IS-ENES3 Milestone M9.1

Release of enhanced ESMValTool documentation for VA1 Activity

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Authors: Rémi Kazeroni (DLR), Sarah Alidoost (NLeSC), Bouwe Andela (NLeSC), Peter Kalverla (NLeSC), Axel Lauer (DLR), Javier Vegas Regidor (BSC)
Reviewers: Saskia Loosveldt Tomas (BSC), Kim Serradell (BSC)
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ABSTRACT

Active user support for the ESMValTool is provided as part of the WP6-VA1. The different resources available for users have been fully documented in an enhanced version of the ESMValTool documentation released with the version 2.4 (November 2021) of the tool. This document describes the different options available for user support and their integration into the ESMValTool documentation.

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1. Objectives

Within WP6-VA1 (enhancing and extending services for critical infrastructure software tools used around climate models), the objective of this milestone was to produce an enhanced and comprehensive version of the Earth System Model Evaluation Tool (ESMValTool) documentation including a description of all user support options offered for the ESMValTool as part of the VA1 activity. This enhanced documentation was released in November 2021 as part of ESMValTool version 2.4. The documentation contains detailed instructions related to the installation, configuration, and usage of the ESMValTool as well as references to additional sources of information including the online tutorial, a discussion forum, the ESMValTool website, and contact information to engage with the ESMValTool development team.

2. Description of work: Methodology and Results

The documentation of ESMValTool is hosted by ReadTheDocs and available at https://docs.esmvaltool.org/ is built automatically using Sphinx which allows continuous enhancement of the user manual as the software is being developed and further improved. The source code of the documentation is publicly available on the GitHub repository of the ESMValTool and consists of source files written in reStructuredText (.rst) format. It is open to contributions on the ESMValTool GitHub repository via pull requests. It has been extensively revised for the release of ESMValTool version 2 [1] and continuously updated in subsequent releases. This documentation also includes the documentation of ESMValCore, core functionality and workflow manager for the ESMValTool and provides all pre-processor functions used by ESMValTool recipes. The documentation parts related to user support available for WP6-VA1 is described in the following.

The ESMValTool documentation starts with a general description of the tool and an outline of the general workflow. This is followed by a chapter on installation, configuration, and running the ESMValTool. The tool is distributed as an open-source software package via the Python package manager or Conda. The source code is freely available on GitHub. Several installation methods are

described in the documentation and cover various use cases such as for users and developers. The recommended method is to install the tool via the Mamba package manager which provides a fast and robust way to create the environment for the ESMValTool. It is also possible to only install subpackages of the ESMValTool if the user only needs to run diagnostic scripts written in one or two of the four supported programming languages Python, NCL, R, and Julia. While default instructions assume a Linux operating system, support for macOS is also available. In addition, alternative installation procedures via Pip, Docker, and Singularity are available and can be used by users running the tool on compute clusters with limited user rights, for example with no possibility to use their own version of Conda to install the ESMValTool. Besides, centrally-installed versions of ESMValTool are available at the major High Performance Computing systems CEDA-JASMIN and DKRZ, which are used by many users of the ESMValTool. For developers of the ESMValTool it is recommended to use the install from source method which gives access to the latest features and the most recent development version of the tool.

The configuration of the tool is handled via a configuration file, `config-user.yml`, that is created by default in `$HOME/.esmvaltool/` with the command: `esmvaltool config get_config_user`. This customizable configuration file contains all settings needed to run ESMValTool recipes, including paths and directory structures used for the input data (e.g. CMIP5, CMIP6, CORDEX, observational data, …).

The documentation contains explanations of how to run the ESMValTool from the command line. It provides examples of running recipes and optional arguments that can be used to, for instance, run only parts of a recipe, skipping datasets that are not available, automatically downloading data needed for a recipe from ESGF nodes, or reusing already pre-processed files from a previous run. The last two options are new features that were added for the release of ESMValTool version 2.4.

In addition to the main documentation of the ESMValTool, there is also an online tutorial available that is targeted particularly at new users. The tutorial is structured as a set of "episodes" covering all key aspects to get started with ESMValTool such as installation, configuration, running and writing recipes. It can be taken by the user without any further instructions or used by instructors within special workshops. Each episode provides a number of examples and exercises with solutions. The final episode focuses on contributing to the development of the ESMValTool. Users are informed about the development process of the tool, including git, code quality standards, automated testing and pull request reviews. The users can also learn how to write diagnostic scripts and how to add support for new observational datasets in the ESMValTool. The ESMValTool main documentation contains links to the relevant episodes of the tutorial.

Support for ESMValTool users is available through different channels, which are listed on the introduction page of the documentation. Contact information to active contributors of the project is available on the ESMValTool website. These contact people are helping to get new users in

contact with the ESMValTool developer community. The website also contains general information about the tool, including news items, references, publications, and a gallery of example plots. The main documentation also provides explanations on how to join the public mailing-list to stay informed about e.g. new releases, monthly online meetings, and upcoming workshops and events.

Users can also ask general and technical questions on the ESMValTool Discussion page hosted on GitHub. This forum is organized by categories with a section for new users and a F.A.Q. section which offers advice on best practices. Another option for interaction with the ESMValTool community is to create a new GitHub issue, which can be used to e.g. report a bug, request a new feature or ask a specific question.

3. Next steps

During the final period of the project, we will continue to improve the active user support based on feedback collected via the different channels described in the report. In particular we will strive to keep the online tutorial synchronized with the latest release of ESMValTool. These tasks will be coordinated by the User Engagement Team as part of the ESMValTool governance.

4. Reference

[1] Righi, M., Andela, B., Eyring, V., Lauer, A., Predoi, V., Schlund, M., Vegas-Regidor, J., Bock, L., Brötz, B., de Mora, L., Diblen, F., Dreyer, L., Drost, N., Earnshaw, P., Hassler, B., Koldunov, N., Little, B., Loosveldt Tomas, S., and Zimmermann, K.: Earth System Model Evaluation Tool (ESMValTool) v2.0 - technical overview, Geosci. Model Dev., 13, 1179-1199, https://doi.org/10.5194/gmd-13-1179-2020, 2020.