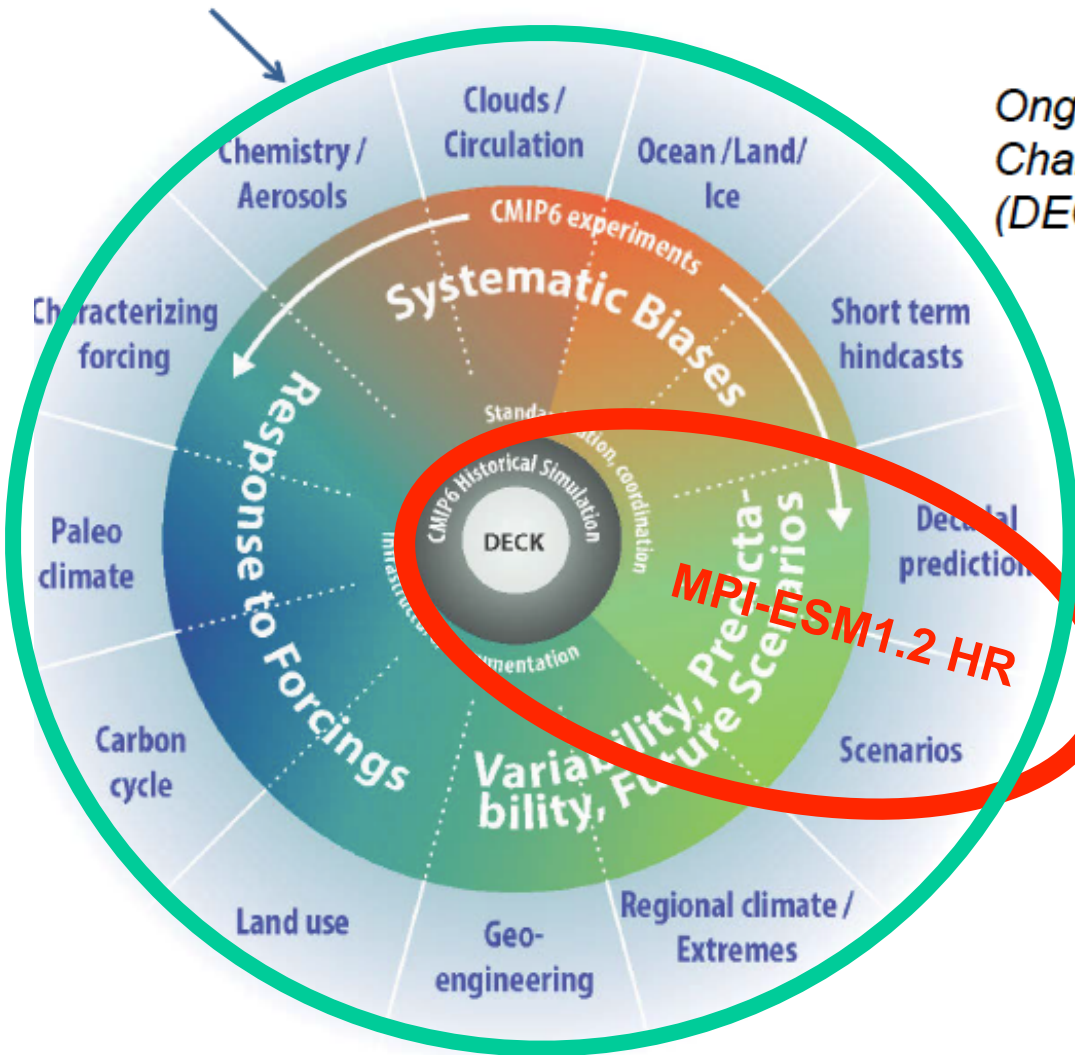


Status of the MPI-ESM1.2 - HR for CMIP6 DICAD

Johann Jungclaus

Matthias Bittner, Thorsten Mauritsen, Monika Esch, Tatiana Ilyina, Irene Stemler, Helmuth Haak, Luis Kornblueh, Marco Giorgetta, Karl-Hermann Wieners, Michael Botzet, Wolfgang Mueller, Kameshwar Rao Modali, Christian Reick, Reiner Schnur, Julia Pongratz, Thomas Raddatz, Hauke Schmidt, Claudia Timmreck et al.,





Ongoing Diagnosis, Evaluation, and Characterization of Klima (DECK) Experiments

DECK (entry card for CMIP)

- i. AMIP simulation (~1979-2014)
- ii. Pre-industrial control simulation
- iii. 1%/yr CO₂ increase
- iv. Abrupt 4xCO₂ run

CMIP6 Historical Simulation (entry card for CMIP6)

- v. Historical simulation using CMIP6 forcings (1850-2014)

(DECK & CMIP6 Historical Simulation to be run for each model configuration used in the subsequent CMIP6-Endorsed MIPs)

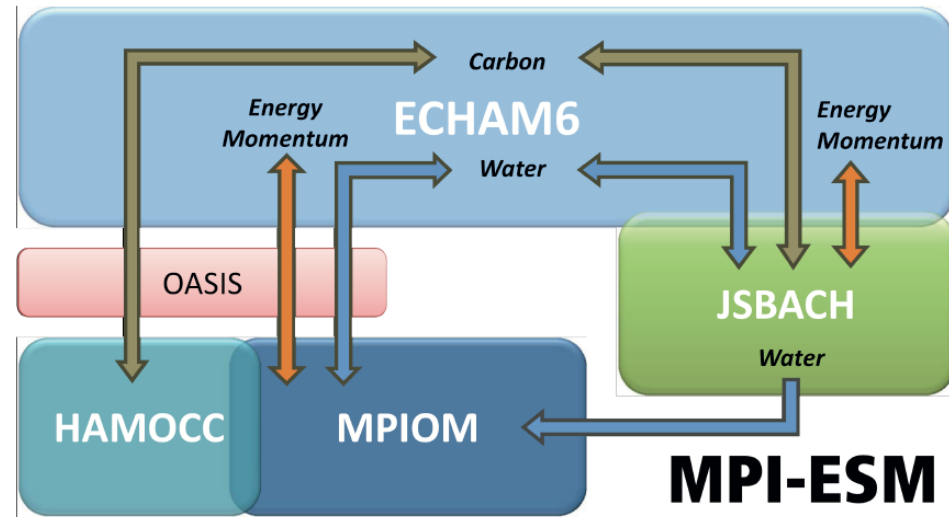
Note: The themes in the outer circle of the figure might be slightly revised at the end of the MIP endorsement process

MPI-ESM1.2

MPI-ESM1.2 main code development until mid 2015

MPI-ESM1.2-LR officially released 15 January 2016

HR tuning (CMIP5-configuration for boundary conditions) finalised summer 2016



MPI-ESM1.2 resolutions

	versions not "officially" supported	
atmosphere	HR	LR
	T127	T63
ocean	TP04	GR15
	CR	XR
	T31	T255
	GR30	TP04/TP6M

MPI-ESM1.2

ECHAM6.3:

- Monte-Carlo independent column approximation (McICA) radiation scheme [option: spectral sampling in time]
- Bug fixes for energy conservation in atmospheric physics
- Bug fix for cloud cover scheme
- Activated stratocumulus parameterisation

JSBACH:

- improved hydrology and soil model based on 5-pool model YASSO

HAMOCC:

- sinking velocity as function of depth
- Prognostic nitrogen fixers:

MPI-ESM1.2 Current status

HR (ECHAM6.3 T127L95 MPIOM1.65 TP04/L40) :

is the base model for DICAD, the MiKlip-II forecast system, and the DCPD contribution

- tuned set-up; CMIP5-type DECK experiments
- runs **without** DynVeg
- **Performance:** 18yrs/day on 108 nodes
 - 216 Node Hours/yr
 - 400 GB/yr (6h output)

pending:

reading of CMIP6 vegetation maps required modification of JSBACH, which need to be merged with ECHAM

Diagnostics: SIMIP, CALIPSO station output

MPI-ESM1.2 adaptation for CMIP6

Diagnostics:

- **to be clarified:** additional diagnostics for specific MIPs?
- CORDEX workflow

Scripting:

pending: archiving/cmor-ization in workflow

MPI-ESM1.2 adaptation for CMIP6

Historical forcing:

- CMIP6 forcing data sets solar, ozone, tropospheric and stratospheric aerosols, GHGs, are available and implemented in MPI-ESM-HR. Implementation of CMIP6 land-use transition maps/vegetation is still in progress.
- Tests have been performed (ozone, solar, strat. Aerosols, GHG)
- Future forcing: ?

Summary

MPI-ESM1.2-HR:

- adaptation and testing of CMIP6 version is underway
- **HR** version will be finalised first, **LR** for other MIPs includes further extensions (e.g. nitrogen cycle) and needs further testing and spin-ups.
- **HR**: merging of latest versions of JSBACH and ECHAM (target end of January)
- final tests and adaptation runs (MiKlip group)

finalisation of diagnostics, MPI-ESM-1.2-HR release (target beginning of March)

- DECK simulations
- historical simulations (Miklip)





MIPs @ MPI-M

- **DECK**

piControl, 1%CO₂increase/4xCO₂

- **Historicals** (with DKRZ)

- **ScenarioMIP** (with DKRZ)

- **DCPP**: decadal climate prediction (HR)

- **HighResMiP**: AMIP/CPLD up to T255/TP6m

- **PMIP**: Last Millennium, LGM, MidHolocene (other PMIP simulations by AWI)

- **FAFMIP**: idealised experiments driven by prescribed fluxes (in cooperation with IfM Hamburg)

- **SIMIP**: sea-ice (diagnostical)

- **ISMIP**: coupled ice sheet models

- **C4MIP**: carbon/nitrogen cycle

- **VoIMIP**: idealised volcanic perturbations

- **LUMIP**: Impacts of land Use/land cover

- **LS3MIP**: Land surface models

- **GeoMIP**: Geoengineering

- **RFMIP**: Radiative Forcing



MIP-related projects

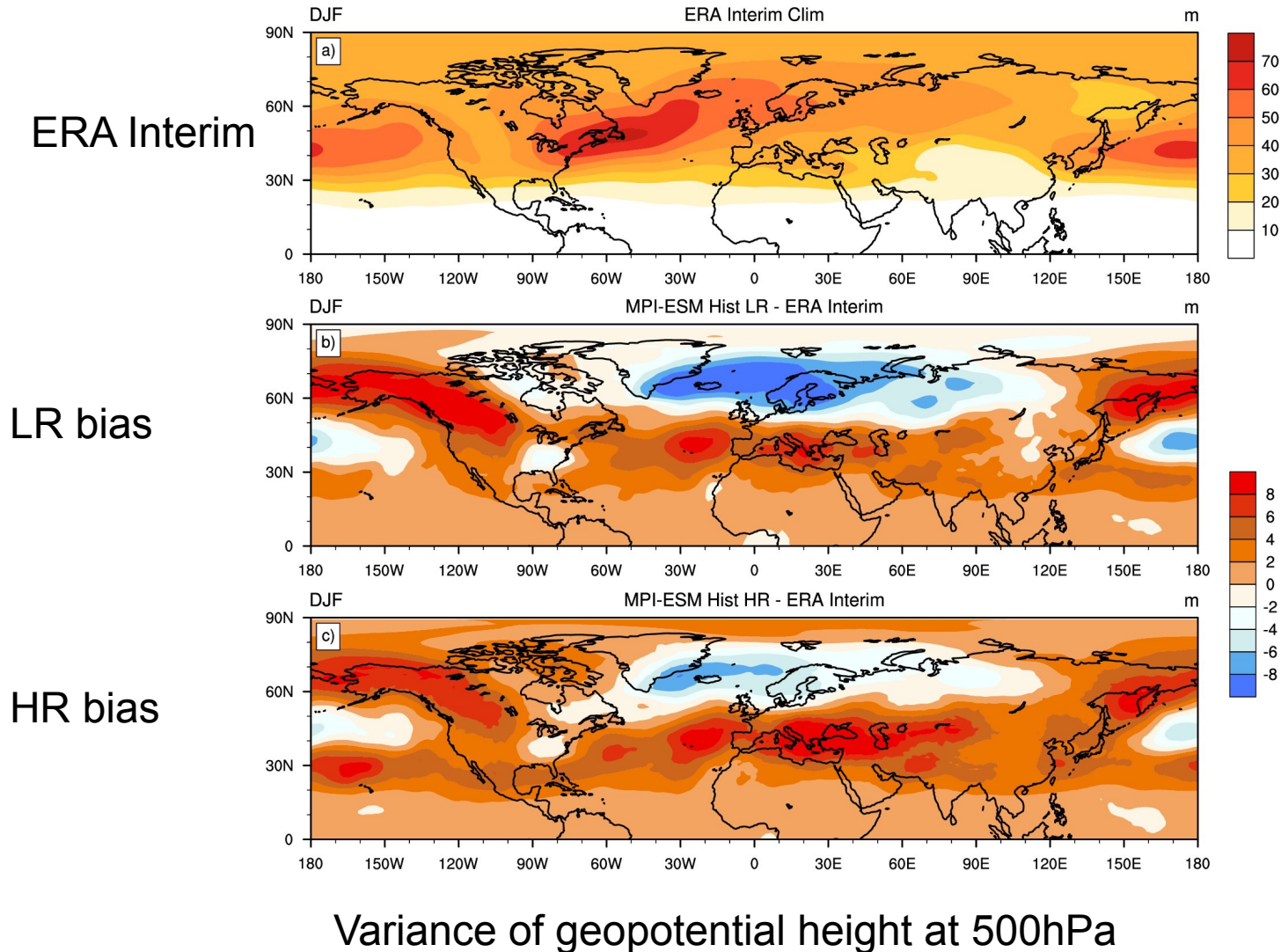
MIP	Project(s)
Historical:	DKRZ-BMBF
SCENARIOS:	DKRZ-BMBF
DCPP:	BMBF MiKlip
C4MIP:	EU H2020 CRESCENDO
FAFMIP:	DFG SPP Sea Level
GeoMIP:	DFG SPP1689, CELARIT
HighResMIP:	H2020 PRIMAVERA
ISMIP6:	BMBF-PalMod
LS3MIP:	EU H2020 CRESCENDO
LUMIP:	EU H2020 CRESCENDO
PMIP:	BMBF PalMod / JPI: PACMEDY
RFMIP:	EU FP7 BACCHUS
VoIMIP:	BMBF MiKlip





MPI-ESM1.2

Resolution matters: HR vs. LR

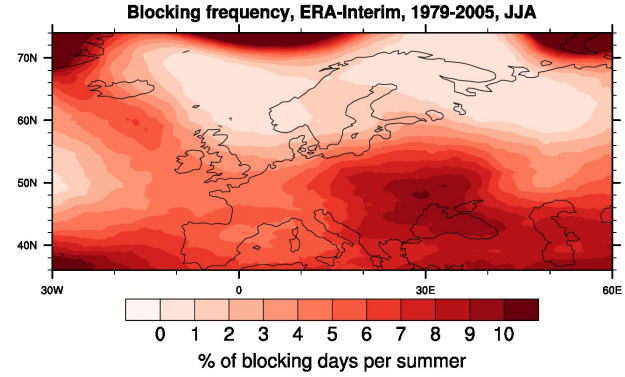
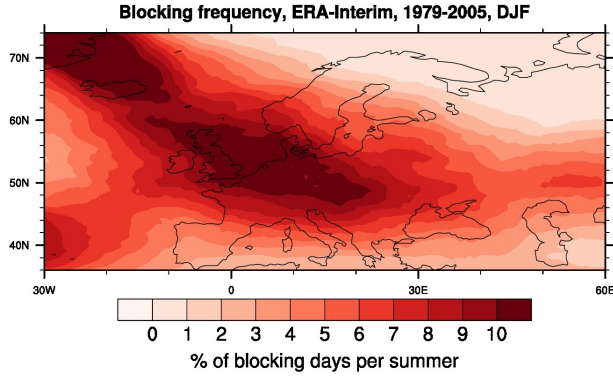


WINTER

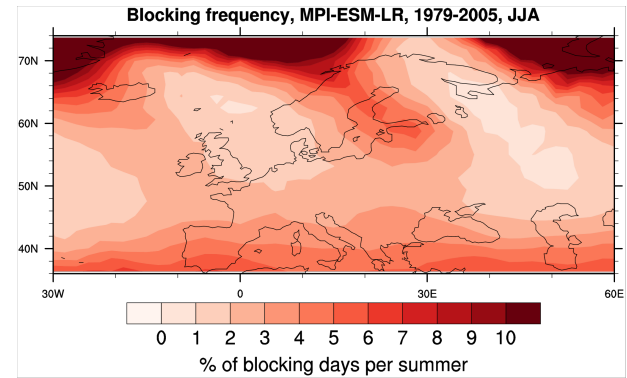
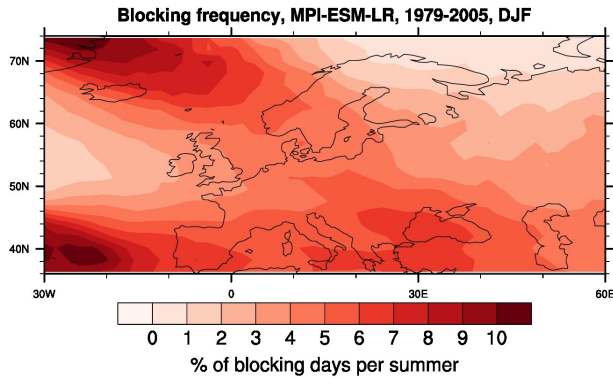
MPI-ESM1.2

SUMMER

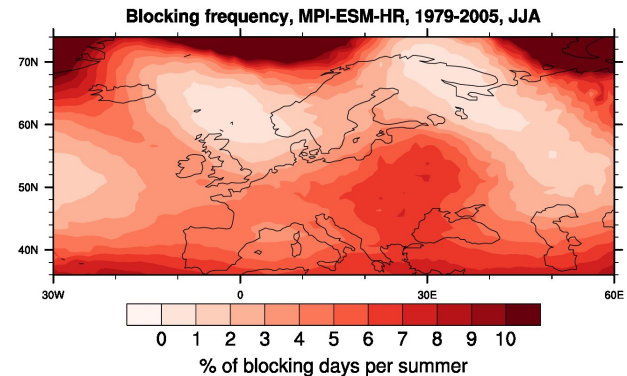
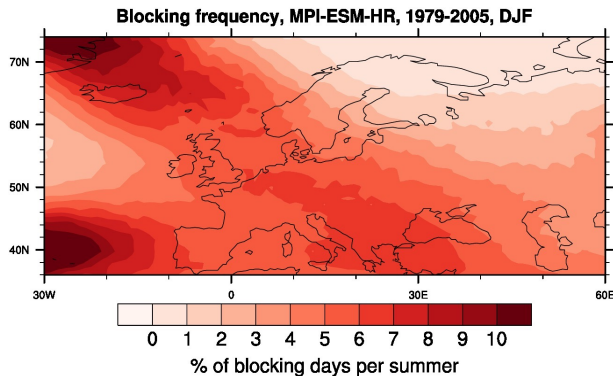
ERA



LR



HR



% of blocking days per season



MPI-ESM1.2

Long term runs show a stable overturning circulation

