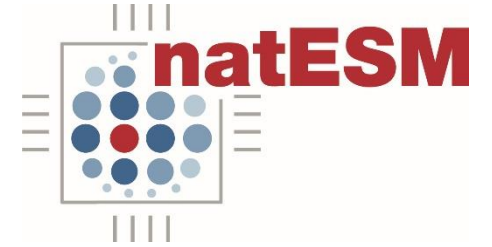


Workshop – natESM strategy

21. February 2022, virtual meeting



ESM-Tools community's support sprint

ESM software infrastructure/model support

ESM-Tools

Alfred Wegener Institute for Polar and Marine Research, Bremerhaven
GEOMAR, Helmholtz Centre for Ocean Research Kiel

The natESM support team is located at DKRZ and JSC. Based on a DKK initiative of the German Earth System Modelling Community, the overall goal is to build a national ESM strategy for the future.

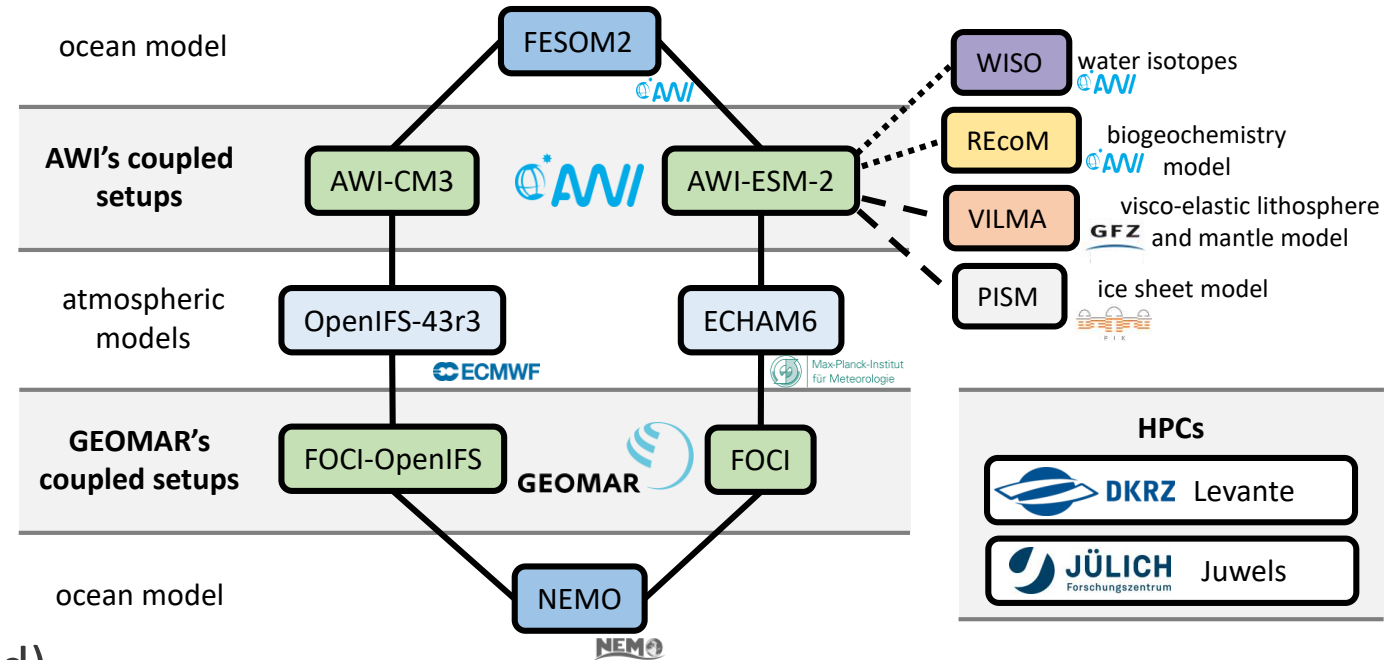


24 May 2023

Brief Overview of ESM-Tools

- ESM field: ESM software infrastructure
- User group: **~40**
- Targeted simulations:
 - Storyline simulations (SCENIC)
 - Seamless sea-ice prediction (YIG SSIP)
 - Last glacial-cycle (PalMod)
 - Frontiers
- HPC usage:
 - **Mistral** and **Juwels** so far, **Levante** (planned)

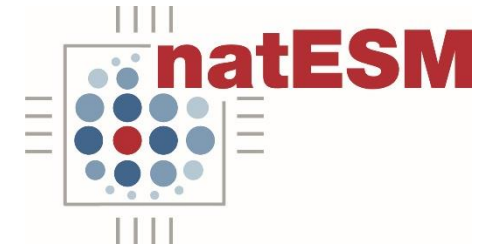
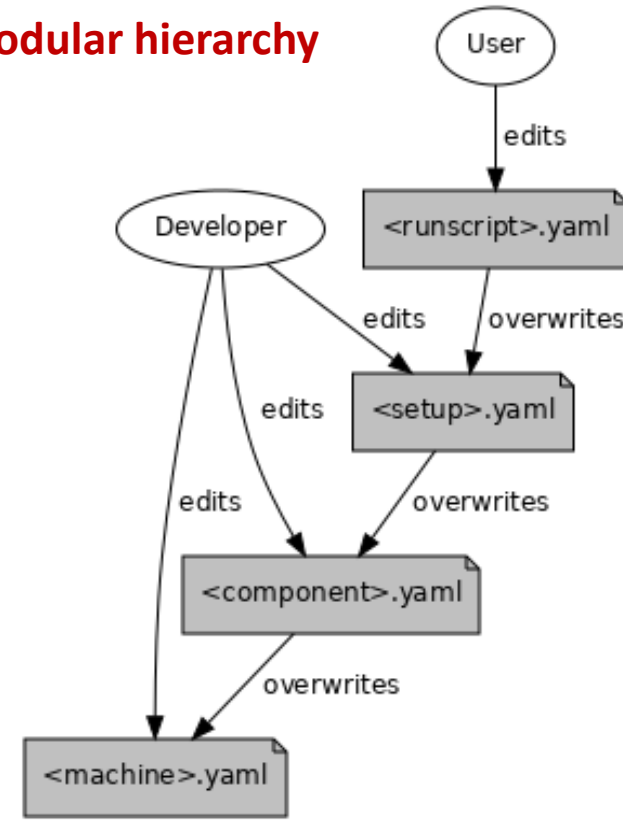
01000101 01010011 01001101 ESM-Tools



Brief Overview of ESM-Tools

- ESM field: ESM software infrastructure
- User group: **~40** (30 at AWI, 10 at GEOMAR)
- Targeted simulations:
 - Storyline simulations (SCENIC)
 - Seamless sea-ice prediction (YIG SSIP)
 - Last glacial-cycle (PalMod)
 - Frontiers simulations
- HPC usage:
 - **Mistral** and **Juwels** so far, **Levante** (planned)
- Maintenance:
 - 4 Core developers, 5 regular contributors
 - OpenSource GLPv2, hosted on GitHub (https://github.com/esm-tools/esm_tools)
 - Software Development and Sustainability Plan
 - Separation of concerns (**core functionality** in **Python**, **model/machine-specific** information **yaml** files)
 - Moving to a **Continuous Integration** (CI) model
 - Integration of user's modifications via Pull-Requests, automatic testing and reviewing

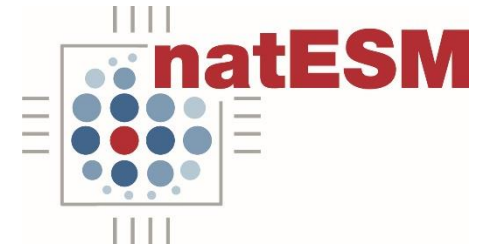
Modular hierarchy



ESM-Tools Application Field

- Scientific highlights:
 - Model **reproducibility**
 - **Reusability** of model and machine configurations ← modularity
 - **Common framework** for different models
- Social relevance:
 - Potential use for **educational** purposes (ESM made simple)
 - Simulation database reduces the **computing resources** (future development)
- Plans for further use and dissemination:
 - Workshops
 - Collaboration in new projects
 - Use for University Lectures (planned for 2023)

Support Sprint Aims



DKRZ Levante

JÜLICH Forschungszentrum Juwels

- User experience
- Optimization
- Stability
- Reproducibility
- Distributability

Special activity
Mistral2Levante
Testing workflow
2 months

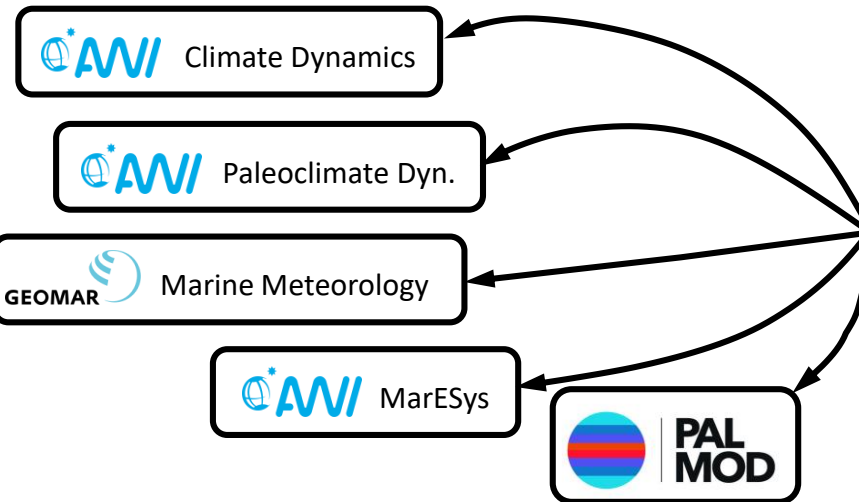
Special activity
Testing workflow
Stages handling
2 months

Climate simulation database

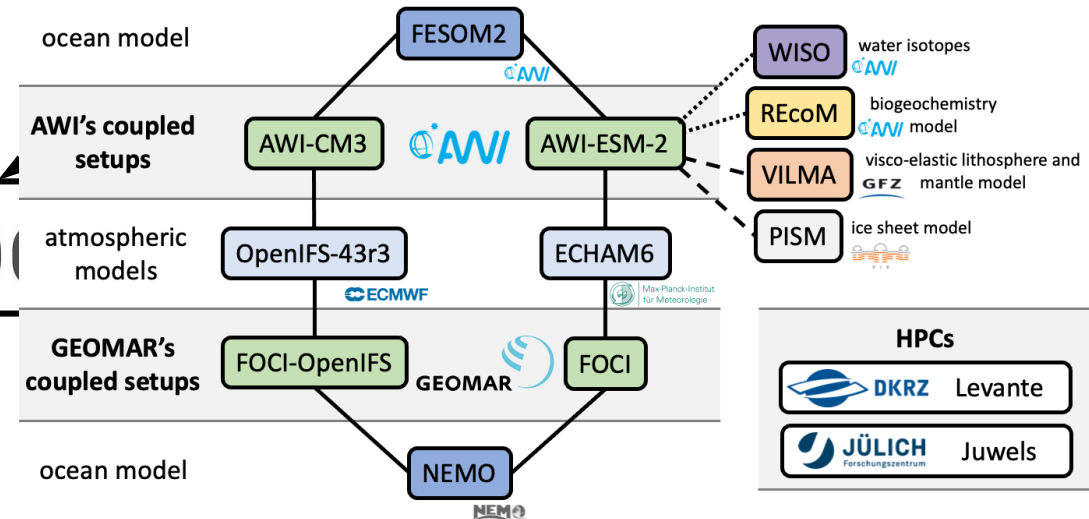
Advisory activity
Needs assessment
Prototype
1 month

- Shareability
- Save resources
- Reproducibility

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01001101 **ESM-Tools**



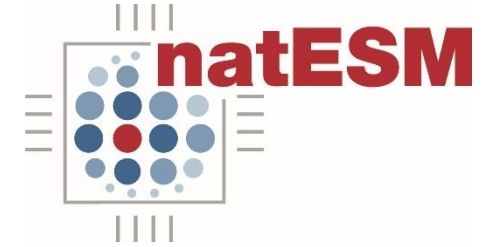
Description of Planned Work

- Scope of Request:

- 2 months – Juwels: improve ESM-user experience
 - Automatic testing
 - Stage handling
 - Model optimization and bottleneck diagnosis
- 2 months – Levante:
 - ESM-Tools models already working in Mistral, transferred to Levante
 - Model optimization and bottleneck diagnosis
- 1 month – Simulation database prototype
 - Evaluate the ESM community's needs
 - Prototype a database (not necessarily restricted to ESM-Tools, but that ESM-Tools can interface with it)
- 1 month – model containerization prove of concept
 - Consult and evaluate the performance of models run under containers

Description of Planned Work

- Deliverables:
 - **Juwels** and **Levante** tasks
 - AWI-CM3, AWI-ESM-2, FOCI and FOCI-OpenIFS running on both HPC
 - Efficiently
 - Stably
 - Deployment of a system for **seamlessly testing** new modules and Stages for these ESMs
 - **Simulation database**
 - Assessment of the need of a national ESM simulation database
 - Prototype
 - Model **containerization**
 - Prove of concept for FESOM, OpenIFS and NEMO components
 - **Performance evaluation**



Contact us

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ESM-Tools

Service Desk (support@esm-tools.atlassian.com)
GitHub https://github.com/esm-tools/esm_tools
<https://esm-tools.net>