

Project: **677**

Project title: **Model development and support for the MESSy system (FZJ-ICE-3 part)**

Principal investigator: **Astrid Kerkweg**

Report period: **2023-11-01 to 2024-10-31**

*Maximum of 2 pages including figures. 9 pt minimum font size.*

In the application for 2024 the planned work was subdivided into five subprojects:

1. Further implementation of MESSy chemical submodels into ICON/MESSy and Tests
2. Reimplementation of MESSy into ICON via the library ComIn.
3. Test of GPU ported code on Levante
4. (Part of) the User Support for MESSy

As stated in the request for 2024, this project is a pure model development and user support project for issues arising around the further development of the MESSy software. This has two consequences: (1) the amount of required computing time and /work storage space is highly speculative, as it depends on the arising debugging requirements. (2) the range and the prioritising of the work to be done is rapidly changing. One important factor, which is outside of our influence is the scheduling of the natESM sprints and the ESIWACE project. It can not be really planned, when these sprints start, but when they start, most of the work force needs to be available for these projects.

As our application for support by ESIWACE was successful (which was not known when we issued this application for 2024), the GPU porting work was shifted in the direction of pushing forward to add all the expansions required for running the MESSy GPU infrastructure within a fully dynamic basemodel. However, after a good start in January, the programmer left and the project was only continued / re-started half a year later. The other 2 natESM sprints happened also to start in autumn 2024.

This accounting period the support requests did not require as much computing time as estimated in our application and, due to the shift in the GPU developments, the development took much more human working time than computing time for testing. This is why we did not use most of the computing time applied for in the reporting period.

1. Further implementation of MESSy chemical submodels into ICON/MESSy and Tests  
Instead of active submodel porting, a lot of time and some resources were used to help other MESSy users starting to port their own submodels to ICON and to GPU, which asked for help because their new code did not work.
2. Reimplementation of MESSy into ICON via the ComIn library.  
A first ComIn publication is currently in open discussion at GMD. The second ComIn natESM sprint is ongoing. However, the big computing time consuming test simulations will follow, once we finished the technical implementation of MESSy via ComIn into ICON.
3. Test of GPU ported code on Levante  
Part from some additionally adjustments of the MESSy infrastructure, the bigger test simulations did not take place, as, unfortunately, the ESIWACE sprint did not proceed as expected but was started beginning of October only.
4. (Part of) the User Support for MESSy  
A considerable number of User Support requests / bug reports have been processed in 2024.  
Explaining these in detail would go beyond the scope of this report, but they could be checked in the MESSy GitLab at DKRZ (e.g. #949, #983, 1017, #1033, #1077, #1103, #1155, #1194, #1081, #1181, #1206)