



Experimental Design of the last deglaciation in MPI-ESM

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Core experiments			Diagnostic experiments						
Control simulation	Boundary conditions	Description							
Last Glacial Maximum (LGM; 21ka BP)	Initial Ocean State	Ocean with strong stratification forced by PMIP2 CCSM3 LGM forcing in MPIOM	Experiment	CO ₂ (ppm)	Glacier	Orbital	Land Sea	Topography	Derived Effect
	Orbital parameters	Eccentricity = 0.018994 Obliquity = 22.949° Perihelion – 180° = 114.42°		/ GHG	Mask (GM)	Para. (OP)	Mask (LSM)	(TP)	
	Trace gases	Carbon dioxide $(CO_2) = 190 \text{ ppm}$	PI_CTL*	PI	PI	PI	PI	PI	Full PI
		Methane (CH_4) = 375 ppb	PI_185*	LGM	PI	PI	PI	PI	LGM GHG
		Nitrous oxide $(N_2O) = 200 \text{ ppb}$	GM	PI	LGM	PI	PI	PI	LGM Albedo
	Ice sheets, orography and coastlines	Ice sheet reconstruction from Tarasov (2012)	GM_GHG*	LGM	LGM	PI	PI	PI	GM + GHG
	Bathymetry	Associated with ice sheet	GM_OP	PI	LGM	LGM	PI	PI	GM + OP
Transient simulation			GM_GHG_OP	LGM	LGM	LGM	PI	PI	GM + GHG + OP
Deglacial simulation (21ka – 10ka BP)	Insolation	Berger (1978)	GM_GHG_OP_LSM*	LGM	LGM	LGM	LGM	PI	GM + GHG + OP + LSM
	Ice Sheet, orography, coastlines and bathymetry	Since ~21ka BP, ice sheet from Tarasov (2012)	LGM_CTL*	LGM	LGM	LGM	LGM	LGM	Full LGM
	Freshwater flux history	Associated with ice sheet	Simulations aiming to evaluate AMOC phase-bases during glacial-interglacial cycles Simulations with * indicate the core experiments here						
	River routing	Associated with ice sheet							
	Trace gases	CO ₂ Bereiter et al. (2015)	cycles. Simulations with multate the core experiments here.						
		CH ₄ Loulergue et al. (2008)							
		N ₂ O Schilt et al. (2010)				•			
Single-forcing simulation			Deglacial insolation and GHG forcing						
Deglacial simulation (21ka – 10ka BP)	Insolation	Berger (1978)							
	Trace gases	CO ₂ Bereiter et al. (2015)	HS1 ACR MWP1a						
	Ice sheets	Tarasov et al. (2012)							
	Freshwater flux	Tarasov et al. (2012)							
	Ice sheet + Freshwater flux	Tarasov et al. (2012)			LGM	Ή	1 BW	Ϋ́ ΥD	







Transient forcing in the last deglaciation. (a) June insolation at 60 N and December insolation at 60 S (Berger, 1978). (b) Atmospheric carbon dioxide concentration (recent composite of EPICA Dome C, Vostok, Taylor Dome, Siple Dome and West Antarctic Ice Sheet Divide records, Antarctica; Bereiter et al., 2015); black dashed line shows preindustrial concentration. (c) Atmospheric methane concentration (EPICA Dome C, Antarctica; Loulergue et al., 2008); green dashed line shows preindustrial concentration. (d) Atmospheric nitrous oxide concentration (Talos Dome, Antarctica; Schilt et al., 2010); brown dashed line shows preindustrial concentration.



2400.0

3200.0

opography (m) -300.0 300.0

-900.0



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