Climate Modelling User Group (CMUG)

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What is CMUG?

CMUG is the Climate Modelling User Group, an ESA Climate Change Initiative (CCI) project. We facilitate communication between the CCI Essential Climate Variable (ECV) dataset providers and with users in the climate modelling, climate research and climate services communities. CMUG gathers requirements from the users of CCI datasets; assesses the dataset quality; carries out research on the effectiveness of the ECVs when used in climate modelling; and promotes policy-relevant applications of ECVs. CMUG's three primary objectives are on the right.

1. Support integration within CCI programme
2. Foster exploitation of satellite-derived ECVs
3. Assess quality and impact of CCI ECVs

ESMValTool

CMUG works to include ESA CCI ECV datasets in the Earth System Model validation tool: ESMValTool, an open-source community-developed diagnostics and performance metrics tool for the evaluation and analysis of Earth System Models (ESMs). Diagnostics and performance metrics within ESMValTool allow tailored analysis for the evaluation of models with ESA CCI data. https://esmvaltool.org/

Cloud and Aerosol Study (companion work: LPS session A.01.06)

Jeronimo Escribano (BSC)

During the Godzilla dust event in June 2020 the BSC MONARCH model underestimated the dust plume crossing the Atlantic towards the Caribbean. The event was analysed again assimilating the CCI SLSTR aerosol optical depth (AOD) from SU algorithm v1.14 product. The first experiment used a linear model of uncertainties and the second used the uncertainties provided with the CCI product.

- Both assimilation experiments show better agreement with the satellite retrievals than the simulations without assimilation.
- Analyses using the reported retrieval uncertainties show larger increments in AOD, with a finer spatial structure than the assimilation using AOD with a linear model uncertainties
- Possible underestimation of uncertainties over the ocean in the BSC data assimilation system was diagnosed, suggesting that better skill of forecasts and analyses can be achieved if the uncertainties of the assimilated AOD over the ocean in the assimilation system are 2 to 4 times larger than current estimates
- Better analysis skills are obtained when the pixel-level observational uncertainty is amplified in the data assimilation, in concordance with Desroziers diagnostics

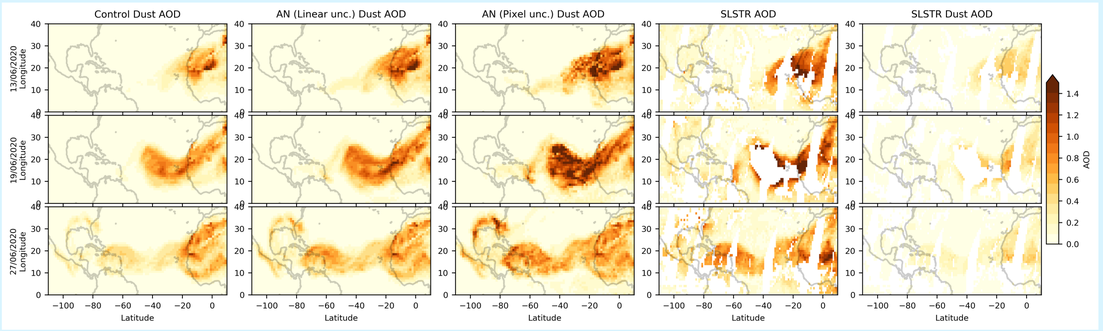

Figure 1: Dust AOD from MONARCH runs without assimilation (first column), with assimilation of SLSTR AOD assuming a linear model of AOD uncertainties (second column), assimilation of SLSTR AOD with pixel-wise AOD uncertainties (third column), SLSTR AOD retrievals (fourth column) and Dust AOD SLSTR retrievals (last column). Rows are AOD snapshots for the 13, 19 and 27 of June 2020.

Scientific Studies CMUG CCI+ Phase 2

LPS Sessions: A.01.04, A.01.06, A.05.04, A.05.06, A.07.01

- WP5.1 Machine Learning
- WP5.2 Vegetation Phenology
- WP5.3 Land Cover
- WP5.4 Ocean Biogeochemistry
- WP5.5 Clouds and Aerosols
- WP5.6 Snow Dynamics
- WP 5.7 Ice Sheets
- WP5.8 Wetland Methane
- WP5.9 Vegetation and Hydrometeorology

Evolution of obs4MIPs

LPS Session: Agora Thurs 5.45pm

A wide variety of observation-based datasets are used for climate model evaluation. Obs4MIPs (Observations for Model Intercomparisons Project) is a collection of documented datasets that have been formatted according to the Coupled Model Intercomparison Project (CMIP) model output requirements and made available on the Earth System Grid Federation (ESGF).

This effort was initiated with support from NASA and the U.S. Department of Energy and has expanded to include contributions from a broader community including ESA. Obs4MIPs underpins model evaluation in CMIP and beyond and thus makes a significant contribution to assessment and improvement of model quality, e.g. reported by IPCC. The CCI ECV projects contribute selected ECV data sets of most interest to the CMIP community.

https://pcmdi.github.io/obs4MIPs/ https://climate.esa.int/media/documents/CMUG_FutureEvolutionofObs4MIPs_D5.7f_v1.2_ieS8qqu.pdf

CMUG has produced a report providing recommendations on the future evolution of Obs4MIPs. This includes:
- Results from interviews with 37 users of obs4MIPs
- A gap analysis of the current obs4MIPs datasets, identifying missing variables and out of data versions
- An in-depth examination of the importance and relevance of recent developments in the understanding of observational error sources to the provision of obs4MIPs data

Snow Dynamics Study

Catherine Ottlé, Amélie Cuynet and Philippe Peylin (LSCE-IPSL)

Analysis of the observation products: impact of the vegetation on snow behaviour

Analysis of snow and land cover products indicated that snow behaviour is strongly influenced by plant functional type (PFT). For example, snow coverage varies with vegetation type, indicating that SCF and albedo parameters should be adapted for each PFT.

Comparison of CCI Snow products with ORCHIDEE simulation outputs

An ORCHIDEE v4 simulation without optimised snow parameters was compared with CCI Snow and MODIS albedo products in the region above 30°N. Figure 3 shows the model SCF is overestimated in areas with year-round snow and underestimated in May due to an early onset of snow melt in the simulation.

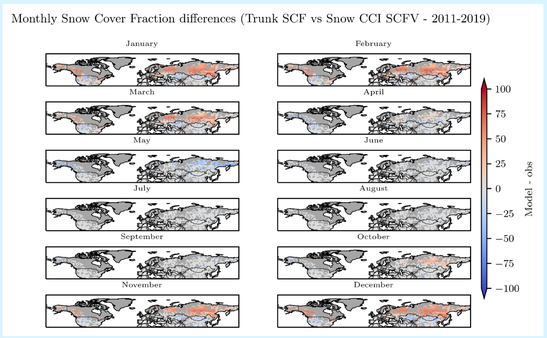

Figure 2: SCFV monthly differences [%] between ORCHIDEE v4 (Trunk) and Snow CCI - 2011-2019. The regions in grey correspond to pixels where data were unavailable

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