Progress and Plans WP6

- *D6.1 Report model configuration for Stream 1 integration*

  - Stream 1 runs will follow HighResMIP protocol.

  - Endorsed by CMIP6. 19 Institutes promised to participate

  - GMD paper describing protocol has appeared (Haarsma et al., 2016)

  - Scientific interest from outside in PRIMAVERA runs. Coordinated by CLIVAR

HighResMIP protocol. Three Tiers

- Tier 1: AMIP   1950-2014
- Tier 2: COUPLED   1950-2050
- Tier 3: AMIP   2015-2050 (2100)

Motivation of these three Tiers
- Focus of HighResMIP is on the 1950-2050 period (Tier 2). This period includes significant past changes and the time horizon for the future is relevant for decision makers.

- The division of the AMIP runs in Tier 1 and Tier 3 is to enable that NWP centers can participate. Also to open the possibility for end of the century simulations .

Resolution: Atmosphere 20-50 km; Ocean ~0.25 degree

- Experiments are repeated with standard resolution. Also entry for DECK runs.
- HighResMIP philosophy: No or minimal additional tuning for high resolution version. If tuning is necessary it should be well documented.

HighResMIP protocol is described in Haarsma et al., GMD, 2016
http://www.geosci-model-dev.net/9/4185/2016/

19 participating institutes and models

Information about HighResMIP :
https://dev.knmi.nl/projects/highresmip/wiki

Model name	Contact Institute	Atmos resolution (STD/ HI) mid-latitude (km)	Ocean resolution (HI)
AWI-CM	Alfred Wegener Institute	-- T255 (~50km)	1-1/4 degree 0.05-1 degree
BCC-CSM2-HR	Beijing Climate Center		
BESM	INPE		
CAM5	Lawrence Berkeley National Laboratory	100 km 25 km	
CAM6	NCAR	100 km 28 km	
CMCC	Centro Euro-Mediterraneo sui Cambiamenti Climatici	100km 25km	0.25 degree
CNRM-CM6	CERFACS	T127 (~100km) T359 (~35km)	1 degree 0.25 degree
EC-Earth	SMHI and 26 other institutes	T255 (~50km) T511/T799 (~25/16km)	1 degree 0.25 degree
FGOALS	LASG, IAP, CAS		
GFDL	GFDL		
INMCM-5H	Institute of Numerical Mathematics	-- 0.3 x 0.4 degree	0.25 x 0.5 degree 1/6 x 1/8 degree
IPSL-CM6	IPSL	0.25 degree	
MPAS	Pacific Northwest National Laboratory	-- 30-50km	0.25 degree
MIROC6-CGCM	AORI, Univ. Of Tokyo/ JAMSTEC/National Institute for Environmental Studies (NIES)	-- T213	0.25 degree
NICAM	JAMSTEC, AORI, Univ. Of Tokyo//RIKEN AICS	56/28 km 14km (short term)	
MPI-ESM	Max Planck Institute for Meteorology	T63 (~200km) T255 (~50km)	0.4 degree
MRI-AGCM3.xS	Meteorological Research Institute	-- TL959 (~20km)	
NorESM	Norwegian Climate Service Centre	-- 0.25 degree	0.25 degree
HadGEM3-GC3	Met Office Hadley Centre	60km 25km	0.25 degree

- D6.2 Historical AMIP runs completed M12 (December 2016)
- D6.3 Future AMIP runs completed M14 (February 2017)
- D6.4 Coupled runs completed M18 (June 2017)

Runs have not started yet. Milestones D6.2 and D6.3 will not be met.

Main reasons for delay:

1. Delay of CMIP6 forcings
2. Delay of preparedness of CMIP6 models
   - Aerosol: MAC-SP scheme (EC-Earth, CMCC, Met Office, CERFACS)
   - High Res: too slow. Switch to other version (CMCC: CAM5 to CAM4)
   - Large biases (MPI, Met-Office, CMCC)
3. Delay output tables

Original time line of PRIMAVERA does not match with time line of CMIP6

Many groups are now close to start tuning/production

Participating models and centers

sInstitution	MO NCAS	KNMI IC3 SMHI CNR	CERFACS	MPI	AWI	CMCC	ECMWF
Model names	MetUM NEMO	ECEarth NEMO	Arpege NEMO	ECHAM MPIOM	ECHAM FESOM	CCESM NEMO	IFS NEMO
Atmosph. Res., core	60-25km	T255-T511	T127-359	T127-255	T127-255	100-25km	TCo199-399 ~0.5° ~0.25°
Oceanic Res., core	¼°	1°, ¼°	¼°	0.4-¼°	1-¼° spatially variable	¼°	1°,¼°

Initial conditions

Met office : Atmosphere: ERA-20C for Jan 1950 (may need ~10 years to spin up soil mois.)
Ocean: EN4 1950-1954 January average
Sea-ice: 1979 January initial condition from previous model (not ideal)

EC-Earth :   Atmosphere: ERA-20C
Ocean: EN4
Sea-ice: uniform prescribed thickness

CERFACS: Ideally from a CNRM-CM6_HR 1850-1950 historical simulation ;
if not possible from a 50-year 1950 control simulation

MPI: Atmosphere: existing restart file (3 years after start from dry atmosphere)
Ocean: nudging T and S from EN4 into coupled CMIP6 1950 control simulation

AWI: Ocean: EN4 1950-1954

CMCC: No specific information

ECMWF   Atmosphere: ERA-20C
Ocean: ORA-20C

Forcings :   CMIP6 forcings, Daily ¼ SST-Sea-ice HadISST, Aerosol: MAC-SP

Met office: Zonal mean ozone; Global mean GHG s
                     Easy Aerosol (PI aerosol climatology + MACv2-SP timeseries dataset)

EC-Earth :   All forcings included.
                     Stratospheric ozone, Land: CMIP5

CERFACS: GHG: global, annual. Solar: annual
                      Ozone Prognostic CNRM-CM6
                      Aerolsol: CNRM TACTIC V2

MPI: Almost all CMIP6 forcings and SST/Sea-Ice forcings successfully included
                    Still to be done: Ozone high-res. Land: CMIP5 or CMIP6?

AWI: Same as MPI

CMCC: Implementation of daily SST and CMIP6 forcings is ongoing

ECMWF: Tested with CMIP5 Forcings and HadISST (for AMIP-type runs)
                     Tests with CMIP6 HighResMIP protocols are ongoing

Tuning

Met office: Tuning is ongoing . Only resolution dependent tuning is USSP factor (QBO)

Added indirect effect and sunlit weighting to EasyAerosol

Forced Atmos has ~-1.4 W/m2 TOA imbalance in 1950 (N96)

Coupled model has ~-0.5 W/m2 over first few years (N96-ORCA025)

EC-Earth : AMIP tuning started last week.

Low res ~0.6 W/m2 TOA.

No high-resolution tuning yet.

CERFACS: Low resolution: almost tuned

High resolution: under technical development. Experience with SPECS version

MPI: Low resolution tuned

High resolution has too weak winds $\longrightarrow$ too weak MOC. Flux correction?

AWI: Tuning is ongoing

CMCC: Tuning of coupled low resolution version: positive bias in surface temperatures

ECMWF: Coupled runs are being tuned.

Issues: drift arctic sea –ice volume, cold bias North Atlantic, weak MOC

Output - postprocessing - work flow: CMORization and storage on JASMIN

Met office: CMORization somewhat tested

Direct link with JASMIN

EC-Earth :   CMORization is optimized almost ready and tested.

6-hourly (3-hourly surface) model data on all model levels is stored locally.

Tests with workflow are being performed

CERFACS: XIOS in ocean and atmosphere model. Postprocessing and CMORIzation

directly done during simulation. No need to first store raw data.

MPI: Atmos: Output implemented.6 –hourly. 3-hourly only for 10 years (slow-down)

Ocean and sea-ice: output diagnostics still to be done

CMORIzation: Atmos/Land succesfully tested.

High-res: 2.5 SYPD. Raw data stored. Upload to JASMIN using globus toolkit

AWI: FESOM has been modified to output CMOR data sets directly

FESOM mesh information will be uploaded to JASMIN.

Data sets without mesh information to save bandwith

CMCC: No specific information

ECMWF: CMOR2 tool is being updated to CMOR3 for CMIP6/PRIMAVERA tables

Time line: AMIP, Coupled

Met office: AMIP: Low-Res   Jan 2017;   High-Res   May/June 2017
           Coupled: Low-Res   March/April 2017   High-Res   July/Aug   2017

EC-Earth :   AMIP: High-Res : Start: Jan   - End: March
           Coupled: High-Res   : Start: March   - End: June

CERFACS: AMIP: Low-Res Jan 2017

MPI: AMIP: Low-Res   March/May   2017   High-Res   May/June 2017
           Coupled: Low-Res   Autumn 2017   High-Res   Winter 2017

AWI:

CMCC: AMIP: Start simulations   Jan 2017
           Coupled: Start simulations   Febr/March 2017

ECMWF:

Summary

- Models are now being tuned, testing post-processing and work-flow

- Delay of runs   ~half a year