Working-group report #2

Establishing community-wide training resources

17.05.2024

Summary

This working group was aiming to collect and share information about already available training opportunities for community members (e.g., different models, HPC access and optimization, teaching material…), and to identify gaps in current training opportunities to optimize training resources.

General information

Duration:	12 months
Responsible contact:	Birgit Hassler (DLR)
WG-members:	Falk, Stefanie (LMU)
	Fritzsch, Bernadette (AWI)
	Grießbach, Sabine (FZJ)
	Kirchner, Ingo (FUB)
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KickOff:	12.05.2023
WG dissolution:	17.05.2024

Working-group objectives

1. Establishing a central location for sharing collected information about available trainings in the community (e.g., from DWD, Jülich, DKRZ). This will allow members of the community to easily find available offers.
2. Establishing a pool of shareable trainings/education that were developed at one institution but could be deployed somewhere else.
3. Identifying gaps in offered training courses to cover the (upcoming) needs of the community.
4. Evaluating the need for, and if necessary, establishing, a high-throughput / low-resolution version of ICON-seamless for university applications and training.

Outcomes

1. We collected information about different available trainings and tutorials that were known to the members of the working group. The broad topics covered in the collection are:
   - Material that is used at different universities regarding the topic (climate) modelling.
   - Tutorials and workshops available from different institutions regarding the topic (climate) modelling.
   - Further training material regarding a wider scope of modelling.
   - Tutorials, courses and information about validation and evaluation.

   Our recommendation is to put the collection below on the natESM website, and invite the wider community to add to the collection if they are aware of courses and tutorials that are not listed in the collection yet.

2. We identified a gap in the offers for people beyond the stage of official university students to learn about climate modelling. While there are some courses available to learn about specific models (e.g., ICON), or specific realms (e.g., Compact Course about Atmospheric Chemistry and Dynamics at FZJ), there is no compact course available about general climate modelling. Some years ago, there was the possibility to attend a summer school co-organized by MPI Hamburg (a two-week summer school), but this is not offered any longer.

   We therefore recommend the following:

   - To create a similar summer school for the natESM community as a one-week (maybe a two-week) summer school similar to the format that MPI Hamburg had provided in the past; we suggest that this format should be organized on a biannual basis. For establishing the new summer-school concept and organization of the school we suggest creating a new natESM working group dedicated to that.
   - To offer a series of online tutorials of different Earth System components covered by the natESM community with some required work being done by the participants in their own time plus one (one-/two-day) in-person meetings to present small projects by every participant; this format would run over several months.

3. We discussed the possibility of a high-throughput/low-resolution version of ICON for university applications and training. However, the necessity of such a configuration is not clear, owing to the current lack of information on how many universities offer focused, in-depth courses on model development and general climate modeling. Low-resolution ICON configurations already exist, along with the necessary initial- and boundary-condition data. No specialized version of ICON is necessary for that. It is possible to define almost any desired experimental set-up via the configuration file(s). natESM could provide two or three different experimental set-ups and re-gridded initial and boundary-condition data (tailored to a very specific scientific question) with:

   - A pre-defined and well-tested configuration file for each setup.
   - A step-by-step documentation on
   - how to use the pre-defined configuration files,

- which questions the configurations can help to answer,
- and what kind of output can be expected (in file sizes and numbers).
- A clear guideline on computational resources demanded by the different configurations (e.g., runtime on Levante at DKRZ, on a university cluster).

The experiment configurations provided by ICON do not suffice for possible configurations since it is not clear how well maintained they are, and for which specific version of ICON they were developed (e.g., obsolete options and variables). The suggestion came up that within the framework of natESM the individual modelling groups could update the experiment configuration files for ICON that they had provided at some point, and then also add a uniform header for the experiments.

Training materials and helpful links

Teaching materials on modeling provided by universities

- Material from FUB: [Modellierung Überblick](#)
    - o https://vast.klimod.de
- Course slides from LMU-LUS (Uncertainties in environmental modeling – first year Masters):
    - o [Google Drive Folder](#)
- Documentation of the course "Physics of Climate" https://doi.org/10.11588/hint.2021.1.84511

Training and courses on modeling from various institutions

- NCAR/UCAR annual workshop on CESM. [Upcoming and past workshops](#)
- CESM tutorial recordings by NCAR/UCAR on YouTube: [YouTube channel](#)
- UCAR COMET Program: [COMET website](#)
- HPC Carpentry: Teaching HPC-oriented coding and data-science skills to researchers: [HPC Carpentry](#)
- Fachverband Umweltphysik (Deutsche Physikalische Gesellschaft (DPG)) trainings at Physikzentrum Bad Honnef. Link to the 2023 ocean training: [Ocean Training 2023](#) (only for physics students)
- DWD numerical model training: [Numerical model training 2023](#)
- Basic Level Course materials and tutorials: [Create Climate Model with Py](#)
- Various models for exploration (University Course Framework): [University of Chicago Climate Models](#) based on materials by [David Archer](#)
- Compact course on Atmospheric Chemistry and Dynamics: [Course details](#)
- NFDI4Earth Academy Program: [Academy Program](#)
- Past ABC-J summer schools on terrestrial modeling: [Geoverbund ABC-J Summer School](#)

Information on the broader topic of modeling

- Volc2Clim (from volcanic eruptions to climate forcing): [Vol2Clim](#)

- CLM land sites platform (University of Oslo) - DockerDesktop-based GUI for easy set-up and running of site-level simulations in CLM/FATES: CLM Land Slides Platform

Information and courses on evaluation and validation

- ESMValTool Tutorial (Software for evaluating Earth System Model simulations): ESMValTool Tutorial
- ClimXtreme evaluation tool: XCES tool