

esm-tools

A tool for Earth-System-Modellers

Nadine Wieters, Dirk Barbi, Luisa Cristini, et al.



01000101
01010011
01001101

ESM-Tools

deRSE, Potsdam
June 5, 2019

- 1 What are the esm-tools?
- 2 How are the esm-tools developed?
- 3 User Support and Contribution
- 4 General Information

What are the esm-tools?

What are the esm-tools?

- Infrastructure for Earth-System-Modelling (ESM)

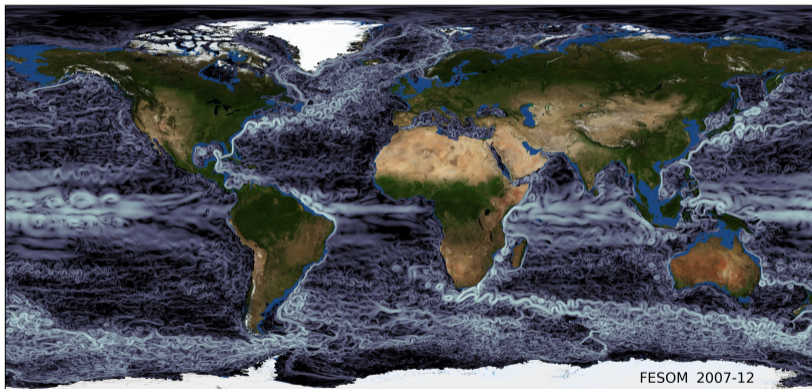


Figure: Global velocity field at 100 m simulated with FESOM1.4 [1] ocean model (see also [2]).

What are the esm-tools?

- All models and ESMs provide their own different compile and execution scripts
- esm-tools provides common infrastructure for
 - ▶ Models and coupled systems
 - ▶ HPC environment
 - ▶ Setup and run model experiment
 - ▶ Data (input and output)

esm-master

make-based tool to download, configure, compile

esm-environment

machine dependant settings

esm-runscripsts

generic runscripsts to run model experimments

- Support 10 models (including 4 ocean, 2 atmosphere, 1 ice sheet, 1 BGC, 1 GIA model and 1 coupler), coupled systems
- 6 HPC systems

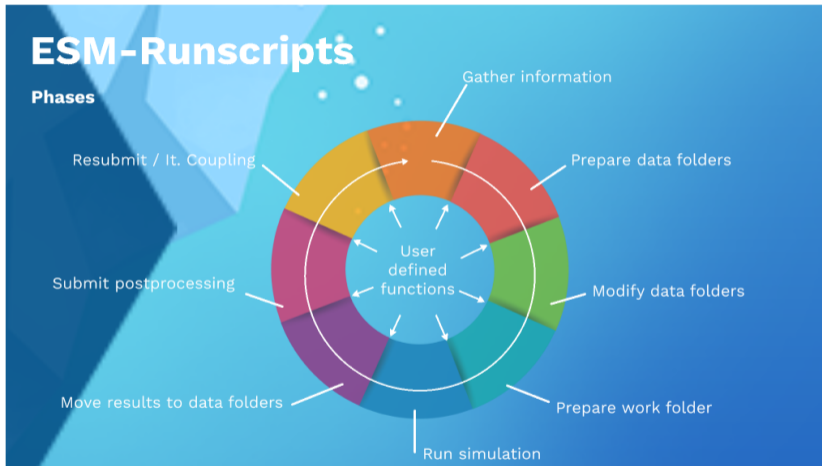


Figure: Different phases of esm-runscripts functionality

esm-runscripys functionality

```
#!/usr/bin/ksh -l
set -e

export FUNCTION_PATH=${WORK}/esm-master/esm-runscripys/functions/all
export FPATH=${FUNCTION_PATH}:$FPATH

machine_name="hpc"
setup_name="fesom_standalone"

compute_time="05:00:00"
#####

INITIAL_DATE_fesom_standalone=2008-01-01      # Initial exp. date
FINAL_DATE_fesom_standalone=2010-01-01      # Final date of the experiment

RES_fesom_standalone=CORE2

MODEL_DIR_fesom_standalone=${WORK}/esm-master/fesom_standalone/

BIN_DIR_fesom_standalone=${MODEL_DIR_fesom_standalone}/fesom_cpl/
EXE_fesom_standalone=fesom.x

BASE_DIR=${WORK}/esm-experiments/

POOL_DIR_fesom_standalone=/pool/FESOM/

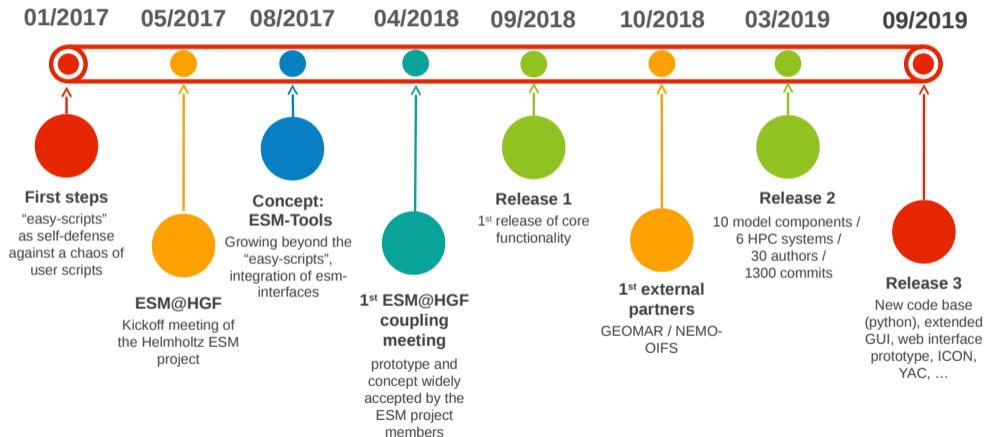
MESH_DIR_fesom_standalone=/pool/FESOM/meshes_default/core/

NYEAR_fesom_standalone=1                    # Number of years per run
#####
```

Figure: Minimal example runscripys

How are the esm-tools developed?

Development Timeline



Core development: Dirk Barbi (AWI), Nadine Wieters (AWI)

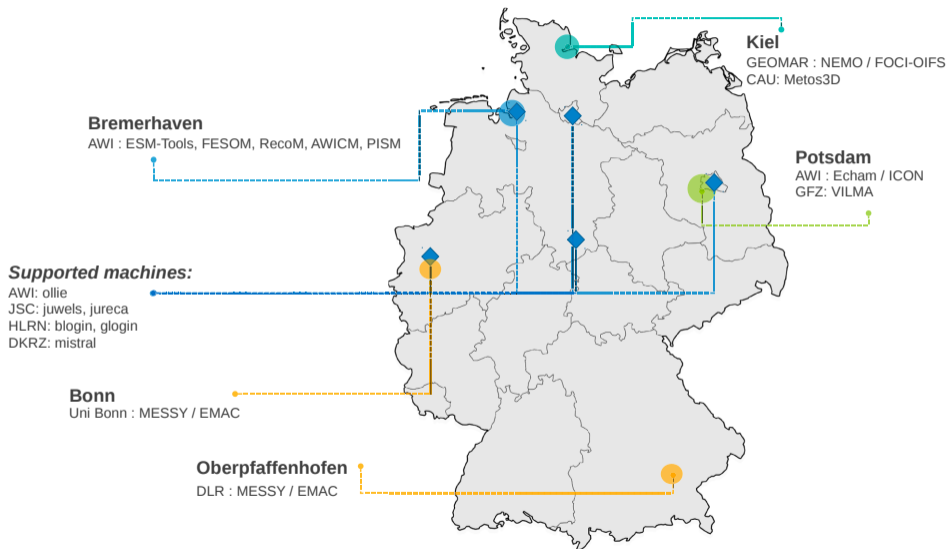
ESM project management: Luisa Cristini (AWI)

Further contributions: Colleagues from the following institutes provided major contributions to the development: AWI, GEOMAR, GFZ, DLR, et al.



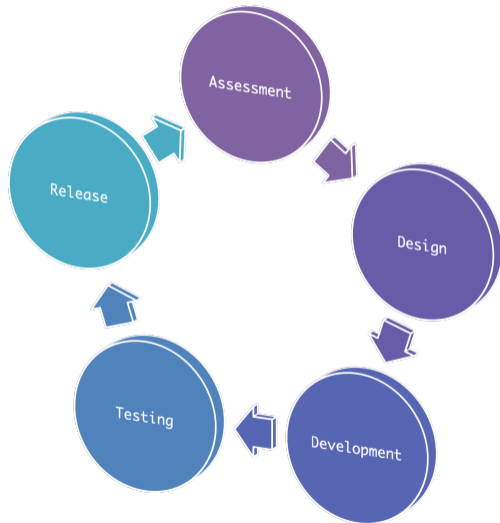
Figure: esm-tools at EGU 2019

Development and Contribution Map



How are the esm-tools developed?

- make, shell, python
- Developed using Git
- Project hosted on GitLab at DKRZ
- Branching model: release, develop, feature branches
- Regular releases (twice a year)
- Iterative development cycles
- Automated testing
- Weekly project meetings
- Monthly developer meetings
- All users developing new features can contribute



User Support and Contribution

Documentation and user support

- esm-usermanual
- GitLab Project Wikis (How do I ...?, FAQ)
- User workshops
- esm-tools Newsletter (monthly)

Contributions from users

- Documentation, Wikis
- Give feedback
- Report bugs, missing features (issue tracker)
- Develop new features and merge them into main development

General Information

General Information

i www.esm-tools.net

■ User support

Dirk Barbi

✉ dirk.barbi@awi.de

Nadine Wieters

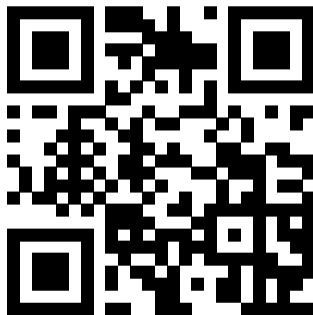
✉ nadine.wieters@awi.de

 [@ToolsEsm](https://twitter.com/ToolsEsm)

 [ESMTools](https://www.youtube.com/ESMTools)

i Newsletter

<https://www.listserv.dfn.de/sympa/subscribe/esm-tools-newsletter>



Thank you for your attention!

References I



S. DANILOV, G. KIVMAN, AND J. SCHRÖTER.

A FINITE-ELEMENT OCEAN MODEL: PRINCIPLES AND EVALUATION.

Ocean Modelling, 6(2):125 – 150, 2004.



DMITRY V. SEIN, NIKOLAY V. KOLDUNOV, SERGEY DANILOV, QIANG WANG, DMITRY SIDORENKO, IRINA FAST, THOMAS RACKOW, WILLIAM CABOS, AND THOMAS JUNG.

OCEAN MODELING ON A MESH WITH RESOLUTION FOLLOWING THE LOCAL ROSSBY RADIUS.

Journal of Advances in Modeling Earth Systems, 9(7):2601–2614, 2017.