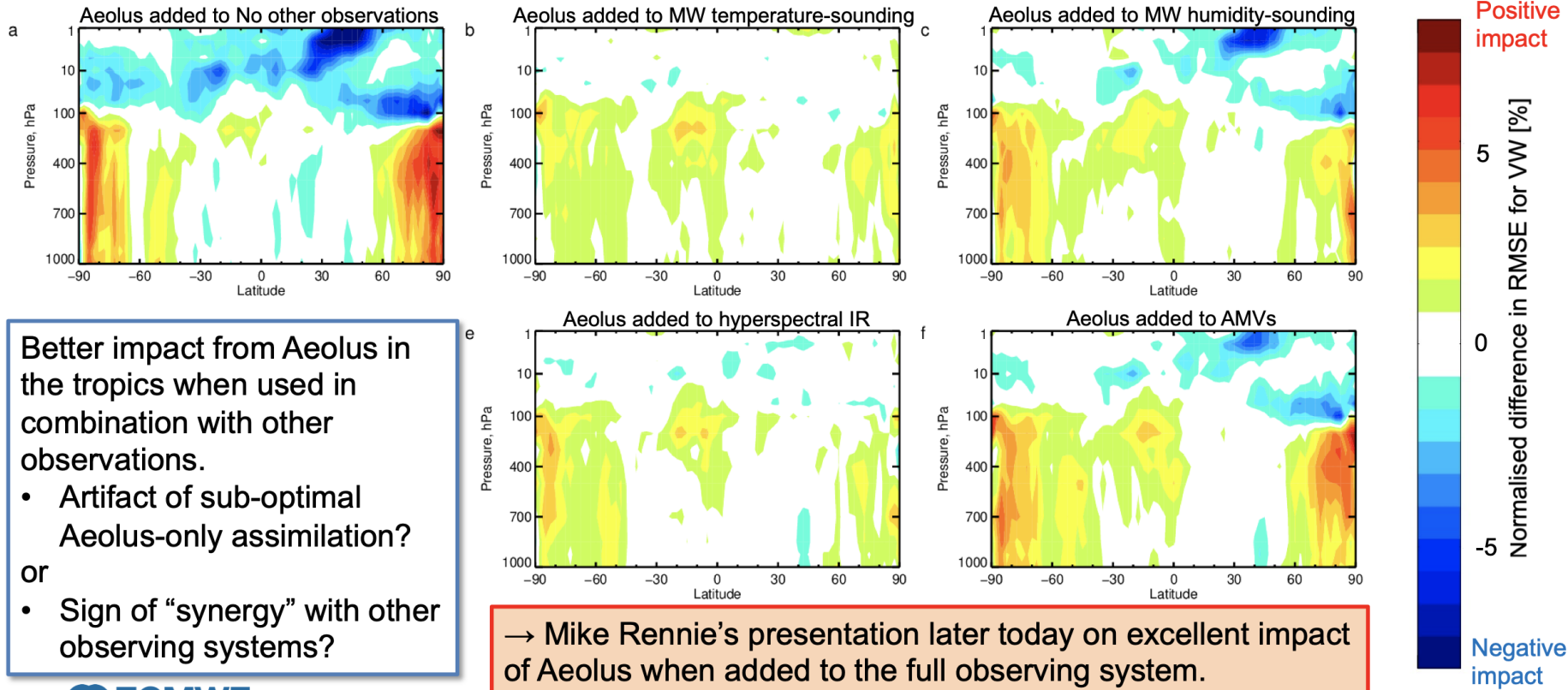
FSOI split by instrument



Complementary potential of Aeolus and other observations at ECMWF

Reduction in forecast error from Aeolus when combined with other observing systems

Normalised difference in RMSE for VW forecasts at T+48h, verified against analyses from the full system, including Aeolus



Better impact from Aeolus in the tropics when used in combination with other observations.

- Artifact of sub-optimal Aeolus-only assimilation?

or

- Sign of “synergy” with other observing systems?

→ Mike Rennie’s presentation later today on excellent impact of Aeolus when added to the full observing system.

To be considered by CGMS:

- **Recommendation 2: Establish an Ocean Surface Wind Task Group (OSW TG) in the CGMS International Winds Working Group (IWWG) that coordinates its actions and recommendations with GSICS, CEOS and the IOVWST.**
- This implies that OSW TG actions and recommendation will be reported to/from CGMS through established IWWG mechanisms and in addition to CEOS and IOVWST.
- Following CGMS-48 WGII A.48.10 and CGMS-48 plenary A.48.10 & 9.
- The associated ToR will be part of the IWWG ToR.

Motivation / Potential

- Scatterometer winds were introduced and represented at the IWWG meetings since 1996 (Ascona meeting).
- OSW side meetings were held at several IWWG meetings with representatives of the NWP community, which is proposed to be continued through the OSW TG.
- **Several user topics need continued attention beyond CEOS and IOVWST, such as:**
 - Intercalibration of wind products for Climate Data Records and operational user convenience
 - An in-situ wind speed reference for high and extreme winds for satellite and model wind calibration
 - Methods for the elimination of model biases in NWP data assimilation (local VARBC)
 - Improved spatial NWP wind assimilation methods; assimilate unique products
 - QC optimization for NWP assimilation, including representativeness considerations
 - Open high-level wind services and timeliness of the virtual constellation
 - Open data comparisons and open software to share in the community
 - Exploit scatterometer wind stress measurements for improved atmosphere-ocean coupling
 - Shared development of coastal winds for all scatterometers
- The OSW TG facilitates an open and shared environment to address above points for the general benefit of the meteorological/ocean and climate communities from NRT operations to Climate Data Records
- Therefore, a group encompassing all operational satellite operators, the in-situ community, NWP and a broader user community is required.

Terms of Reference OSW TG

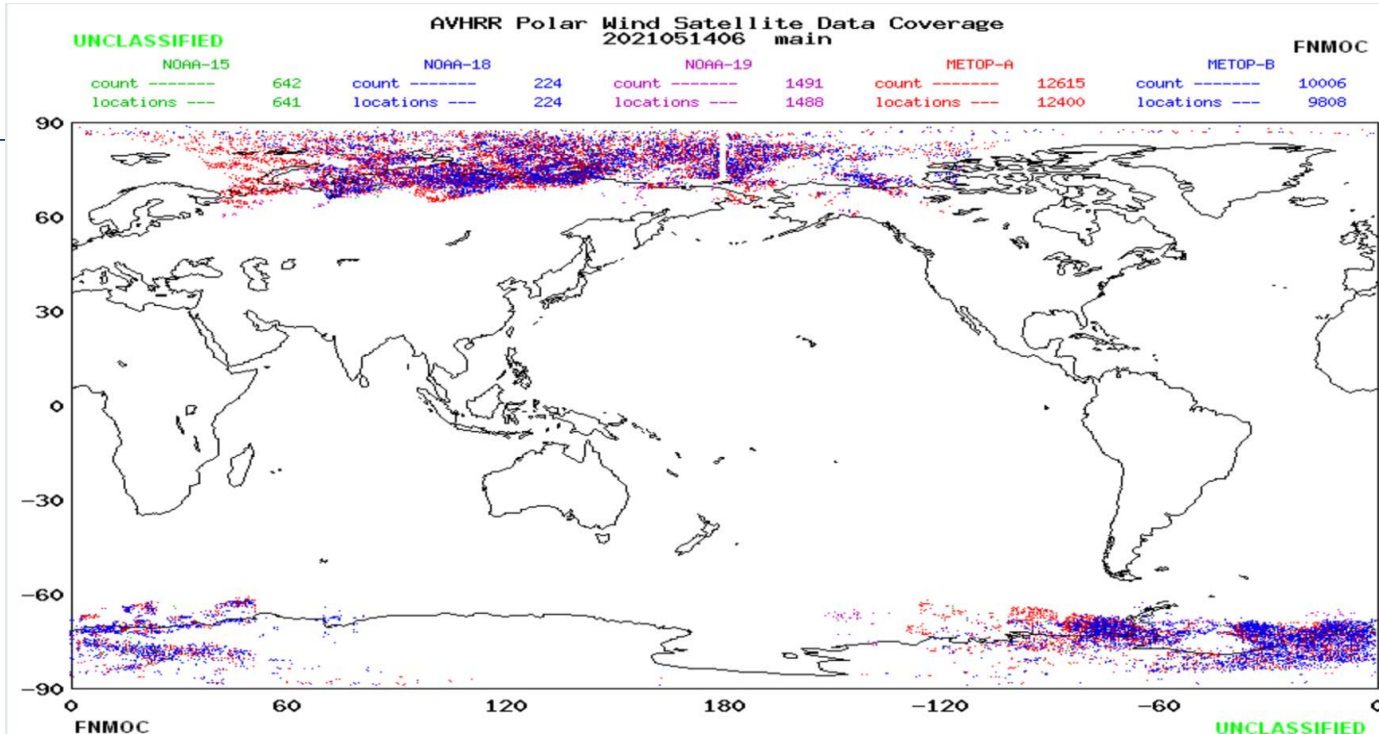
- OSW TG are included in the recently drafted IWWG ToR and presented at CGMS-49 WGII.
- The OSW TG convenes as subgroup of the bi-annual IWWG, being informed by the IOVWST and CEOS OSVW-VC.
- The OSW TG interacts with the CGMS plenary through the IWWG and informs CEOS.
- The OSW TG is co-chaired, coordinating the information exchanges, actions and recommendations.
- Operational OSW are, inter alia, obtained by scatterometers, SARs and radiometers.
- The CGMS OSW TG provides a forum for the exchange of information on polar-orbiting satellite ocean wind missions, such as reporting on current satellite status and future plans, data exchange, timeliness, operations, intercalibration of sensors, processing algorithms, products and their validation, and data transmission standards.
- The OSW TG harmonizes to the extent possible satellite mission parameters such as orbits, sensors, data formats and ground segment.
- The OSW TG encourages complementarity and compatibility through cooperative mission planning, consolidated meteorological data products and services and the coordination of space and data related activities, thus complementing the work of other international satellite coordinating mechanisms.

To be considered by CGMS:

- **Recommendation 3: For consideration by CGMS the endorsement of the IWWG ToR.**
- No ToR existed in the IWWG's 27-year history as an ISWG within CGMS.
- IWWG ToR requirement and necessary modifications accepted by WGII co-chairs and rapporteurs during CGMS-49.
- Explicit inclusion of the OSW TG ToRs.

To be considered by CGMS: From IWWG WG2

- Recommendation 4: IWWG WG2 recommends to NOAA to continue operating NOAA-15, -18, and -19 as long as the sensing instruments perform adequately. These satellites continue to provide useful polar AMV datasets.
- Recommendation 4: IWWG WG2 recommends to NOAA/NESDIS to keep processing AMVs from POES + MODIS for the lifetime of the instruments.



To be considered by CGMS:

- **Recommendation 1:** For consideration by CGMS 49: The IWWG recommends space agencies to address the gap of 3D wind profile observations (lidar & IR missions) with global coverage as high priority, and to especially consider a joint system for operational lidar missions based on the successful Aeolus experience.
- **Recommendation 2:** Establish an Ocean Surface Wind Task Group (OSW TG) in the CGMS International Winds Working Group (IWWG) that coordinates its actions and recommendations with GSICS, CEOS and the IOVWST.
- **Recommendation 3:** For consideration by CGMS the endorsement of the IWWG ToR.
- **Recommendation 4:** For consideration by CGMS to recommend to NOAA to continue operating NOAA-15, -18, and -19 as long as the sensing instruments perform adequately and continue to produce AMVs.

<https://www.ssec.wisc.edu/meetings/iwwg/2021-meeting/>

EXTRA SLIDES



To be considered by CGMS:

- **Recommendation 2: For consideration by CGMS the endorsement of the Ocean Surface Wind Task Group and associated ToR.**

CGMS-48 actions – Plenary Session					
Actionee	AGN item	Action #	Description	Deadline	Status
CGMS members	7.3	A48.	CGMS members to provide point(s) of contact to be part of the SCAT task team (together with Ad Stoffelen, OSVW-VC (Co-chairs Paul Chang/NOAA, Raj Kumar/ISRO, Stefanie Linow/EUM), and IWWG (Co-chairs Regis Bordes/Steve Wanzong),		OPEN
SCAT task team	7.3	A48.	SCAT task team to present the Terms of Reference, and roadmap for the work to CGMS-49 plenary for endorsement	CGMS-49	OPEN

Proposed Recommendation

- **Establish an Ocean Surface Wind Task Group (OSW TG) in the CGMS International Winds Working Group (IWWG) that coordinates its actions and recommendations with GSICS, CEOS and the IOVWST**
- This implies that OSW TG actions and recommendation will be reported to/from CGMS through established IWWG mechanisms and in addition to CEOS and IOVWST
- Following CGMS-48 WGII A.48.10 and CGMS-48 plenary A.48.10 & 9

Current CGMS OSW Task Group

- Ad Stoffelen (KNMI, lead)
- Fangli Du (CMA)
- Jian Shang(CMA)
- Régis Borde(EUMETSAT)
- Stefanie Linow (EUMETSAT)
- Mark Bourassa (FSU, **IOVWST**)
- Dave Halpern (IOC)
- Raj Kumar (ISRO)
- Ernesto Rodriguez (NASA)
- Svetla Hristova (NASA)
- Paul S Chang (NOAA, **CEOS VC**)
- Juhong Zou (NSOAS)
- Dong Xiaolong (NSSC, **CEOS WGCV MSSG**)
- Steve Wanzong (UW-Madison/SSEC/CIMSS)
- Heikki Pohjola (WMO)

Roadmap

- Priorities based on user requirements (IOVWST, IWWG, SAF, ..)
- Recommendations on optimization/exploitation Virtual Constellation (in collaboration with CEOS OSVW-VC)
 - Missions and LST, diurnal cycle, NRCS intercalibration, risk, redundancy, expert community support (link to GSICS and CEOS WGCV MSSG)
 - Data exchange, ground segment, timeliness
 - Comparison studies, wind intercalibration, validation, verification standards (link to GSICS and CEOS WGCV MSSG)
 - Open version-controlled software
 - Mission monitoring, visualization
 - Transparency in processing, standards, user guidance, user access
 - Service messages, nowcasting alerts
 - Gridded products
- Radio Frequency Interference (RFI)

To be considered by CGMS:

- **Recommendation 3: For consideration by CGMS the endorsement of the IWWG ToR.**
- IWWG established in 1991 and became a formal group within CGMS in 1994.
- Addresses much more than traditional geostationary feature tracking.
- Subset of Objectives:
 - Promote increased scientific activity in the AMV field and establish a routine means of exchanging results.
 - Support and perform AMV inter-comparison in close collaboration with ICWG.
 - Make recommendations to CGMS and international agencies regarding utilization of current and future satellite instruments.
- Encourage a strong working relationship with NWP.
- Working Arrangements Defined
 - 2 Co-Chairpersons nominated by current IWWG chairs and appointed within plenary of CGMS.
 - 1 CGMS rapporteur.
 - New 3-term workshop commitment for co-chairs and rapporteur.
 - Organize workshops approximately every 2 years.