

## 2<sup>nd</sup> Technical ESMValTool Workshop

15-16 November 2016, Duration 2 days

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A 2<sup>nd</sup> workshop on the technical development of the Earth System Evaluation Tool (ESMValTool, *Eyring et al.* [2016b]) will be held at the Ludwig-Maximilians-Universität München (LMU) in the Department of Geography from 15-16 November 2016. The ESMValTool is developed as a community system, open to both users and developers, hence encouraging open exchange of evaluation methods and results. This will facilitate and improve ESM evaluation beyond the state-of-the-art and aims at supporting model evaluation and development activities at individual model centers and within CMIP. It is envisaged to run the tool routinely on model output submitted to the Coupled Model Intercomparison Project (CMIP), utilizing observations available through the ESGF in standard formats (obs4MIPs/ana4MIPs) or provided by the user.

The workshop invitations will be restricted to that subgroup of the ESMValTool Development Team that works on general technical issues and the structure of the tool, as well as the coupling of the tool to the Earth System Grid Federation (ESGF).

**Workshop Goal:** (1) Define a common strategy across projects and institutions towards an efficient performance and provenance of the ESMValTool in time for the analysis of CMIP6 simulations. (2) Define a strategy towards an improved and more routine evaluation of CMIP models with the ESMValTool (see also *Eyring et al.* [2016a]).

### Workshop Objectives:

- How can the ESMValTool become more flexible to integrate additional diagnostics and data streams?
- What improvements can be made that would facilitate broad community development and usage?
- How to simplify ESMValTool integration with existing data repositories and the ESGF infrastructure?
- Discuss steps towards a clear roadmap for ESMValTool enhancement for CMIP6 and beyond
- Define technical definition and roadmap towards implementation of common interfaces for ESMValTool with other evaluation packages.
- Best-practices for facilitating python-based diagnostics
- Define a strategy for parallelization on multicore (shared memory) and multinode environments.
  - Main requirements and specifications
  - Current limitations (I/O-bound tasks, CPU-bound tasks)
  - Major modification/rewrite of current *backend* (incl. utilization of IRIS (UV-CDAT?) and coupling to *Auto-Assess*)
  - Benchmark test data (defining a standard for ESM-evaluation software)
  - Discussion on possibility for distributed computation in Grid-environments
- Reducing “technical debt”
  - Coding guidelines revisited
  - Automated testing for core and diagnostics
  - Remove dependencies on deprecated external software
- Common development framework for monitoring of the performance and resource consumption
- Visualization and documentation

The workshop is held under the auspices of the InfraStructure for the European Network for Earth System Modelling Phase 2 (ISENES-2) project, the Coordinated Research in Earth Systems and Climate: Experiments, kNowledge, Dissemination and Outreach (CRESCENDO) project, the Institute of Atmospheric Physics of the German Aerospace Center (DLR), and the Department of Geography at LMU Munich.

### References:

- Eyring, V., et al. (2016a), Towards improved and more routine Earth system model evaluation in CMIP, *Earth Syst. Dynam. Discuss.*, 2016, 1-24.
- Eyring, V., et al. (2016b), ESMValTool (v1.0) – a community diagnostic and performance metrics tool for routine evaluation of Earth system models in CMIP, *Geosci. Model Dev.*, 9(5), 1747-1802.