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Dataset for "Future projections for the Antarctic ice sheet until the year 2300 with a climate-index method"

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– README –

Ralf Greve[1,2], Christopher Chambers[1], Takashi Obase[3], Fuyuki Saito[4], Wing-Le Chan[3,4], Ayako Abe-Ouchi[3]

[1] Institute of Low Temperature Science, Hokkaido University, Sapporo, Japan

[2] Arctic Research Center, Hokkaido University, Sapporo, Japan

[3] Atmosphere and Ocean Research Institute, University of Tokyo, Kashiwa, Japan

[4] Japan Agency for Marine-Earth Science and Technology, Yokohama, Japan

19 model experiments (for details see Table 1 and the paper)

- HIST: historical simulation 1990–2015.
- CTRL (Exp. #0): constant-climate projection control experiment 2015–2301.
- Exps. #5–10, 12–13, A5–A8, B6–B10: future-climate experiments 2015–2301; see Table 1.

Variables

The variable names follow closely the ISMIP6 convention (e.g., Table A1 of https://tinyurl.com/ismip6-wiki-ais). However, years are used instead of seconds as the time unit (1 a = 3.1556926 × 10^7 s). Time itself is counted in years CE.

2D variables are provided on the native 8-km grid of SICOPOLIS (EPSG:3031).

2D state variables (in archives hist.zip, ctrl_proj_ext.zip, exp05_ext.zip, …, expB10_ext.zip)

lithk	–	Ice thickness (m)
orog	–	Surface elevation (m)
base	–	Ice base elevation (m)
topg	–	Bedrock elevation (m)

xvelsurf – Surface velocity in x (m a^{-1})
yvelsurf – Surface velocity in y (m a^{-1})
zvelsurf – Surface velocity in z (m a^{-1})
horvelsurf – Horizontal surface velocity (m a^{-1})
xvelbase – Basal velocity in x (m a^{-1})
yvelbase – Basal velocity in y (m a^{-1})
zvelbase – Basal velocity in z (m a^{-1})
horvelbase – Horizontal basal velocity (m a^{-1})
xvelmean – Mean velocity in x (m a^{-1})
yvelmean – Mean velocity in y (m a^{-1})
horvelmean – Horizontal mean velocity (m a^{-1})
litemptop – Surface temperature (K)
litempbot – Basal temperature (K)
strbasemag – Basal drag (Pa)
sftgif – Land ice area fraction (–)
sftgrf – Grounded ice sheet area fraction (–)
sftflf – Floating ice shelf area fraction (–)

These variables are provided as snapshots for the following years:
hist: 1991 (1) 2015, all other experiments: 2035 (20) 2295, 2301.
Time variable: 'time'.

2D flux variables (in archives hist.zip, ctrl_proj_ext.zip, exp05_ext.zip, …, expB10_ext.zip)

acabf – Surface mass balance flux (kg m^{-2} a^{-1})
libmassbf – Basal mass balance flux (kg m^{-2} a^{-1})
licalvf – Calving flux (kg m^{-2} a^{-1})
dlithkdt – Ice thickness imbalance (m a^{-1})
hfgeoubed – Geothermal heat flux (W m^{-2})

These variables are provided as averages over the intervals bounded by the following years:
hist: 1990 (1) 2015, all other experiments: 2015 (20) 2295 + a final snapshot for 2301.
Time variables: 'time', 'time_bnds'.

Scalar state variables (in common archive all_scalar.zip)

lim – Total ice mass (kg)
limnsw – Mass above floatation (kg)
iareagr – Grounded ice area (m^2)
iareafl – Floating ice area (m^2)

These variables are provided as yearly snapshots for the following full years:
hist: 1991–2015, all other experiments: 2016–2301.
Time variable: ‘time’.

Scalar flux variables (in common archive all_scalar.zip)

dlimdt	–	Total ice mass change (kg a^{-1})
tendacabf	–	Total surface mass balance flux (kg a^{-1})
tendlibmassbf	–	Total basal mass balance flux (kg a^{-1})
tendlibmassbffl	–	Total basal mass balance flux beneath floating ice (kg a^{-1})
tendlicalvf	–	Total calving flux (kg a^{-1})

These variables are provided as yearly averages over the intervals bounded by the following years:
hist: 1990–2015, all other experiments: 2015–2301.
Time variables: ‘time’, ‘time_bnds’.

Note

For further details on the variables, see the metadata in the netCDF files (e.g., by Linux command ‘ncdump –h’ or MATLAB command ‘ncdisp’).

Exp. #	GCM	Scenario	Ocean forcing	Ice-shelf fracture	
0	—	CTRL	—	—	Control exp.
5	NorESM1-M	RCP8.5	Medium	No	Core experiments (Tier 1)
6	MIROC-ESM-CHEM	RCP8.5	Medium	No	
7	NorESM1-M	RCP2.6	Medium	No	
8	CCSM4	RCP8.5	Medium	No	
9	NorESM1-M	RCP8.5	High	No	
10	NorESM1-M	RCP8.5	Low	No	
12	CCSM4	RCP8.5	Medium	Yes	
13	NorESM1-M	RCP8.5	PIGL-Medium	No	
A5	HadGEM2-ES	RCP8.5	Medium	No	Extended ensemble (Tier 2)
A6	CSIRO-Mk3.6.0	RCP8.5	Medium	No	
A7	IPSL-CM5A-MR	RCP8.5	Medium	No	
A8	IPSL-CM5A-MR	RCP2.6	Medium	No	
B6	CNRM-CM6-1	SSP5-8.5	Medium	No	CMIP6 extension (Tier 2)
B7	CNRM-CM6-1	SSP1-2.6	Medium	No	
B8	UKESM1-0-LL	SSP5-8.5	Medium	No	
B9	CESM2	SSP5-8.5	Medium	No	
B10	CNRM-ESM2-1	SSP5-8.5	Medium	No	

Table 1. Extended ISMIP6-Antarctica Tier-1 and Tier-2 future climate experiments for the period 2015–2301 (= end of 2300). See the paper for further details.