



Preparations for the establishment of a new CGMS International Science Working Group

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Presented to CGMS-49 Plenary session

Item: CGMS-49-GUEST-WP-04

International Earth Surface Working Group - IESWG

This current group has convened 3 meetings; edited a special issue[‡]; is finalizing a seminar series; and preparations are underway for the 4th meeting

[‡]Advancing Earth Surface Representation via Enhanced Use of Earth Observations in Monitoring and Forecasting Applications
https://www.mdpi.com/journal/remotesensing/special_issues/earthsurface_RS

Events	Partner*	Location	Date
1 st	SMAP Weather Focus Session	Monterey, CA, USA	19-20Jul2017
2 nd	EUMETSAT Land-SAF	Lisboa, Portugal	26-28Jun2018
3 rd	Global Cryosphere Watch (WMO/ESA)	Montréal, Canada	15-17Jul2019
--	Invited Seminar Series and Discussions	Virtual	TBD Jun2021; Jul2021; Sep2021
4 th	TBD	Helsinki, Finland	TBD Apr2022

**broaden exposure and understand breadth of issues; IESWG has partnered for each of the previous in-person meetings*

International Earth Surface Working Group - IESWG

There are a number of other existing Land/Surface Working Groups:

- Existing WGs currently focus on either a given **observable** or **specific processes**
- The IESWG will bridge the gap engaging **Earth surface-interface multi-disciplinary** experts
- Focus on **reducing timelines** for increased uptake of EO for **Earth systems applications**

International Bodies	
<i>Modelling</i>	<i>Observations</i>
WMO Polar Prediction Project	WMO Global Cryosphere Watch
WCRP CMIP and SnowMIP	IEEE GNSS+R
WCRP GEWEX panels / LHAs	Water/Energy cycle
WWRP WGNE	NWP/Atmosphere
HEPEX	Hydrology

The uptake of Earth observations in IR/MW over land and snow remains very low with roadblocks not just in observation simulation; but, in the alignment of the numerical models with that of the forward models and products.

*The current IESWG co-chairs are split specialties between modelling and observations.
The intention is to preserve this representation moving forward.*

International Earth Surface Working Group - IESWG

Goal: Gather requirements specific to surface observations to enhance both our understanding and ability to monitor the components of the Earth system.

Foster uptake of Earth Observations for land, vegetation, and snow

Objectives of the IESWG include (*for full details see draft IESWG ToR*):

- Use of Earth Observation (EO)-data for Cryosphere and Biosphere modelling relevant to study processes at the land-atmosphere interactions;
- Use of EO-data for parameter optimization including those for the land surface, vegetation and snow and the resulting surface emissivity/reflectance spectra;
- Land Data Assimilation Systems (LDASs) both current state and recent developments; sensitivity studies of surface model parameters to remotely sensed data;
- Radiative transfer and emissivity/reflectivity model development: VIS/IR/MW, review of current parameterization for forward modelling surface boundary;
- Retrievals of land surface parameters: product characteristics and performances;

International Earth Surface Working Group - IESWG

Activities:

Special Issue: Advancing Earth Surface Representation via Enhanced Use of Earth Observations in Monitoring and Forecasting Applications (2019)

https://www.mdpi.com/journal/remotesensing/special_issues/earthsurface_RS

Overview Article: Balsamo, G.; et. al. Satellite and In Situ Observations for Advancing Global Earth Surface Modelling: A Review. *Remote Sens.* **2018**, *10*, 2038. <https://doi.org/10.3390/rs10122038>

New Special Issue: Remote Sensing of Land Surface and Earth System Modelling (closing date: 31May2021)
https://www.mdpi.com/journal/remotesensing/special_issues/Land_Surface_Earth_System_Modeling

IESWG has:

- *coordinated a roadmap to highlight largest deficiencies and experiments designed to understand and prioritize research and development*
- *documented the current state of the land surface models and data assimilation systems*
- *an effort underway working towards coordinating a climatology of surface sensitive L-band radiances*
- *worked towards creating a community-wide adopted set of validation metrics, particularly scoring coupled interactions and energy budget closures.*

Key issues of relevance to CGMS:

- The International Earth Surface Working Group (IESWG) has targeted a gap:
 - Arctic (snow covered surface), Land and Vegetated surfaces continue to lack coordinated effort throughout the process from observation uptake by data assimilation into numerical prediction models
 - Compensating errors make model development difficult: having confidence that our model developments bring the model closer to observations (not necessarily model analysis) for the right reason is crucial;
- The IESWG is engaging Earth surface-interface multi-disciplinary experts facilitating both modellers & data assimilation experts:
 - Improving the coupled models which in turn allows us to improve the use of Earth surface sensitive satellite observations
- For the remainder of 2021 convene a virtual 3 part invited seminar series and discussion covering:
 - Snow ice and cryosphere-atmosphere interaction
 - Vegetation and land-atmosphere fluxes
 - Soil moisture, river-discharge and water cycle
- Apr2022 the IESWG will convene a 4th workshop in Helsinki, Finland.



To be considered by CGMS:

- General action, to review and provide feedback to draft of Terms of Reference (ToR) for the International Earth Surface Working Group (IESWG)
- Action to the CGMS agencies, if it hasn't previously sent representation, consider joining IESWG-4 to provide their insights and priorities
- Incorporate responses from CGMS-49 plenary, and report outcome of IESWG-4 back to the CGMS-50 plenary for endorsement of IESWG