CMIP6 Status Germany

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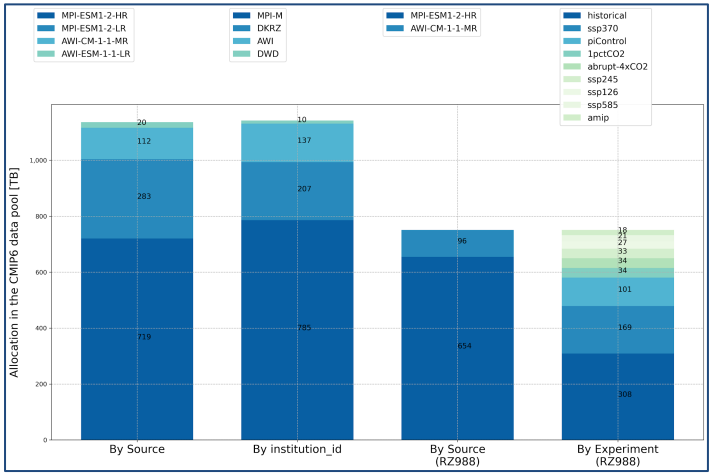
CMIP6 Models

Institution	DLR	AWI	MPI-M & DWD	DKRZ
Model(s)	ECHAM/MESSy Atmospheric Chemistry (EMAC)	AWI-ESM-LR AWI-CM-LR AWI-CM-MR (ECHAM/FESOM)	MPI-ESM-LR, MPI-ESM-HR, MPI-ESM-XR, (MPI-ESM-ER) (ECHAM/MPIOM) ICON-ESM (only DECK)	MPI-ESM-HR
specific feature(s)	interactive chemistry	novel ocean model	various model resolutions	postprocessing, workflow, cmor
MIPs	CMIP AerChemMIP	CMIP, PMIP, ScenarioMIP, HighResMIP, PAMIP	CMIP, PMIP, C4MIP, LUMIP, VolMIP, RFMIP, DAMIP, ScenarioMIP, DCPP, LS3MIP, GeoMIP, PAMIP, FAFMIP	CMIP, ScenarioMIP

Upload to ESGF

MIP	AWI-ESM/CM		
	LR	MR	HR
CMIP DECK	X	X	
ScenarioMIP		X	
PMIP	X		
HighResMIP	X		X
PAMIP		X	



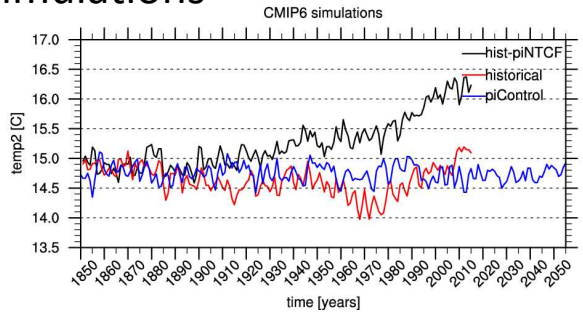
MIP	MPI-ESM		
	LR	HR	XR
CMIP DECK	X	X	
ScenarioMIP	X	X	
PMIP	X		
HighResMIP		X	X
C4MIP	X		
RFMIP	X		
DCPP	X	X	
LUMIP	X		
FAFMIP	X	X	
LS3MIP	X		
DAMIP	X		
VOLMIP	X	X	
GeoMIP	X	X	

Ongoing CMIP6 activities

EMAC simulations for CMIP6

coupled atmosphere – ocean system with interactive atmospheric chemistry & aerosol

- well balanced for pre-industrial conditions (piControl) after several hundred years of spin-up
- aerosol effect on clouds is probably largely overestimated
- ongoing effort to repeat CMIP6 simulations

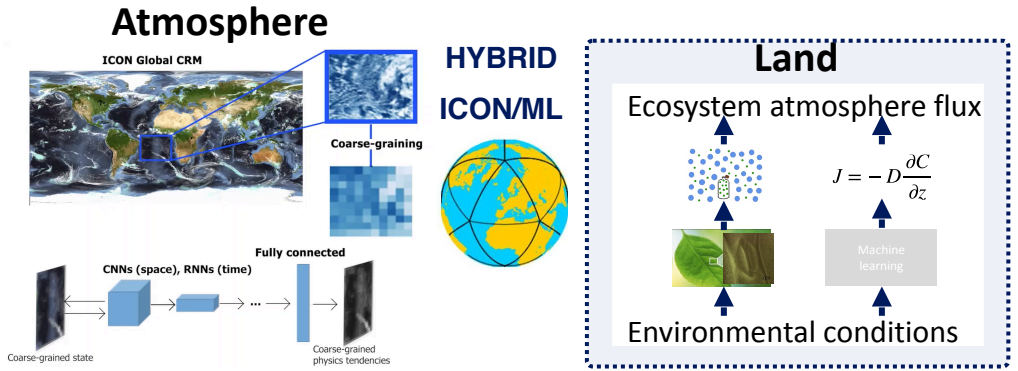


CMIP7

Development of an EMAC successor based on the ICON/MeSSy system

New ERC project (V. Eyring): *Physics-aware machine learning based Earth system modelling*

USMILE

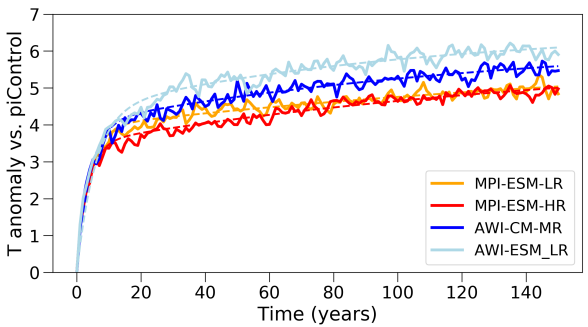


https://www.usmile-erc.eu/

Ongoing CMIP6 activities

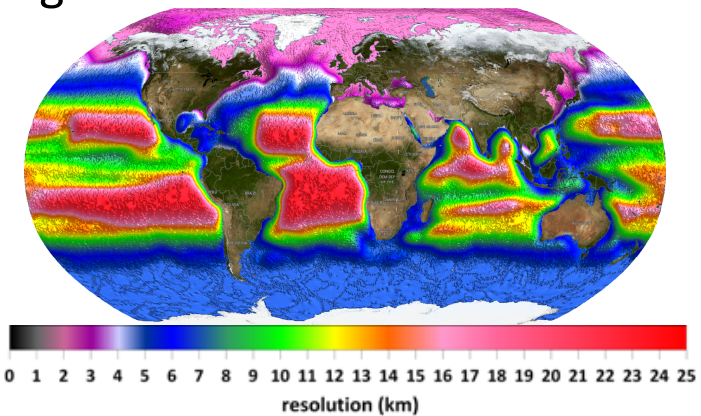
engagement in MIPs' harvest and further development: PAMIP, HighResMIP

Common analyses of AWI-CM vs MPI-ESM (models with the same atmosphere, but different oceans)



CMIP7

- Pushing the boundaries for coupled atmosphere-land-ocean-sea ice modeling (AWI-CM) regarding resolution exploiting the flexibility of FESOM
- Pushing the boundaries for earth system modeling (AWI-ESM) regarding components: ice shelf cavities, ice sheets, ocean biogeochemistry, high resolution focused on polar regions



Max-Planck-Institut für Meteorologie

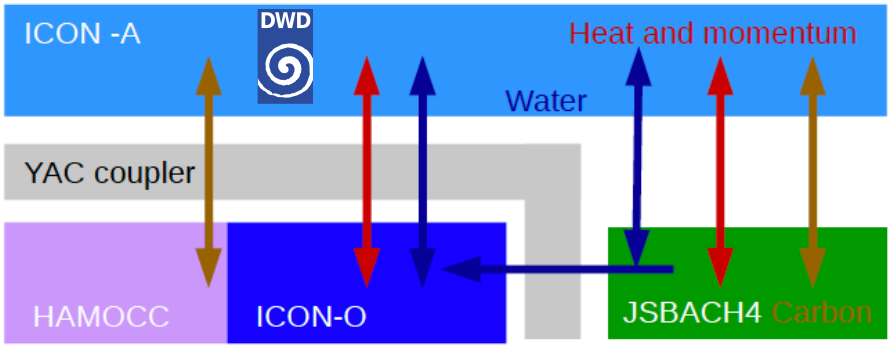
DWD

Ongoing CMIP6 activities

@ MPI-M: engagement in MIPs' harvest and further development

- open for new MIPs or flavours (e.g., CovidMIP, PAMIP)
- expanding scenarios to large ensembles (~50 members)

ICON-ESM



CMIP7

@MPI-M: critical discussion: is CMIP compatible with fundamental research mission of MPIs? Can CMIP be carried out by operational services?

@DWD: expand mission to seasonal & decadal predictions and climate projections

Synthesis: Joint effort to build ICON-ESM with atmosphere based on NWP physics, Target resolution ICON-A: 40km, ICON-O: 10km.

MPI-M engagement in WCRP lighthouse activities @ultra high resolution

key references

EMAC

Jöckel, P. et al. (2016): Earth System Chemistry integrated Modelling (ESCiMo) with the Modular Earth Submodel System (MESSy) version 2.51, *Geosci. Model Dev*. 9, 1153–1200, doi: 10.5194/gmd-9-1153-2016

AWI-CM:

Semmler, T., et al. (2020): Simulations for CMIP6 with the AWI climate model AWI-CM-1-1. *JAMES,* doi: 10.1029/2019MS002009.

MPI-ESM:

Mauritsen, T., et al. (2019): Developments in the MPI-M Earth System Model version 1.2 (MPI-ESM 1.2) and its response to increasing CO_2. *JAMES,* 11, 998-1038, doi: 10.1029/2018MS001400.

Gutjahr, O., et al. (2019): Max Planck Institute Earth System Model (MPI-ESM) for High-Resolution Model Intercomparison Project (HighResMIP). *Geosci. Model Dev.*, doi: 10.5194/gmd-2018-286.