CMIP model evaluation with the Earth System Model Evaluation Tool (ESMValTool)

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The Coupled Model Intercomparison Project (CMIP) has successfully provided the climate community with a rich collection of simulation output from Earth system models (ESMs) that can be used to investigate past climate changes and obtain projections and uncertainty estimates of the future climate. An important pre-requisite for gaining confidence in ESM results is the evaluation of the models with observations. Over the last decades significant progress has been made in climate models. Because of the increasing complexity of the models and rapidly growing data volumes, the CMIP community has now reached a critical juncture at which many baseline aspects of model evaluation need to be performed much more efficiently. To enable a systematic, comprehensive and rapid performance assessment of the large number of models participating in CMIP, the Earth System Model Evaluation Tool (ESMValTool, Eyring et al., 2016) is developed as open source software. A collection of standard sets of diagnostics, so-called namelists allows, for instance, reproduction of figures from the IPCC AR5 evaluation and projection chapters. The ultimate goal is to run the ESMValTool alongside the Earth System Grid Federation (ESGF) as part of a more routine evaluation of CMIP model simulations, which can complement additional in-depth explorative analysis and research that makes use of CMIP output which will remain essential to close gaps in our scientific understanding.

In this presentation we provide an overview of the current status of CMIP5/6 model evaluation with the ESMValTool with a focus on SPARC-relevant processes and variables (e.g. ozone, water vapor, and clouds). For the evaluation of the models we use observations available through the Earth System Grid Federation (ESGF) in standard formats (obs4MIPs) and selected other datasets such as an updated version of a gap-free monthly mean zonal mean ozone database (Hassler et al., 2018).

Key words: ESMValTool, CMIP, model evaluation, ozone

References

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