ESMValTool developments for IPCC AR6

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ESMValTool homepage: https://www.esmvaltool.org

ESMValTool v2 user manual: https://esmvaltool.readthedocs.io/en/latest/

This document describes how the ESMValTool development can be used to view or produce CMIP6 results in support of IPCC AR6.

(I)   To view ESMValTool CMIP6 results, please use the access data below.

(II)   In order to work with and contribute to the development of the ESMValTool in support of IPCC WGI AR6 chapters a GitHub account is needed.

(III)   In addition, access to DKRZ computing facilities and the CMIP6 output of its local replica can be granted in case you want to run the ESMValTool at DRKZ.

Please follow the instructions outlined below.

(I)   View ESMValTool CMIP6 results

As previously announced, the website at http://cmip-esmvaltool.dkrz.de/ shows model evaluation results produced with the ESMValTool, originally for CMIP5 simulations only. ESMValTool has the capability to reproduce figures from selected AR5 chapters and peer-reviewed papers, and incorporates targeted analysis packages such as the NCAR Climate Variability Diagnostics Package (CVDP) and the Expert Team on Climate Change Detection and Indices (ETCCDI) software package. Figures are displayed with freva (Freie Universität Berlin Evaluation System).

CMIP6 model simulations are now being published to the ESGF and the ESMValTool results browser has been started to be updated with CMIP6 results. More model simulations will be added as they become available on the ESGF. Also, more namelists (and therefore additional diagnostics), also for high-frequency output will be analysed. Initially, the CMIP6 evaluation results produced with the ESMValTool are water-marked and made available on a password restricted website. This strategy has been supported, encouraged, and approved by the WCRP Working Group of Coupled Modelling (WGCM). Therefore, all results presented on this website are strictly confidential at this stage and should not be used in publications. Therefore, please do not do not forward the access data below beyond your chapter team:

User name: ESMValTool4CMIP6

Password: Keep.All.Confidential@ThisStage:)

You can sort the results by "ESMValTool namelists", "Projects", "CMIP6 Realms", "Themes", "Models", "Domain", "Plot Type", "Statistics", "References", "Variables", or "Results". Should you have a comment on a specific figure, we encourage you to use the notes function by clicking on the figure, then on the "Notes" tab, adding your text and clicking the "Save" button.

Please note that there is a delay between the model simulation output that you have published to the ESGF and the one that is displayed in the ESMValTool figures. The reason for this is that the simulations are transferred to a local replica at DKRZ that is hosted alongside the ESGF and that the ESMValTool operates on.

(II)   ESMValTool developments in support of IPCC AR6

1) Join private ESMValTool-AR6 repository

For ESMValTool developments for IPCC AR6, we have set up an ESMValTool-AR6 private github repository. We strongly recommend to all chapters to develop their code in this repository. This has the advantage that (1) we synchronize frequently with the most recent stable branch of the ESMValTool github public repository (which is important as we are currently working on improvements for v2.0 that you could benefit from) and (2) it will make sharing the code between the chapters easier.

We will keep the ESMValTool-AR6 private github repository up to date with the master branch but not vice versa. In other words, we will not push back the ESMValTool-AR6 private repository to public one until the IPCC report is officially published. The ESMValTool-AR6 repository must not be copied into any public domains. This will be done on completion of the assessment when the report is being published. A strict confidential treatment is essential, in line with the confidentiality agreement signed by IPCC WGI AR6 authors.

If you want to join the ESMValTool-AR6 repository, please create a github account (unless you already have one) and send your github user name to veronika.eyring@dlr.de, axel.lauer@dlr.de and rodrigo.manzanas@universite-paris-saclay.fr.

2) Working with the ESMValTool v2

➜ Follow the installation instructions in the README.md to create your local copy of the tool:
https://github.com/ESMValGroup/ESMValTool-AR6/blob/version2_development/README.md

➜ Create your own feature branch for your development, indicating the number of your chapter and the content, for example:
git checkout –b ar6_chapter3_monsoon

➜ Optionally, you can open an issue on the ESMValTool-AR6 repository to document your planned and ongoing work, ask for help, or discuss related topics.

➜ Once the development work in your branch is finished, open a pull request in the ESMValTool-AR6 repository to merge your feature branch to version2_development and wait for approval, or address the comment by the core development team (if any).

➜ Please follow the testing and code style guidelines as described in the README.md file.

(II)   DKRZ account (only if you want to run ESMValTool at DKRZ)

1) To get an account, register at https://luv.dkrz.de/projects/newuser/

Please note that this account is limited to ESMValTool work at DKRZ in support of IPCC AR6 chapters. Due to limited resources, please ensure that you are not using this account for purposes other than ESMValTool IPCC AR6 work.

2) With your account, log into https://luv.dkrz.de/ and select 'Join existing project'. Since resources from already approved DKRZ projects have to be used in 2019, we have split chapters across three different projects as follows to share the demands.

- **IPCC AR6 WGI Chapter 4 authors:** please select project "mh0482 (Data Store Admin MPI-M)".

- **All other IPCC AR6 WGI chapters:** please select project "1088 (DKRZ_MIP_Pool_Analysis)" and write a short mail describing your planned activities during 2019 to data_pool@dkrz.de and veronika.eyring@dlr.de. This will make you known to our request tracker for future communication, please mention your project 1088 join request.

A system administrator will approve your request and then you have access.

3) Availability of CMIP5 and CMIP6 data

CMIP5: **/mnt/lustre01/work/kd0956/CMIP5/data/cmip5/output1/**

CMIP6: **/mnt/lustre02/work/ik1017/CMIP6/data/CMIP6/CMIP/**

OBS (ESMValTool v2): **/mnt/lustre02/work/bd0854/DATA/ESMValTool2/OBS**

4) Running ESMValTool at DKRZ

➔ A configuration file for the DKRZ (config-user_DKRZ.yml) will be made available on the github ESMValTool-AR6 repository. This file contains all the settings required to run the tool, including the paths to the input data.

➔ Execute the ESMValTool:
> esmvaltool –c config-user_DKRZ.yml recipes/<recipe>

5) How to work at DKRZ

➔ User manual**:** https://www.dkrz.de/up/systems/mistral

➔ Use the following command to access one of the mistral login nodes
> ssh <user-account>@mistral.dkrz.de
in which <user-account> must be replaced by your individual account.
Login nodes are for compiling and job submission only! For all other tasks, use one of the **pre- and post-processing nodes**
> ssh <user-account>@mistralpp.dkrz.de
(see also https://www.dkrz.de/up/systems/mistral/hpc-concepts)

➔ Data storage:
Personal data: home directory (24GiB)
Project data: **/work/bd0854/<user-account>**
Temporary data: scratch directory on **/scratch/*/<user-account>** (e.g. /scratch/b/b380103) will be automatically deleted after 14 days (15TiB) **(Please use this directory for tests! Do not use the work directory for tests.)**
(see also https://www.dkrz.de/up/systems/mistral/hpc-concepts)

➔ Running batch jobs:
Info and examples on SLURM job scheduling system at DKRZ:
https://www.dkrz.de/up/systems/mistral/running-jobs