The ESA CCI Climate Modelling User Group

Met Office, Exeter, U.K.; Barcelona Supercomputing Centre (BSC), Barcelona, Spain; Deutsches Zentrum für Luft und Raumfahrt (DLR), Oberpfaffenhofen, Germany; European Centre for Medium-range Weather Forecasting (ECMWF), Reading, U.K.; Institut Pierre Simon Laplace (IPSL), Paris, France; Max-Planck Institute für Meteorologie (MPI-M), Hamburg, Germany; Météo France, Toulouse, France; Swedish Meteorological and Hydrological Institute (SMHI), Norköpping, Sweden; Science and Technology Facilities Council-UK Research Institute (STFC-UKRI), Harwell, UK.

Overview

What is CMUG?

ESA has established the Climate Modelling User Group (CMUG) to place a climate system perspective at the centre of its Climate Change Initiative (CCI) programme.

CMUG provides a dedicated forum through which the Earth Observation (EO) data community and the climate science and services community can work closely together. CMUG works with the Essential Climate Variable (ECV) CCI projects to achieve this goal. Figure 1 to the right shows the structure of the CMUG project.

What is CCI?

The European Space Agency (ESA) set up the Climate Change Initiative (CCI) programme with the objective to realise the full potential of the long-term global EO archives that ESA, together with its Member states, has established over the past 30 years, as a significant and timely contribution to the ECV databases required by the Global Climate Observing System (GCOS).

The programme undertakes the activities necessary to meet its objective of supporting the UNFCCC through GCOS-defined ECVs. The CCI programme comprises 23 parallel projects geared to ECV data production.

Climate Modelling User Group (CMUG) Project Structure
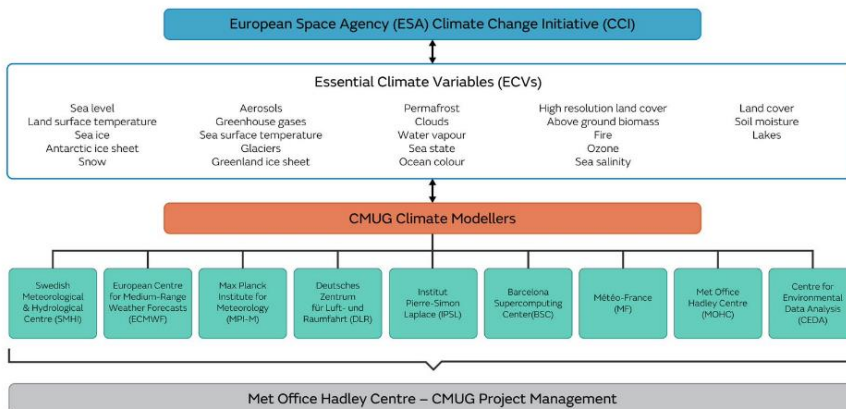

ESMValTool

The Earth System Model Evaluation Tool (ESMValTool) is a community diagnostics and performance metrics tool for the evaluation of Earth System Models (ESMs) that allows for routine comparison of single or multiple models, either against predecessor versions or against observations.

The priority of the CMUG effort so far has been to target specific scientific themes focusing on selected ECVs. The tool is being developed in such a way that additional analyses can easily be added. A set of standard recipes for each scientific topic reproduces specific sets of diagnostics or performance metrics that have demonstrated their importance in ESM evaluation in the peer-reviewed literature. CMUG continuing to add useful diagnostics related to the CCI ECVs, this is a work in progress.

The ESMValTool is a community effort open to both users and developers encouraging open exchange of diagnostic source code and evaluation results from the CMIP ensemble. This will facilitate and improve ESM evaluation beyond the state-of-the-art and aims at supporting such activities within the Coupled Model Intercomparison Project (CMIP) and at individual modelling centres.

Obs4MIPs
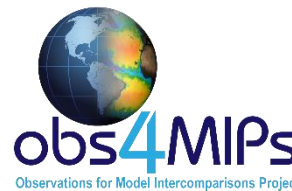
A wide variety of observation based datasets are used for climate model evaluation. Obs4MIPs (Observations for Model Intercomparisons Project) refers to a limited collection of documented datasets that have been formatted according to the Coupled Model Intercomparison Project (CMIP) model output requirements 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 (DOE) and has now 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 the assessment of and sustained improvement in model quality, e.g., as reported by IPCC. The CCI ECV projects contribute ECV data sets, which are decided to be of most interest to the CMIP community, to Obs4MIPs.

C3S

The Copernicus Climate Change Service (C3S) mission is to support adaptation and mitigation policies of the European Union by providing consistent and authoritative information about climate change. C3S offer free and open access to climate data and tools based on the best available science.

CMF

The Climate Monitoring Facility (CMF) is an interactive interface that facilitates the evaluation of the multi-year variability of various statistics computed from a variety of climate data records (CDRs). The tool is designed to evaluate the long-term homogeneity and perform a consistency analysis of the selected CDRs.

All data included in the C3S Climate Data Store can be accessed by the CMF and these include ESA CCI ECVs: Sea Surface Temperature, Ocean Colour, Sea Level, Sea Ice, Soil Moisture, Ozone, and Aerosols.

Climate Services Interface

CMUG would like to reach out to climate data users from the climate services sector to

- better understand their requirements
- receive feedback on the usefulness of the existing products
- gather information on where improvements can be made to ESA CCI products

Please contact CMUG if you would be interested in giving feedback: mailto:CMUG@metoffice.gov.uk

How to access the ESA CCI ECV data: **https://climate.esa.int/en/explore/**

ESA CCI data are available from a wide variety of platforms and organisations and are free at the point of use. Some services may require user registration.

- The Cate Toolbox provides a simple platform for CCI data exploration and analysis: https://cci-tools.github.io/
- CCI data products are available to download at the Open Data Portal: https://climate.esa.int/en/odp/#/dashboard
- The Copernicus Climate Change Service (C3S), many ESA CCI ECV datasets are processed and updated regularly to support end user applications. This service, led by the European Centre for Medium-Range Weather Forecasts (ECMWF), provides operational climate data records to support adaptation and mitigation policies in Europe in response to climate change. These data sets are available from the C3S Climate Data Store: https://cds.climate.copernicus.eu/#!/home and C3S toolbox: https://cds.climate.copernicus.eu/cdsapp#!/toolbox
- ESMValTool: https://www.esmvaltool.org/
- Obs4MIPs: https://esgf-node.llnl.gov/search/obs4mips/