

01000101  
01010011  
01001101

# ESM-Tools

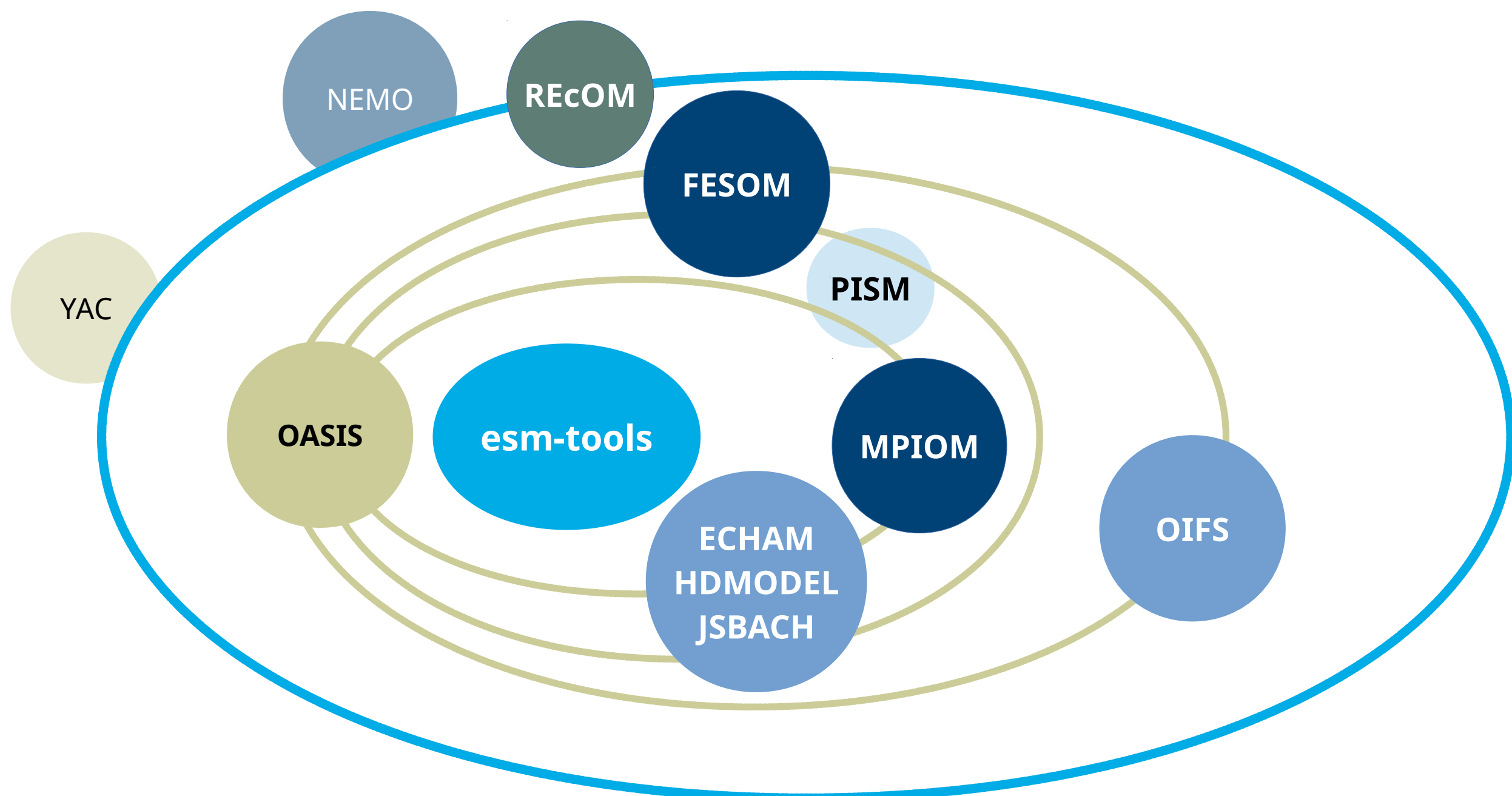
Release 1.0

## A Collection of Tools for the Configuration, Compiling, Execution and Coupling of different Models and Coupled Systems

### esm-tools



#### Supported models and coupled systems



#### Supported HPC systems

- ollie@awi
- mistral@dkrz
- blogin@hln
- jureca@jülich
- juwels@jülich

### esm-master ✓

Makefile-based tool to download, configure, compile and clean Earth system models and esm-tools

#### Basic usage and syntax

```
$ make <task>-<model>-<version>
```

#### Supported tasks

- download (get-)
- configure (conf-)
- clean (clean-)
- compile (comp-)

#### Example for AWI-CM 2.0

- Downloading the source code  

```
$ make get-awicm-2.0
```
- Compiling the source code  

```
$ make comp-awicm-2.0
```

### esm-environment ✓

- Shell script to set the required environment for compiling and executing models on supported HPC systems
- Will be automatically executed by the **esm-master** tool and **esm-runscripsts**

### esm-runscripsts ✓

- Collection of functions for unified runscripsts to execute different models and coupled systems with only one tool
- Similar runscripsts for all supported models
- Functionality is very modular and easy to extend

#### Basic usage and syntax

```
$> ./awicm.run -e <experiment-id>
```

#### Example AWI-CM runsript (awicm.run)

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

export FUNCTION_PATH=/work/esm-master/esm-runscripsts/functions/all #Path to esm-runscripsts
export FPATH=${FUNCTION_PATH}:%FPATH

machine_name="ollie"
setup_name="awicm"
compute_time="00:30:00" # Compute time per run

#####
INITIAL_DATE_awicm=2008-01-01 # Initial date of experiment
FINAL_DATE_awicm=2010-01-01 # Final date of experiment

SCENARIO_awicm=1850 # Scenario of experiment
SCENARIO_fesom=CORE2 # FESOM mesh

NYEAR_awicm=0 # Number of years per run
NMONTHS_awicm=1 # Number of months per run

MODEL_DIR_awicm=${WORK}/esm-master/awicm-CMIP6/
BIN_DIR_echam=${MODEL_DIR_awicm}/bin/ # ECHAM binary
BIN_DIR_fesom=${MODEL_DIR_awicm}/bin/ # FESOM binary

BASE_DIR=${WORK}/esm-experiments/ # Experiment output

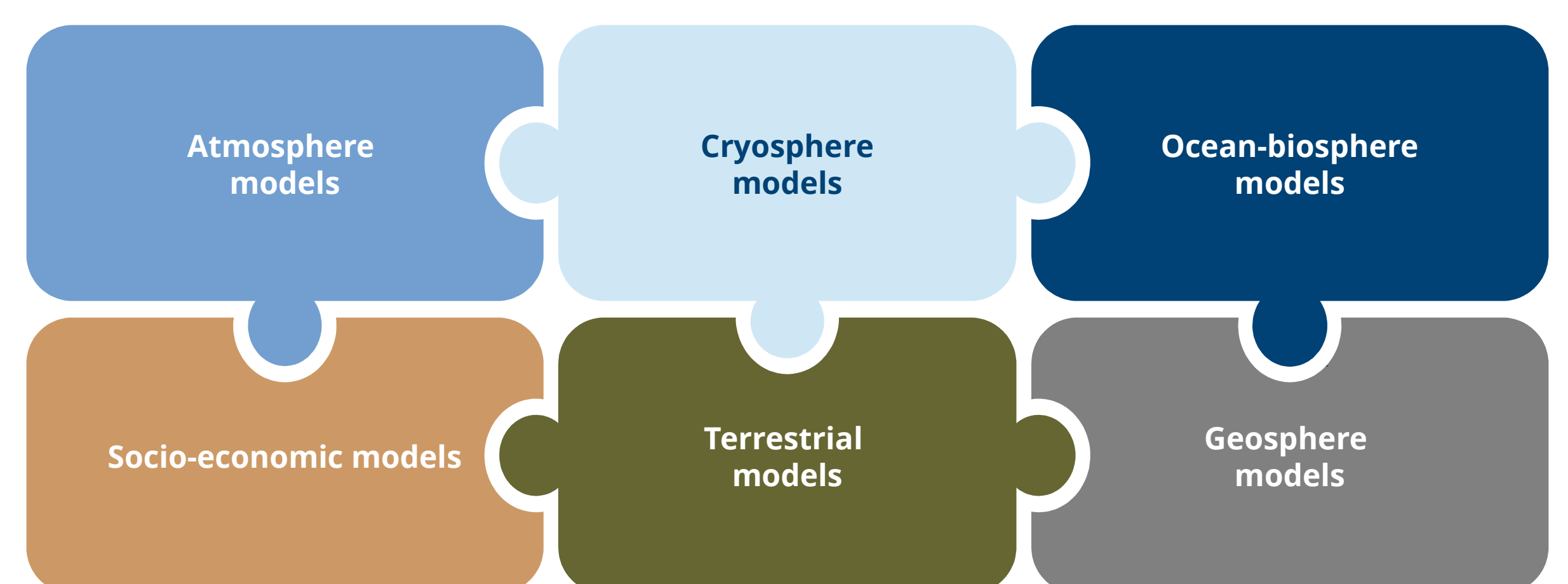
POOL_DIR_awicm=/work/ollie/pool/ # Input or forcing
POOL_DIR_echam=/work/ollie/pool/ # data
POOL_DIR_fesom=/work/ollie/pool/FESOM/

MESH_DIR_fesom=/work/ollie/pool/FESOM/meshes_default/ # FESOM mesh path

#####
load_all_functions
general_do_it_all $@
```

### esm-interfaces

- Collection of generic interfaces that wrap calls to libraries (model components, coupler, I/O) to make them easily replaceable
- Enable a modular approach to Earth System Modelling



#### Example of a modular ESM setup

- No direct function calls to other model components
- The model components do not need to know each other
- No direct function calls from the components to the coupler
- The coupler itself is modular and exchangeable

