

TERMS OF REFERENCE FOR A NEW CGMS IESWG

1. Background

1.1 Formation of the International Earth Surface Working Group

The International Earth Surface Working Group (IESWG), began in 2006 from a sub-group on Remote Sensing and Modelling of Surface Properties (RSMSP) under the International TOVS Working Group. After four successful meetings, the final RSMSP meeting in Grenoble in March 2016 it was decided to incorporate a broader stance towards bridging the modeling gap of the Earth surface-atmosphere interactions and fluxes in energy and water, for the purposes of improvement of NWP and reanalysis.

The new International Earth Surface Working Group (IESWG) has convened three meetings in 2017, 2018 and 2019. Regrettably the global COVID-19 pandemic stalled the meeting in 2020. In 2021, the group organized 3 invited seminar speakers which are followed by discussion sessions; and, will resume in-person meeting in May 2022 with remote capability planned for Helsinki, Finland.

1.2 International Framework

The IESWG has had a strong connection with the CGMS-ITWG and also has interaction and close contact with the CGMS-IPWG. The IESWG has also coordinated each of the first 3 meetings to align with other specific and related meetings. IESWG-1 with a SMAP Weather Focus Session, IESWG-2 with the 8th EUMETSAT LSA-SAF Workshop, and IESWG-3 in tandem with SnowWATCH-GCW of the WMO. This has helped to raise awareness of the IESWG to a broader community and strengthened the communication with these other activities.

2. Terms of Reference

The International Earth Surface Working Group (IESWG) aims at enhancing the use of Earth Observation (EO)-data for Cryosphere and Biosphere modelling applications from active/passive remote sensing for the study of processes at the surface-atmosphere interactions with the aim of advancing data assimilation for application in weather and climate. The scope of the IESWG covers observations from SMOS, SMAP, GMI, OLCI, ASCAT and similar instruments, and also follow-on missions building from this heritage. The IESWG is monitoring and documenting user requirements of surface characterization related to surface-atmosphere interaction in numerical models in particular for: soil moisture, snow and ice, vegetation state, and surface temperature to aid in mapping Earth observation to these parameters. The IESWG seeks to facilitate and guide continuity of measurements to advance science; communicate methods and data across agencies to achieve common objectives; promote the science and goals for earth observation and modeling; and foster and explore new areas for research.

The Objectives of the IESWG are:

Use of Earth Observation (EO)-data for modelling the Earth surface using both active and passive remote sensing data relevant to study processes and the surface-atmosphere interactions characterized for the purposes of improvement of Earth surface models for NWP and reanalysis;

Use of EO-data for NWP surface model parameter optimization including surface temperature, albedo, vegetation state, soil moisture, snow water equivalent, water-body extent, canopy parameters, vegetation water content, etc. and the resulting surface emissivity/reflectance spectra;

Charting the state of the operational Earth Surface and Land Data Assimilation Systems (LDASs); sensitivity studies of surface model parameters to remotely sensed data; outcomes of assimilating sensors such as SMOS, SMAP, ASCAT, and GPM and the follow-on missions building from this heritage; along with, their combination with higher resolution sensors such as MODIS/VIIRS and Sentinel-3-OLCI;

Advancing radiative transfer and emissivity/reflectivity model development for VIS/IR/MW over land and snow covered surfaces. Review current parameterization for forward modelling of the surface boundary; description of available land emissivity databases/atlasses; intercomparison and validation of physical models and retrieved emissivity (including land and snow surfaces);

Characterize product retrievals of surface parameters their performances and evolution. Products include: surface temperature, albedo, vegetation state, soil moisture, snow water equivalent, inland water-body extent, canopy parameters, vegetation water content, etc. and the resulting surface emissivity/reflectance spectra;

Future Planned Activities are:

In the near term, the IESWG will for the remainder of 2021 convene a virtual 3 part invited seminar series and discussion covering:

- 1) Snow ice and cryosphere-atmosphere interaction
- 2) Vegetation and land-atmosphere fluxes
- 3) Soil moisture, river-discharge and water cycle

Further planning is underway to convene a May 2022 workshop in Helsinki, Finland to continue to topical discussions and interactions from the previous meetings.

Continue to hold meetings approximately every 2 years to produce guidance for the CGMS member agencies through the CGMS plenary. Provide a forum for relying advances in data assimilation or modeling methodologies and validation; and to coordinate efforts and target areas of greatest uncertainty. The Workshops will seek to promote and translate the impacts and use of current satellite product and needs for future development to the producers of current EO satellite data.

The IESWG shall continue to be chaired by two Co-Chairmen, who would be nominated by the current IESWG representatives and appointed by the plenary of the CGMS. The Co-Chairmen shall compile a report on relevant activities for the scheduled plenary meetings of the CGMS. The co-chairs shall oversee that the aims of the Working Group are accomplished, and coordinate the required reporting between the IESWG and the CGMS. The interactive connection with satellite operators will be

performed through the use of a Rapporteur who will attend and report to the CGMS meetings. This rapporteur shall attend IESWG's Workshops and report on IESWG at CGMS's annual meetings.

Under the lead of the two Co-Chairs, the IESWG will organize Workshops, co-sponsored by CGMS, the WMO, and a local host approximately every two years. The Workshops will promote the exchange of scientific and operational information between the producers of satellite wind products, the research community, and the user community.

Membership

The IESWG will be open to participation from representatives of the user community expressing interest and/or willing to contribute to science for the Earth surface related to use of Earth observation data for retrieval, modeling or data assimilation of the biosphere and cryosphere. The working group shall also include representatives nominated by the satellite operators of the CGMS, other members of CGMS and relevant research satellite operators. The Working Group shall be chaired by two Co-Chairpersons to be nominated by the current IWWG representatives and appointed by the plenary of the CGMS, nominally for four years.