Annex II: Models

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This Annex provides information on the numerical models used in this assessment.

AII.1 Regional Climate Models (RCMs) participating in CORDEX

The Coordinated Regional Climate Downscaling Experiment (CORDEX, (Gutowski Jr. et al., 2016)) coordinates regional downscaling activities worldwide over a number of defined domains. Regional downscaling is performed using Regional Climate Models (RCMs) run over limited geographical regions, driven at the boundaries by the output from CMIP global model simulations. CORDEX relies on the same infrastructure as the Coupled Model Intercomparison Project (CMIP) to make the multi-model output publicly available in a standardized format: the data is disseminated via the Earth System Grid Federation (ESGF, Williams et al. 2016).

Table AII.1 lists the current CORDEX domains, displaying the different resolutions (from the lowest 0.44º, to the highest 0.11º, typically in rotated coordinates), with data available through the ESGF. Figure Atlas.7 provides a geographical map of the domains. Note that 0.44º and 0.22º are the prioritized resolution in the CORDEX and CORDEX-CORE experimental designs, respectively, and only some domains provide information for higher resolution (0.11º); see Atlas, Section Atlas.1.4.4 and https://cordex.org for further details. Table AII.1 also displays the number of simulations available for the following experiments: "evaluation" (ERA-Interim driven simulations), and the "historical", "RCP26", "RCP45" and "RCP85" CMIP5-driven simulations (Taylor et al., 2012). This table illustrates the heterogeneity of information available across the different domains which limits the assessment of some scenarios in some regions.

The RCMs contributing to CORDEX (as available from ESGF) are listed in Table AII.2, including the main references and details on model components relevant for the WGI AR6 assessment.

Finally, Tables AII.3 and AII.4 provide information on the CMIP5 and RCM models used in the different CORDEX domains, respectively (the numbers in each cell indicate the number of available simulations for each scenario). Note that CORDEX information is complex to describe since each particular simulation is produced by a single combination of a CMIP5 boundary forcing, or “driving model” (or reanalysis for the evaluation experiment) and an RCM model from Table AII.2. These two tables together provide comprehensive information on the GCM/RCM composition of the ensembles available in each domain, which is key to understanding the assessment done in WGI chapters (in particular the regional Chapters 10, 11, 12 and Atlas).

[START TABLE AII.1 HERE]

Table AII.1: CORDEX regional domains

List of CORDEX domains. Column 1: name of the domain. Column 2: domain code (as in ESGF specification). Column 2: horizontal grid resolutions (11, 22, 44 for 0.11º, 0.22º and 0.44º resolution in the original rotated coordinates, and the suffix “i” indicating regular interpolated domains). Columns 4 to 8 indicate the number of simulations available at each resolution, for the evaluation, historical, RCP26, RCP45, RCP85 experiments, respectively, as archived in the ESGF as of 31 January 2021. Note that MED-CORDEX data is stored on a dedicated server (details at http://www.medcordex.eu) and include experiments with only atmosphere (the standard for other domains) and atmosphere-ocean coupled regional climate models (denoted by MED and OMED, respectively). See Section Atlas 1.4.4 for more details on CORDEX and CORDEX-CORE experiments.

CORDEX Domains	Code	Resolutions	evaluation	historical	RCP26	RCP45	RCP85
1: South America	SAM	[20, 22, 44]	[1, 2, 5]	[3, 6, 14]	[0, 6, 6]	[3, 0, 12]	[3, 6, 13]
2: Central America	CAM	[22, 44]	[3, 2]	[9, 15]	[6, 5]	[0, 3]	[9, 14]
3: North America	NAM	[11, 22, 44]	[1, 5, 7]	[0, 17, 13]	[0, 3, 1]	[0, 5, 6]	[0, 17, 13]

4: Africa	AFR	[22, 44]	[4, 10]	[10, 33]	[9, 13]	[1, 22]	[10, 29]
5: Europe	EUR	[11, 22, 44]	[14, 2, 15]	[65, 3, 27]	[29, 3, 11]	[26, 0, 21]	[63, 3, 26]
6: South Asia	WAS	[22, 44, 44i]	[3, 3, 0]	[9, 18, 1]	[8, 7, 1]	[0, 18, 1]	[9, 18, 1]
7: East Asia	EAS	[22, 44]	[5, 3]	[6, 5]	[6, 0]	[0, 5]	[6, 5]
8: Central Asia	CAS	[22, 44]	[2, 2]	[4, 2]	[4, 0]	[1, 2]	[4, 2]
9: Australasia	AUS	[22, 44, 44i]	[2, 6, 1]	[6, 34, 24]	[6, 0, 0]	[0, 25, 17]	[6, 25, 17]
10: Antarctica	ANT	[22, 44]	[4, 0]	[12, 6]	[2, 0]	[8, 5]	[10, 5]
11: Arctic	ARC	[22, 44, 44i]	[2, 13, 2]	[1, 11, 0]	[0, 1, 0]	[1, 6, 0]	[1, 13, 1]
12: Mediterranean	MED	[11, 22, 44]	[6, 3, 20]	[2, 2,13]	[1, 0, 1]	[2, 0, 7]	[1, 2, 12
	OMED	[11, 22, 44]	[5, 4, 9]	[1, 1, 8]	[0, 0, 1]	[1, 0, 4]	[1, 1, 7]
13: Middle East North Africa	MNA	[22, 44]	[1, 2]	[2, 6]	[0, 1]	[0, 6]	[2, 6]
14: South-East Asia	SEA	[22]	[3]	[12]	[6]	[5]	[11]

[END TABLE AII.1 HERE]

[START TABLE AII.2 HERE]

Table AII.2: Regional Climate Models contributing to CORDEX experiments.

Salient features of the Regional Climate Models (RCMs) participating in CORDEX scenario experiments (CMIP5-driven). Column 1: sponsoring institution(s). Column 2: name of the model (and versions); subsequent columns for each of the model components with main references. Column 3: atmospheric component with number of vertical levels and main reference; Column 4: aerosols component (interactive or prescribed, with component details when interactive). Column 5: land component (number of levels and component name). Column 6: ocean component (prescribed or interactive, with model details when interactive). Column 7: additional components (lake, urban, river models) and comments on versions and/or different configurations of the same model. See Table AII.1 for the codes of CORDEX domains.

Institution (Country)	Model	Atmosphere 1) number of levels 2) main references	Aerosols 1) interactive or prescribed 2) component name (when interactive)	Land 1) number of levels 2) component name	Ocean 1) interactive or prescribed 2) component name 3) details	Additional components / comments Lake (LK), urban (UR), or river (RI) models, etc. Comments on the different versions
CNRM (France)	ALADIN52_v1 ALADIN53_v1	1) 31 2) (Colin et al., 2010)	1) Prescribed; (Szopa et al., 2013) dataset for eval and GCM forcing for scen runs, 5 classes, 2D spatial pattern, vertical profile, seasonal cycle, temporal evolution	1) 3 2) ISBA (Noilhan and Mahfouf, 1996)	1) Prescribed SST (ice cover defined by a SST threshold)	LK: no UR: no ALADIN53_v1 is same as ALADIN52_v1 except for the radiation scheme (RRTM for the LW, Mlawer et al. (1997) and FMR-6bands for the SW, Fouquart and Bonnel, (1980); Morcrette et al. (2008), for the turbulent air-sea fluxes (ECUME) and for the mixing length based on Lenderink's work.
CNRM (France)	ALADIN63_v1 ALADIN63_v2	1) 91 2) (Nabat et al., 2020)	1) Prescribed; TACTIC dataset for eval and GCM forcing for scen, 5 classes, 2D spatial pattern, vertical profile, seasonal cycle, temporal evolution	1) 14 2) SURFEX8-ISBA (Decharme et al., 2019). No land use land cover change is taken into account	1) Prescribed SST (ice cover defined by a SST threshold)	LK: Flake (Le Moigne et al., 2016), pronostic lake ice. UR: Urban areas are considered as rock (Daniel et al., 2019) ALADIN63_v1 and ALADIN63_v2 are identical. v2 label is used to indicate that the runs driven by the CNRM-CM5 GCM use the corrected version of the CNRM-CM5 Atmospheric-LBCs contrary to ALADIN53_v1
RMIB-UGent (Belgium)	ALARO-0_v1	1) 46 2) (Giot et al., 2016; Top et al., 2021)	1) Prescribed	1) 2 2) ISBA (Douville et al., 2000)	1) Prescribed SST	N/A
CCCma (Canada)	CanRCM4_r2	1) 25 2) (Scinocca et al., 2016)	1) Interactive 2) described in main reference	1) 3 2) CLASS 2.7	1) Prescribed SST	Full atmospheric physics package identical to that used by parent global model, CanAM4, used by CanESM2 for CMIP5. Historical + RCP8.5 large ensemble (50 members) of 'NAM-44' available for large ensemble (50 members) of its parent model CanESM2.
CSIRO (Australia)	CCAM_v1 CCAM-1704_v1	1) 27 2) (Hoffmann et al., 2016)	1) Interactive 2) sulfate, black carbon, organic aerosol, mineral dust and sea salt (Rotstayn and Lohmann, 2002; Rotstayn et al., 2011)	1) 6 2) CABLE (Kowalczyk et al., 2013)	1) Prescribed SST after bias and variance correction (CCAM_V1) or just bias correction (CCAM-1704_v1)). No atmospheric nudging.	UR: UCLEM (Lipson et al., 2018)
CSIRO (Australia)	CCAM-2008_v1	1) 35 2) (Thatcher and McGregor, 2009)	1) Interactive 2) sulfate, black carbon, organic aerosol, mineral dust and sea salt (Rotstayn and Lohmann, 2002; Rotstayn et al., 2011)	1) 6 2) CABLE (Kowalczyk et al., 2013)	1) Prescribed SST	UR: UCLEM (Lipson et al., 2018)
CLM-	CCLM4-8-17-	1) 35	1) Prescribed	1) 9	1) Prescribed SST	N/A

Community: BTU, CMCC, DWD, ETH, GUF, HZG, JLU, KIT, WEGC ZAMG (Europe)	CLM3-5_v1	2) (Di Virgilio et al., 2019)		2) CLM (Dickinson et al., 2006)		
CLM-Community (Europe)	CCLM4-8-17_v1	1) 35 2) (Panitz et al., 2014)	1) Prescribed	1) 9 2) soil-vegetation-atmosphere-transfer TERRA-ML (Schrodin and Heise, 2002)	1) Prescribed SST	N/A
CLM-Community (Europe)	CCLM5-0-2_v1	1) 45 2) (Li et al., 2018)	1) Prescribed. Aerosol optical thickness: NASA/GISS (Global Aerosol Climatology Project)	1) 9 Multilayer soil model TERRA-ML (Schrodin and Heise, 2002)	1) Prescribed SST	Surface roughness: GLOBE (NOAA/NGDC); Global Land Cover 2000 Project (GLC2000)
CLM-Community: HZG and KIT (Germany)	CCLM5-0-15_v1	1) 57 2) N/A	1) Prescribed	1) 9 2) TERRA-ML (Schrodin and Heise, 2002)	1) Prescribed SST	LK: FLake (Mironov et al., 2010)
CLM-Community: GUF (Germany)	CCLM5-0-9-NEMOMED12-3-6	1) 40 2) (Akhtar et al., 2018)	1)Prescribed; AeroCom Global AOD data is used for Aerosol representation (Kinne et al., 2006)	1) 9 TERRA-ML (Schrodin and Heise, 2002)	1) Interactive 2) NEMOMED12 (1/12º resolution) is the interactive ocean model component (Beuvier et al., 2012) 3) The CCLM and NEMOMED12 models are coupled via OASIS3-MCT (Valcke, 2013) with a 1-h coupling time.	RI: TRIP (Total Runoff Integrating Pathways) is used as the interactive river component for rivers over the Mediterranean Basin to feed runoff at the river mouths to the Mediterranean Sea (NEMOMED12)
CLM-Community: ETH (Switzerland)	COSMO-crCLIM-v1-1_v1	1) 40 (EUR-11), 57 (WAS-22) 2) (Leutwyler et al., 2017)	1) Prescribed; AeroCom1 aerosol monthly climatology dataset (Kinne et al., 2006).	1) 9 2) TERRA-ML with a soil hydrology scheme (Schlemmer et al., 2018)	1) Prescribed SST	COSMO-crCLIM is similar to CCLM. Its main characteristics are that it runs on GPUs and includes the soil hydrology scheme of Schlemmer et al. (2018). Other adjustments include changing the upper level damping to only relax the vertical velocity instead of all dynamical fields (Klemp et al., 2008)
OURANOS (Canada)	CRCM5_v1	1) 56 (TOA 10 hPa) 2) (Martynov et al., 2013; Šeparović et al., 2013)	1) Prescribed	1) 17 (to 15 m) 2) CLASS3.5c (Verseghy et al., 1993)	1) Prescribed SST and sea-ice fraction	LK: Flake

UQAM (Canada)	CRCM5_v1	1) 56 (TOA 10 hPa) 2) (Martynov et al., 2013)	1) Prescribed; not varying in time; higher values at the equator, lower at the poles; higher values over land than over the ocean	1) 26 (to 60 m) 2) CLASS3.5+	1) Prescribed SST and sea-ice fraction	LK: FLake
INPE (Brazil)	Eta_v1	1) 38 (TOA 25hPa) 2) (Chou et al., 2014a, 2014b)	1) Prescribed	1) 4 2) NOAH scheme (Ek et al., 2003) 12 Vegetation types and 9 soil types.	1) Prescribed SST	No orography smoothing; No internal or lateral boundary relaxation nudging.
DMI (Denmark)	HIRHAM5_v1 HIRHAM5_v2 HIRHAM5_v3	1) 31 2) (Christensen et al., 2007)	1) Prescribed	1) 5 2) ECHAM5	1) Prescribed SST and sea-ice	The different versions v1, v2, v3, are simulation versions due to necessary re-runs, not different model versions.
MOHC (U.K.)	HadREM3-GA7-05_v1 HadREM3-GA7-05_v2	1) 63 2) (Walters et al., 2019)	1) Prescribed. MACv2-SP dataset (Stevens et al., 2017), total aerosol properties, 9 bands. EasyAerosol (Voigt et al., 2014) RCP scenarios	1) 4 2) (Walters et al., 2019)	1) Prescribed SST and sea-ice from driving GCM/reanalysis	LK: no The "v2" runs are using CNRM boundary conditions from pressure level 3d data. No differences in the RCM, only a different source of lbcs.
LMD (France)	LMDZ4NEMOMED8_v1 LMDZ4NEMOMED8_v2	1) N/A 2) (L'Hévéder et al., 2013; Vadsaria et al., 2020)	1) Prescribed	1) 2 2) ORCHIDEE	1) interactive 2) NEMOMED8 (Beuvier et al., 2010) 3) Interactive Mediterranean Sea only; 43 vertical levels with a 6-m thick first level; daily coupling frequency by the OASIS coupler (Valcke, 2013)	RI: Interactive river coupling in v2. No river coupling in v1
ULg (Belgium)	MAR311_v1	1) 24 2) (Agosta et al., 2019; Kittel et al., 2021)	1) Prescribed, RCP scenarios	1) 7 2) SISVAT (De Ridder, 1997; De Ridder and Schayes, 1997), (Gallée and Duynkerke, 1997; Gallée et al., 2001; Lefebre, 2003)	1) Prescribed SST and SIC (evolution of the snow properties simulated by SISVAT)	SISVAT model: 30 snow/ice layers over the ice sheet and two sub-pixels (rocs and permanent ice-covered area)
UB Belgarde (Serbia)	EBU-POM2c_v1	1) 32 2) (Djurdjevic and Rajkovic, 2008, 2010; Kržič et al., 2011)	1) Prescribed	1) 4 2) NOAH-LSM (Ek et al., 2003)	1) Interactive 2) POM - Princeton ocean model (30km, L21, coupling frequency 6 min)	N/A
ENEA (Italy)	PROTHEUS_v2	1) 18 2) (Artale et al., 2010; Soto-Navarro et al., 2020)	1) no active aerosol chemical model	1) 2 2) BATS1e (Dickinson et al., 1993). Air–sea exchanges by Zeng et al.	1) Interactive 2) MITMED8 (1/8° resolution) is the interactive ocean model component (Sannino et al.,	RI: Fully interactive (daily coupling) using the TRIP river routine model

				(1998) to improve excessive evaporation from warm ocean surfaces (Pal et al., 2007) in the original BATS package.	2009)	
KNMI (Netherlands)	RACMO21P_v1 RACMO21P_v2	1) 40 2) (van Meijgaard et al., 2008)	1) Prescribed (Tegen et al., 1997) four classes (land, maritime, dust, urban) + stratospheric + (optionally) volcanic	1) 4 2) baseline LSM TESSEL (van den Hurk et al., 2000); Land-ice tile added for ice-sheet modelling. Multi-layer snow-ice-refreezing scheme (Ettema et al., 2010); snow albedo scheme (Kuipers Munneke et al., 2011); snow drift scheme (Lenaerts et al., 2012)	1) Prescribed SST and sea-ice concentration; inferred from re-analysis or GCM	Model versions: Simulations with RACMO21P_v2 are straight reruns of RACMO21P_v1 employing the same model system and parameter settings. In ANT-44 simulations, v2 is only used with MOHC-HadGEM2-ES forcing to fix the remapping of SST to the RACMO grid in the v1-simulation
KNMI (Netherlands)	RACMO22E_v1 RACMO22E_v2	1) 40 2) (van Meijgaard et al., 2012)	1) Prescribed; inferred from CAM inventory (except volcanic); historical and rcp pathways (Lamarque et al., 2010, 2011; van Vuuren et al., 2011); also used in evaluation. Sulfate, particulate organic matter black carbon, sea salt, desert dust stratospheric aerosols, volcanic aerosol. Spatial maps and vertical profiles per species. Monthly variations and decadal trends.	1) 4 2) HTESSEL (Balsamo et al., 2009)	1) Prescribed SST and sea-ice concentration; inferred from re-analysis or GCM	Model versions: Simulations with RACMO22E_v2 are straight reruns of RACMO22E_v1 employing the same model system and parameter settings. Meaning of v2 depends on forcing GCM: i) MOHC-HadGEM2-ES: remapping of GCM-SST to RACMO grid erroneous in v1, corrected in v2 ii) CNRM-CERFACS-CNRM-CM5: atmospheric forcings derived from pressure level fields, because of error in CNRM-CM5 model level fields
KNMI (Netherlands)	RACMO22T_v1 RACMO22T_v2	1) 40 2) (van Meijgaard et al., 2012)	1) Prescribed, as in RACMO22E	1) 4 2) HTESSEL (Balsamo et al., 2009)	1) Prescribed SST and sea-ice concentration; inferred from re-analysis of GCM	Model versions: Simulations with RACMO22T_v2 are straight reruns of RACMO22T_v1 employing the same model system and parameter settings. In AFR-44, v2 is only used with MOHC-HadGEM2-ES forcing to fix the remapping of SST to the RACMO grid in the v1-simulation
SMHI (Sweden)	RCA4_v1 RCA4_v1a RCA4_v2	1) 40 2) (Samuelsson et al., 2015; Strandberg et al., 2015)	1) Prescribed: single integrated class, parameterized aerosol effect on radiation fluxes,spatially uniform, static.	1) 3 2) a tile-based scheme with physiography based on ECOCLIMAP (Samuelsson et al., 2015)	1) Prescribed SST and sea-ice from daily driving GCMs/reanalysis	LK: Flake (pronostic lake ice). (Mironov et al., 2010) Model versions: i) RCA4-v1a is simply a re-run because a restart file to start the scenario experiment was taken from another

	RCA4_v3 RCA4-SN_v1					simulations, ii) RCA4-v2 and RCA4-v3 are slightly tuned versions of RCA4-v1 (some parameters) but parameterizations are the same. RCA-SN indicates spectral nudging.
CNRM (France)	RCSM4_v1	1) 31 2) (Sevault et al., 2014)	1) Prescribed (Szopa et al., 2013) dataset for evaluation and GCM forcing for scen runs, 5 classes, 2D spatial pattern, vertical profile, seasonal cycle, temporal evolution	1) 3 2) ISBA (Noilhan and Mahfouf, 1996)	1) Interactive 2) NEMOMED8 (Beuvier et al., 2010) 3) Mediterranean Sea only; 43 vertical levels with a 6-m thick first level; daily coupling frequency by the OASIS coupler (Valcke, 2013)	1) interactive rivers connecting the atmosphere to the ocean 2) TRIP (Oki and Sud, 1998; Decharme et al., 2010) 3) 50km spatial resolution
GERICS and MPI-CSC (Germany)	REMO2009_v1 REMO2015_v1 REMO2015_v2	1) 27 2) (Jacob and Podzun, 1997; Jacob, 2001)	1) Prescribed (Tanré et al., 1984)	1) 5 2) a tile-based scheme including annual cycle of albedo (Rechid et al., 2009)	1) Prescribed SST and SIC	REMO2009_v1 and REMO2015_v1 and V2 are essentially the same, just with some technical changes
GERICS-AWI (Germany)	ROM ROM_v1	1) 27 2) (Sein et al., 2015)	See above	See above	1) Interactive. 2) SST, SIC and SIT are calculated in ocean model MPIOM	1) interactive rivers connecting the atmosphere to the ocean 2) Hydrological Discharge (HD) model 3) 50km spatial
MGO (Russia)	RRCM_v1	1) 25 2) (Shkolnik and Efimov, 2013)	1) Prescribed	1) 4 2) MGO-2	1) Prescribed SST	N/A
ITU (Turkey)	RegCM4-BATS_v1	1) 18 2) (Ruti et al., 2016; Turuncoglu, 2019)	1) no active aerosol chemical model	1) 2 2) BATS1e	1) Prescribed; surface layer (Zeng et al., 1998)	In MED-11, Wave Model (WAM) Cycle-4 (4.5.3-MPI) coupled with Atmospheric model
ITU (Turkey)	RegESM	1) 18 2) (Ruti et al., 2016; Turuncoglu, 2019)	See above	See above	1) Interactive 2) ROMS-revision 809; (Haidvogel et al., 2008)	In MED-11, Wave Model (WAM) Cycle-4 (4.5.3-MPI) coupled with Atmospheric model
ICTP (Italy) RU-CORE (Thailand)	RegCM4-3_v4	1) 18 2) (Giorgi et al., 2012)	1) no active aerosol chemical model	1) 2 2) BATS1e [SAM-44: 1) 10 2) CLM3.5]	1) Prescribed; surface layer (Zeng et al., 1998)	N/A
ICTP (Italy) BOUN (Turkey)	RegCM4-3_v5	1) 18 2) (Ozturk et al., 2017, 2018)	1) no active aerosol chemical model	1) 1 2) BATS 1e	1) Prescribed; surface layer (Zeng et al., 1998)	N/A
ICTP (Italy)	RegCM4-4_v0	1) 18 2) (Giorgi et al., 2012)	1) no active aerosol chemical model	1) 2 2) BATS1e	1) Prescribed; surface layer (Zeng et al., 1998)	N/A
ICTP (Italy)	RegCM4-4_v5	1) 18 2) (Giorgi et al., 2012;	1) no active aerosol chemical model	1) 10 2) CLM4.5	1) Prescribed; surface layer (Zeng et al., 1998)	UR: CLM4.5

IITM (India)		Sanjay et al., 2017, 2020)				
ICTP (Italy)	RegCM4-6_v1	1) 23 2) (Giorgi et al., 2012)	1) no active aerosol chemical model	1) 10 2) CLM4.5	1) Prescribed; surface layer (Zeng et al., 1998)	UR: CLM4.5
ICTP (Italy) ORNL (USA)	RegCM4-7_v0	1) 23 2) (Giorgi et al., 2012)	1) no active aerosol chemical model	1) 10 2) CLM4.5	1) Prescribed; surface layer (Zeng et al., 1998)	UR: CLM4.5
ICTP (Italy) ISU (USA)	RegCM4_v4-4-rc8	1) 18 2) (Giorgi andAnyah, 2012; Mearns et al., 2017; Bukovsky and Mearns, 2020)	N/A	1) 3 soil layers 2) BATS	1) Prescribed SST; no sea-ice prescribed, atmospheric skin temperature instead	LK: (Hostetler et al., 1994)
UB (Serbia)	EBU	1) 32 2) N/A	Same as EBU-POM2c_v1	Same as EBU-POM2c_v1	1) Prescribed SST	N/A
UCAN (Spain)	WRF341I_v2	1) 30 2) (Skamarock et al., 2008)	1) Prescribed uniform background with vertical profile. Constant in time.	1) 4 2) Noah (Chen and Dudhia, 2001)	1) Prescribed SST and sea-ice	WRF v3.4.1. "I" stands for the coordinated physics configuration used within CORDEX. "v2" refers to the variable GHG input and noleap calendar in scenario (CanESM2) simulations. Otherwise, fully comparable to v1 in ERA-Interim (fixed GHG, standard cal.)
CYI (Cyprus)	WRF351_v1	1) 30 2) (Zittis et al., 2014; Zittis and Hadjinicolaou, 2017)	1) Prescribed	1) 4 2) Noah (Chen and Dudhia, 2001)	1) Prescribed SST	N/A
UNSW (Australia)	WRF360J_v1 WRF360K_v1	1) 30 2) (Powers et al., 2017; Evans et al., 2020)	1) Prescribed	1) 4 2) Noah (Chen and Dudhia, 2001)	1) Prescribed SST (ice with SST threshold)	N/A
UNSW (Australia)	WRF360L_v1	1) 30 2) (Powers et al., 2017; Di Virgilio et al., 2019)	1) Prescribed	1) 4 2) Noah (Chen and Dudhia, 2001)	1) Prescribed SST (ice with SST threshold)	N/A
UHOH (Germany)	WRF361H_v1	1) 50 2) (Skamarock et al., 2008)	1) Prescribed uniform background with vertical profile. Constant in time.	1) 4 2) NOAH (Chen and Dudhia, 2001)	1) Prescribed SST (ice with SST threshold)	N/A
CRC (France)	WRF381_v1	1) 50 2) https://doi.org/10.25666/dataosu-2021-03-05-02 https://doi.org/10.25666/dataosu-2021-03-05	1) Prescribed (Tegen et al., 1997)	1) 4 2) Noah_mp (Niu et al., 2011) Modis land categories	1) Prescribed SST (ice with SST threshold) from global model	Allow sub-grid cloud fraction interaction with radiation (Alapaty et al., 2012) The forcing variables have been bias-corrected using ERA-Interim fields for 1981-2005, as in Bruyère et al. (2014).
IPSL (France)	WRF381P_v1 WRF381P_v2	1) 31 2) (Skamarock et al., 2008)	1) Prescribed aerosols	1) 4	1) Prescribed SST and sea-ice (from global model)	N/A

NCAR and UA (USA)	WRF_v3-5-1	1) 28 2) (Skamarock et al., 2008; Mearns et al., 2017; Bukovsky and Mearns, 2020)	1) Prescribed	1) 4 soil levels 2) Noah	1) Prescribed SST, prescribed sea-ice for GFDL and MPI-driven simulations, sea-ice with an SST threshold for HadGEM-driven simulation	WRF v3.5.1 Spectral nudging used.

[END TABLE AII.2 HERE]

[START TABLE AII.3 HERE]

Table AII.3: CMIP5 models used for downscaling in the different CORDEX domains

Climate models participating in CMIP5 (rows) used as boundary conditions for the CORDEX regional simulations in the different domains (columns). Each cell indicates the number of simulations available for the historical, RCP26, RCP45 and RCP85 experiments (see the color legend). Salient features of these models are described in IPCC-AR5 Appendix 9.A (model names are taken from table 9.A.1). Further details on these simulations (e.g. particular GCM-RCM combinations in each cell) are given in the November 2021 list of simulations available in the CORDEX website https://cordex.org. (*) For the Mediterranean domain, only the coupled atmosphere-ocean simulations are listed.

GCM/Domain	SAM				CAM				NAM				AFR				EUR-11				WAS				EAS				CAS			
CanESM2_r1i1p1	3		3	3	3			3	6		5	6	4		4	3					2		2	2								
CNRM-CM5_r1i1p1					2			2	1		1	1	2		2	2	10	5	6	9	2		2	2	1		1	1	1	1	1	1
ACCESS1-0_r1i1p1																																
ACCESS1-3_r1i1p1																																
CSIRO-Mk3-6-0_r1i1p1	1		1	1	1			1					1		1	1					2		2	2								
EC-EARTH_r12i1p1	1	1	1	1	1	1	1	1	1	1	1	1	4	3	3	3	8	5	4	8	2	1	1	2	1		1	1				
EC-EARTH_r1i1p1													2		1	2	4		1	4												
EC-EARTH_r3i1p1									1		1	1	2		1	2	4	1	1	4					1		1	1				
PSL-CM5A-LR_r1i1p1													1	1		1	1	1			1		1	1								
IPSL-CM5A-MR_r1i1p1	1		1	1	1			1					1		1	1	5		2	5	1		1	1								
MIROC5_r1i1p1	2	1	2	2	1	1		1					2	2	1	2		2			2	2	1	2								
HadGEM2-CC_r1i1p1																																
HadGEM2-ES_r1i1p1	5	3	3	5	4	3	1	4	5	1		5	8	6	3	8	9	6	5	9	2	2	1	2	3	2	1	3	2	1	1	2
HadGEM2-ES_r2i1p1					1			1																								
MPI-ESM-LR_r1i1p1	3	3	2	3	2	2	1	2	8	1	2	8	6	4	4	5	9	4	3	#	5	5	3	5	2	1	1	2	1	1		1
MPI-ESM-LR_r2i1p1													1			1	3	1	1	3												
MPI-ESM-LR_r3i1p1													1			1	3			3												
MPI-ESM-MR_r1i1p1	2	1		2	2	1		2	2			2	2	1		2					2	1	1	2	1	1		1	1		1	1
MPI-ESM-MR_r2i1p1					1																											
CCSM4_r1i1p1																																
CCSM4_r6i1p1																																
NorESM1-M_r1i1p1	3	3	1	3	2	2		2	1	1		1	4	4	1	4	8	3	3	8	4	4	1	4	2	2		2	1	1		1
GFDL-CM3_r1i1p1																																

GCM/Domain	AUS				ANT				ARC				MED(*)				MNA				SEA			
CanESM2_r1i1p1	3		3	3	1		1	1	4		3	4												
CNRM-CM5_r1i1p1	2		2	2									3	1	2	2	1		1	1	1			
ACCESS1-0_r1i1p1	9		5	5	1		1	1																
ACCESS1-3_r1i1p1	6		2	2	1			1																
CSIRO-Mk3-6-0_r1i1p1																								
EC-EARTH_r12i1p1	1		1	1	1	1			2	1	1	2	1			1	2	1	1	2				
EC-EARTH_r1i1p1					1		1	1													1		1	1
EC-EARTH_r3i1p1					1		1	1	1		1	1												
PSL-CM5A-LR_r1i1p1																					1		1	1
IPSL-CM5A-MR_r1i1p1													2		1	2								
MIROC5_r1i1p1	2		2	2	1		1	1																
HadGEM2-CC_r1i1p1	1		1	1																				
HadGEM2-ES_r1i1p1	2	2		2	1	1	1	1									1		1	1	4	2	2	4
HadGEM2-ES_r2i1p1																								
MPI-ESM-LR_r1i1p1	4	2	2	4					3		1	5	3		1	3					1	1		1
MPI-ESM-LR_r2i1p1																								
MPI-ESM-LR_r3i1p1																								
MPI-ESM-MR_r1i1p1									1			1	1			1	1		1	1	2	1	1	2
MPI-ESM-MR_r2i1p1																								
CCSM4_r1i1p1	1		1	1																				
CCSM4_r6i1p1																	1		1	1				
NorESM1-M_r1i1p1	5	2	3	5	2		1	2	1		1	1									2	2		2
GFDL-CM3_r1i1p1	1		1	1																				

GFDL-ESM2G_r1i1p1													1	1			1	1										
GFDL-ESM2M_r1i1p1	2		1	1	3	1		3	5		1	5	1		1	1					2		2	2				

GFDL-ESM2G_r1i1p1																												
GFDL-ESM2M_r1i1p1					2		2	2	1		1	1					1		1	1	2		1	2				

Color legend: historical RCP2.6 RCP4.5 RCP8.5

[END TABLE AII.3 HERE]

[START TABLE AII.4 HERE]

Table AII.4: Regional models used for downscaling in the different CORDEX domains

Regional simulations contributed by the different models participating in CORDEX (rows, grouped by model families, see Table AII.2) in the different domains (columns). Each cell indicates the number of simulations available for the historical, RCP26, RCP45 and RCP85 experiments (see the color legend). Further details on these simulations (e.g. particular GCM-RCM combinations in each cell) are given in the November 2021 list of simulations available in the CORDEX website https://cordex.org. (*) For the Mediterranean domain, only the coupled atmosphere-ocean simulations are listed.

RCM/Domain	SAM				CAM				NAM				AFR				EUR-11				WAS			
ALADIN63																	5	2	2	5				
ALARO																	1	1	1	1				
CCAM																								
CCLM													7	3	4	7	4	2	4	4				
COSMO-crCLIM																	8			8	3	2		3
CRCM5					4			4	1		6	1	2		2									
CanRCM4									2		2	2	2		2	2								
EBU-POM2c																								
Eta	3		3	3																				
HIRHAM5									1		1	1	1		1	1	8	2	3	8				
HadREM3-GA7-																	5	2		4				
LMDZ4NEMOM																								
MAR311																								
PROTHEUS																								
RACMO													3	2	2	2	8	5	4	8				

RCM/Domain	EAS				CAS				AUS				ANT				ARC				MED(*)				MNA				SEA			
ALADIN63																																
ALARO					1	1	1	1																								
CCAM									1		1	1	6		5	5																
CCLM	4		4	4					7	3	4	7									2		1	2								
COSMO-crCLIM																																
CRCM5																	2			2												
CanRCM4																	2		2	2												
EBU-POM2c																					1			1								
Eta																																
HIRHAM5	1		1	1									1		1	1	1		1	3												
HadREM3-GA7-																																
LMDZ4NEMOM																					4		1	4								
MAR311													2			2																
PROTHEUS																					1		1									
RACMO													3	2	2	2																

RCA4	9	5	9	9	1	5	3	1	2	1	2	2	1	5	1	1	1	5	7	1	1	5	1	1																	8	1	4	8					5	1	3	5	1		1	1
RCSM4																																													1	1	1	1								
REMO2009	1	1	1	1									6	6	2	5	2	2	2	2	2	2	2	2																																
REMO2015	3	3		3	3	3		3	3	3		3	3	3		3	6	7	3	4	3	3		3	3	3		3	3	3		3	3	3		3																	3	3		3
ROM																																													2		1	2								
RRCM																																									1			1												
RegCM4_3	3		1	2	4			3					2			2													2		2	2																	2		2	2	5		4	4
RegCM4-4*6*7	3	3		3	3	3		3	6			6	3	3		3	3	2		3	9	3	6	9	3	3		3																									3	3		3
WRF	1		1	1					6			6					5		1	6													#		6	6													1		1	1				

Color legend: historical RCP2.6 RCP4.5 RCP8.5

[END TABLE AII.4 HERE]

AII.2 Earth System Models and General Circulation Models for climate projections

Detailed and structured information about climate models, simulations and their conformance to common experimental protocols is not only important for scientific interpretation but, under increased scrutiny from society, it is also demanded of climate science that purports to be mature, credible, open, transparent and reproducible (Guilyardi et al., 2013). Scientific publications remain an essential way of documenting models but remain largely scattered and not easily accessible by the growing community of users of model output. To address these challenges, the Earth System Documentation (ES-DOC) project offers an eco-system of tools and services in support of Earth System modelling documentation creation, analysis and dissemination. ES-DOC is coordinated with other community efforts such as the Coupled Model Intercomparison Project (CMIP) via the World Climate Research Programme work group on Climate Modelling (WGCM) and its Infrastructure Panel WIP (Balaji et al., 2018).

The objective of CMIP is to better understand past, present and future global climate changes arising from natural, unforced variability or in response to changes in radiative forcing in a multi-model context (Chapter 1, Section 1.5.4). This understanding includes assessments of model performance during the historical period (Chapter 3) and quantifications of the causes of the spread in future projections (Chapters 4, 7). Idealised experiments are also used to increase understanding of the model responses. In addition to these long time scale responses, experiments are performed to investigate the predictability of the climate system on various time and space scales as well as making predictions from initialised climate states. The different activities (MIP) endorsed by CMIP6 are listed in Chapter 1, Table 1.3 (Eyring et al., 2016). A set of common experiments, the DECK (Diagnostic, Evaluation and Characterization of Klima) and CMIP historical simulations (1850–2014) were introduced that will maintain continuity with previous CMIP phases and help document basic and evolving characteristics of models. ScenarioMIP is the framework for future climate projections (O'Neill et al., 2016). The infrastructure panel of the World Climate Research Programme coordinates framework developments and defines data standards for CMIP. A key aspect is the dissemination of the data via the Earth System Grid Federation, ESGF (Williams et al., 2016; Petrie et al., 2021)

A new online service, ES-DOC, provides information about all aspects of CMIP6. Building on the Common Information Model concepts and standards (Lawrence et al., 2012), a number of documents are created for the CMIP6 Project, as illustrated on https://es-doc.org/cmip6/. These include documents to describe experiments, ensembles simulations, models, conformance to the numerical requirements of the CMIP6 protocol (see (Pascoe et al., 2019) for CMIP6 experiments) and other important aspects of the CMIP6 model archive. These different documents are either produced automatically or provided in a standard way by modelling groups. Hundreds of clearly structured properties are harvested and stored on a database to be used by clients and portals (e.g. https://search.es-doc.org/ and https://explore.es-doc.org/). Another entry point to the database is provided by the one-stop-shop "further_info_url" global attribute in each CMIP6 netcdf data file. ES-DOC also includes the CMIP6 errata system (https://errata.es-doc.org), which tracks issues with the model data and the potential corrections made. ES-DOC includes information at the model level and the experiment level.

Model datasets shared on ESGF are characterized by their institution, model, experiment, variable, and ensemble member (the different types of ensemble strategies are introduced in Chapter 1, Section 1.4). Each ensemble member is designated by a label of four letters, each associated with a number: "r" for realization, "i" for initialization, "p" for physics, and "f" for forcing. For example, Table Atlas.A.2 lists the ensemble member label of each CMIP6 dataset used in the Atlas. In the future, ES-DOC will document in more detail how each individual member differs from the other members of a given ensemble.

The key new model developments since AR5 are summarized in Chapter 1, Section 1.3.5, and model results are assessed in multiple chapters of this report. In this Annex, Table AII.5 presents the main features of the CMIP6 coupled models, in a format comparable with AR5 table 9.A.1 for CMIP5 (Flato et al., 2013). At the date of March 2021, 136 models had registered for CMIP6, including the 23 CMIP6-endorsed MIPs (Chapter 1, Table 1.3). For conciseness, Table AII.5 documents only the coupled models used in the CMIP6 "DECK" experiments and ScenarioMIP, excluding atmosphere-only and ocean-only components (AMIP and

OMIP), radiative transfer models (RFMIP), etc. Registered coupled model that have not submitted data in time to be used in this report are not included. The high-resolution models used for HighResMIP (Haarsma et al., 2016) are listed in Table AII.6, and ice sheet models are documented in section AII.3. The citation information for all CMIP6 model datasets is compiled in section AII.4, Table AII.10

[START TABLE AII.5 HERE]

Table AII.5: Coupled Climate and Earth System Models participating in CMIP6 DECK, historical simulation, and ScenarioMIP

Salient features of the coupled General Circulation Models (GCMs) and Earth System Models (ESMs) participating in the CMIP6 DECK, historical simulation, and ScenarioMIP. Column 1: sponsoring institution(s), Column 2: names of model configurations; Column 3: main reference(s); subsequent columns for each of the model components, with names and main component reference(s). In addition, there are standard entries for the atmosphere component: horizontal grid resolution, number of vertical levels, grid top; and for the ocean component: horizontal grid resolution, number of vertical levels, vertical coordinate type. The horizontal resolution (rounded to 10km) is the square root of the number of grid points divided by the surface area of the Earth, or the number of surface ocean grid points divided by the area of the ocean surface, for the atmosphere and ocean respectively. When reported in hPa, the atmosphere top heights are converted into km assuming standard atmosphere (ISO 2533:1975, 1975). Aerosols are either prescribed or computed from emissions (emission-driven). For land carbon, a list of active processes is provided among: active land carbon cycle (Land carbon), active nitrogen cycle (N cycle), prognostic biogeography of vegetation (Prog. veg.), carbon included in a permafrost pool (Permafrost), and dynamic fires (Fires). A blank entry indicates that information was not available. The information contained in the table is consistent with version 6.2.55.10 of the CMIP6 Controlled Vocabularies (https://github.com/WCRP-CMIP/CMIP6_CVs).

institution **full name** **country**	**Models**	**Main references**	**Atmosphere** **1) Component name** **2) resolution (km) and number of levels** **3) Top** **4) references**	**Aerosol** **1) Component name** **2) emission-driven or prescribed** **3) references**	**Atmospheric Chemistry** **1) Component name** **2) details** **3) references**	**Ocean** **1) Component name** **2) horizontal resolution and number of levels** **3) vertical grid** **4) references**	**Cryosphere** **1) Sea ice** **2) Land ice**	**Land** **1) component name** **2) reference**	**Land carbon** **Active processes**	**ocean interactive biogeochemistry** **1) component name** **2) reference**
AS-RCEC Research Center for Environmental Changes, Academia Sinica, **Taiwan**	**TaiESM1.0**	(Lee et al., 2020)	1) TaiAM1 2) 100 km, 30L 3) Top 43 km	1) SNAP 2) emission-driven 3) (Chen et al., 2013)	none	1) POP2 2) 60 km, 60 L 3) z	1) CICE4	1) CLM4.0 with modified surface solar radiation 2) (Lee et al., 2013)	Land carbon N cycle Fires	none
AWI Alfred Wegener Institute, **Germany**	**AWI-CM-1-1-LR** **AWI-CM-1-1-MR** **AWI-ESM-1-1-LR**	(Sidorenko et al., 2015) (Semmler et al., 2020)	1)ECHAM6.3.04p1 2) **LR**: 170 km, 47L ; **MR:** 80 km, 95L 3) Top 80 km	2) prescribed MACv2-SP 3) (Stevens et al., 2017)	none	1) FESOM1.4 2) **LR**: 50 km, 46L **MR** : 20km, 46L 3) z	1) FESOM1.4	JSBACH 3.20	**AWI-CM:** none **AWI-ESM**: Land carbon N cycle Prog. Veg. Fires	none
BCC Beijing Climate Centre, **China**	**BCC-CSM2-MR**	(Wu et al., 2019)	1) AGCM3 2) 100 km, 46L 3) Top 45 km	2) prescribed MACv2-SP 3) (Stevens et al., 2017)	1) none	1) MOM4 2) 80 km, 40L 3) z	1) SIS1	BCC_AVIM2 (Li et al., 2019)	none	none
BCC	**BCC-ESM1**	(Wu et al., 2020b)	1) AGCM3 2) 250 km, 26L 3) Top 42 km	2) emission-driven	1) BCC-AGCM3-Chem 2) interactive 3) (Wu et al., 2020b)	1) MOM4 2) 80 km, 40L 3) z	1) SIS1	BCC_AVIM2 (Li et al., 2019)	Land Carbon	none
CAMS Chinese Academy of Meteorological Sciences **China**	**CAMS-CSM1-0**	(Rong et al., 2018)	1) ECHAM5_CAMS 2) 100 km, 31L 3) Top 31.2 km	2) prescribed MACv2-SP 3) (Stevens et al., 2017)	none	1) MOM4 2) 90 km, 50L 3) z	1) SIS1	CoLM	none	none
CAS Chinese Academy of Sciences **China**	**FGOALS-f3-L**	(He et al., 2020)	1) FAMIL2.2 2) 90 km, 32 L 3) Top 42.1 km (He et al., 2019)	2) prescribed 3) (He et al., 2019)	none	1) LICOM3.0, 2) 80 km, 30L 3) z 4) (Lin et al., 2020a)	1) CICE4.0	CLM4.0 / CAS-LSM (Xie et al., 2018)	none	none

CAS	**FGOALS-g3**	(Li et al., 2020)	1) GAMIL3 2) 190 km, 26 L 3) Top 42 km	2) prescribed 3) (Li et al., 2020)	none	1) LICOM3.0, 2) 80 km, 30L 3) z 4) (Lin et al., 2020a)	1) CICE4.0	CLM4.0 / CAS-LSM (Xie et al., 2018)	none	none
CCCMa Canadian Centre for Climate Modelling and Analysis **Canada**	**CanESM5** **CanESM5-CanOE**	(Swart et al., 2019)	1) CanAM5 2) 250 km, 49L 3) Top 48. km	2) emission-driven 3) (von Salzen et al., 2013)	2) specified oxidants, interactive sulfur 3) (von Salzen et al., 2013)	2) NEMO3.4.1 2) 70 km, 45 L 3) z	1) LIM2	1)Physics, CLASS3.6 Biogeochemistry, CTEM1.2 2) (Verseghy, 2000; Arora and Boer, 2010)	Land carbon	**CanESM5:** CMOC **CanESM5-CanOE:** CanOE
CCCR-IITM Centre for Climate Change Research, Indian Institute of Tropical Meteorology, **India**	**IITM-ESM**	(Swapna et al., 2018)	1) IITM-GFS 2) 170 km, 64L 3) Top 61 km	2) prescribed MAC-v2 3) (Stevens et al., 2017; Fiedler et al., 2019)	none	1) MOM4p1 2) 90 km, 50L 3) z	1) SISv1.0	NOAH LSMv2.7.1	none	TOPAZv2.0
CMCC Centro Euro-Mediterraneo sui Cambiamenti Climatici **Italy**	**CMCC-CM2-SR5** **CMCC-ESM2**	(Cherchi et al., 2019)	1) CAM5.3 2) 100 km, 30L 3) Top 43 km	1) MAM3 2) emission-driven 3) (Liu et al., 2012a)	2) Specified oxidants based on MOZART simulations	1) NEMO3.6 2) 70 km, 50L 3) z	1) CICE4.0	1) CLM4.5 2) (Oleson et al., 2013)	Land carbon N cycle Permafrost Fires	**CM2-SR5**: none **ESM2:** BFM5.2
CNRM Centre National de Recherches Météorologiques, **and CERFACS** Centre Européen de Recherche et de Formation Avancée en Calcul Scientifique **France**	**CNRM-CM6-1** **CNRM-CM6-1-HR**	(Voldoire et al., 2019; Saint-Martin et al., 2020)	1) Arpege 6.3; 2) **CM6-1 :** 140 km, 91L; **CM6-1-HR:** 50km, 91L 3) Top 78 km 4) (Roehrig et al., 2020)	1) TACTIC_v2 2 prescribed 3) (Michou et al., 2020)	1) OZL_V2 2) linear ozone	1) NEMO3.6 2) **CM6-1:** 70 km, 75L **CM6-1-HR:** 20 km, 75L 3) z	1) Gelato 6.1	1) ISBA-CTRIP 2) (Voldoire et al., 2017; Decharme et al., 2019)	none	none
CNRM and CERFACS	**CNRM-ESM2-1**	(Séférian et al., 2019)	1) Arpege 6.3; 2) 140 km, 91L; 3) Top 78 km	1) TACTIC_v2 2) emission-driven 3) (Michou et al., 2020)	1) REPROBUS-C-V2 2) Stratosphere only (above 560hPa)	1) NEMO3.6 2) 70 km, 75L 3) z	1) Gelato 6.1	1) ISBA-CTRIP 2) (Delire et al., 2020)	Land carbon Fires	Pisces 2.s (Aumont et al., 2015; Séférian et al., 2020)
CSIRO Commonwealth Scientific and Industrial Research	**ACCESS-ESM1-5**	(Ziehn et al., 2020)	1) HadGAM2 r1.1 2) 140 km, 38L 3) Top 39 km	1) CLASSIC (v1.0) 2) emission-driven 3) (Bellouin et	2) Specified oxidants for aerosols	1) ACCESS-OM2 GFDL-MOM5 2) 70 km, 50L 3) z	1) CICE4.1	1) CABLE2.4 2) (Ziehn et al., 2020)	Land carbon N cycle	Wombat1.0

Organisation **Australia**				al., 2011)		4) (Kiss et al., 2020)				
CSIRO-ARCCSS CSIRO and Austr. Res. Council Centre of Excellence for Climate System Science **Australia**	**ACCESS-CM2**	(Bi et al., 2020)	1) HadGEM3-GA7.1 2) 140 km, 85L 3) Top 85 km	1) UKCA-GLOMAP-mode 2) emission-driven 3) (Mulcahy et al., 2020)	2) Specified oxidants for aerosols	ACCESS-OM2 GFDL-MOM5 2) 70 km, 50L 3) z 4) (Kiss et al., 2020)	1) CICE5.1.2 (Ridley et al., 2018a)	1) CABLE2.5 2) (Bi et al., 2020)	none	none
E3SM National laboratories consortium **U.S.A**	**E3SM 1.0** **E3SM-1-1** **E3SM-1-1-ECA**	(Golaz et al., 2019)	1) E3M v1.0 2) 100 km, 72L; 3) Top 66 km 4) (Rasch et al.)	1) MAM4 2) emission-driven 3) (Wang et al., 2020)	2) Specified oxidants for aerosols ; linear interactive stratospheric ozone (LINOZ v2)	1) MPAS-Ocean v6.0 2) 40 km, 60L 3) z* 4) (Petersen et al., 2019)	1) MPAS-Seaice v6.0	1) ELM v1.0, based on CLM4.5 2) **E3SM-1.0:** (Golaz et al., 2019) **E3SM-1.1**: (Burrows et al., 2020)	**ES3M 1.0**: none **ES3M1.1**: Land carbon, N cycle, Fires	none
EC-Earth consortium **Europe**	**EC-Earth3** **EC-Earth3-LR** **Options:** **AerChem,** **Veg**	(Döscher et al., 2021)	**1)** IFS cy36r4 **2) EC-Earth3:** 80 km, 91L; **EC-Earth3-LR:** 120 km, 62L 3) **EC-Earth3:** Top 80 km **EC-Earth3-LR:** Top 36 km	**EC-Earth3** 2) Prescribed, MACv2-SP **AerChem:** 1)TM5 2) emission-driven 3)(van Noije et al., 2014, 2020)	**EC-Earth3** none **AerChem :** 1) TM5 2) interactive 3) (van Noije et al., 2014, 2020)	**NEMO3.6** 2) 70 km, 75L 3) z	1) LIM3 (Rousset et al., 2015)	**EC-Earth3** 1) H-TESSEL 2) (Balsamo et al., 2009) **Veg**: 1) H-TESSEL and LPJ-GUESS 2) (Smith et al., 2014)	**EC-Earth3** none **Veg:** N cycle Prog. Veg Fires	none
EC-Earth	**EC-Earth3-CC**	(Döscher et al., 2021)	**1)** IFS cy36r4 **2)** 80 km, 91L; 3) Top 80 km	2) prescribed, MACv2-SP	none	**NEMO3.6** 2) 70 km, 75L 3) z	1) LIM3 (Rousset et al., 2015)	1) H-TESSEL and LPJ-GUESS 2)) (Smith et al., 2014)	Land carbon N cycle Prog. Veg Fires	PISCES v2
FIO-QNLM First Institute of Oceanography , and Pilot National Laboratory for Marine Science and Technology (Qingdao), **China**	**FIO-ESM-2-0**	(Bao et al., 2020)	1) CAM5 2) 100km, 26L 3) Top 43 km	2) prescribed MACv2-SP (Stevens et al., 2017)	none	POP-W with MASNUM surface wave model 2) 60 km, 60L 3) z 4) (Qiao et al., 2013)	1) CICE4.0 (Hunke and Lipscomp, 2008)	1) CLM4.0 2) (Lawrence et al., 2011)	Land carbon N cycle	BEC

HAMMOZ-Consortium Switzerland, Germany, UK, Finland	**MPI-ESM-1-2-HAM**	(Neubauer et al., 2019)	1) ECHAM6.3 2) 170 km, 47L 3) Top 80 km	1) HAM2.3 2) emission-driven 3) (Tegen et al., 2019)	2) Specified oxidants, sulfur chemistry 3)(Feichter et al., 1996; Inness et al., 2013)	1) MPIOM 1.63 2) 100 km, 40L 3) z	**1)** (Notz et al., 2013a)	1) JSBACH3.20 2) (Reick et al., 2021)	Land carbon N Cycle Prog. Veg. Fires	HAMOCC6
INM Institute for Numerical Mathematics **Russia**	**INM-CM4-8** **INM-CM5-0**	INM-CM4-8: (Volodin Evgenii M et al., 2018) INM-CM5-0: (Volodin et al., 2017)	**CM4:** 1) INM-AM4-8 : 2) 150 km, 21L 3) Top 31 km **CM5**: 1) INM-AM5.0 2) 150 km, 73L 3) Top 61 km	1) INM-AER1 2) emission-driven 3) (Volodin and Kostrykin, 2016)	none	INM-OM5 2) **CM4**: 70 km, 40L **CM5**: 30 km, 40L 3) sigma 4) (Zalesny et al., 2010)	1) INM-ICE1 (Yakovlev, 2009)	INM-LND1	Land carbon	none
IPSL Institut Pierre-Simon Laplace **France**	**IPSL-CM6A-LR**	(Boucher et al., 2020)	1) LMDZ NPv6 2) 160 km, 79L 3) Top 80 km (Hourdin et al., 2020)	2) prescribed 3) (Lurton et al., 2020)	2) specified oxidants for aerosols	1) NEMO 3.6 2) 70 km, 75L 3) z	1) NEMO-LIM3 (Rousset et al., 2015)	ORCHIDEE (v2.0, Water/Carbon/Energy mode)	none	PISCES
IPSL	**IPSL-CM5A2-INCA**		1) LMDZ APv5 2) 240 km, 79L, 3) Top 80 km (Hourdin et al., 2020)	1) INCA 2) emission-driven	1) INCA 2) interactive 3) (Hauglustaine et al., 2014)	1) NEMO 3.6 2) 150 km, 30L 3) z	1) NEMO-LIM3 (Rousset et al., 2015)	ORCHIDEE (IPSLCM5A2.1, Water/Carbon/Energy mode)	Land carbon	PISCES
KIOST Korea Institute of Ocean Science & Technology **Korea**	**KIOST-ESM**	(Pak et al., 2021)	1) GFDL-AM2.0 2) 190 km, 32L 3) Top 43 km 4) (Anderson et al., 2004)	1) GFDL-AM2.0 2) emission-driven 3) (Anderson et al., 2004)	none	1) GFDL-MOM5.0 2) 90km, 52L 3) z	1) GFDL-SIS	GFDL-LM3.0 (Milly et al., 2014)	Land Carbon N cycle Prog.Veg.	TOPAZ2
MIROC consortium JAMSTEC, AORI, NIES, R-CCS **Japan**	**MIROC-ES2L** **MIROC-ES2H** **MIROC6**	**ES2L:** (Hajima et al., 2020) **ES2H :** (Kawamiya et al., 2020) **MIROC6**: (Tatebe et al., 2019)	**ES2L**: 1) CCSR AGCM 2) 250 km, 40L; 3) Top 40 km **ES2H, MIROC6:** 1) CCSR AGCM 2) 120 km, 81L; 3) Top 80 km	1) SPRINTARS 2) emission-driven 3) (Takemura et al., 2000, 2005, 2009)	**ES2L, MIROC6:** 2) prescribed oxidants **ES2H**: 1) CHASER 2) interactive 3) (Sudo et al., 2002b, 2002a; Morgenstern et al., 2017)	1) COCO4.9 2) 80 km, 63L 3) z	1) COCO4.9	**MIROC6:** MATSIRO6.0 (Takata et al., 2003; Nitta et al., 2014, 2017) **ES2L & ES2H** MATSIRO6.0 And visit-e ver 1.0 (Hajima et al., 2020)	**MIROC6:** none **ES2L & ES2H** Land carbon N cycle	OECO v2.0
MOHC Met Office Hadley Centre **U.K.**	**HADGEM3-GC31-LL** **HADGEM3-GC31-MM**	(Williams et al., 2018) (Kuhlbrodt et al., 2018) (Sellar et al., 2019)	1) MetUM-HadGEM3-GA7.1 2) **LL**: 140 km, 85L **MM**: 60 km, 85L 3) Top 85 km	1) UK-GLOMAP 2) emission-driven 3) (Mulcahy et al., 2020)	none	1) NEMO-HadGEM3-GO6.0 2) **LL** : 70 km, 75L **MM**:20 km, 75L	1) CICE HadGEM3-GSI8 (Ridley et al., 2018b)	JULES-HadGEM3-GL7.1	none	none

						3) z				
MOHC	**UK-ESM1.0-LL**	(Sellar et al., 2019)	1) MetUM-HadGEM3-GA7.1 2) 140 km, 85L 3) Top 85 km	1) UK-GLOMAP 2) emission-driven 3) (Mulcahy et al., 2020)	1) UKCA-StratTrop 3) (Archibald et al., 2020)	1) NEMO-HadGEM3-GO6.0 2) 70 km, 75L 3) z	1) CICE HadGEM3-GSI8 (Ridley et al., 2018b)	JULES-HadGEM3-GL7.1 (Sellar et al., 2019; Wiltshire et al., 2020)	Land carbon N cycle Prog. Veg	MEDUSA2
MPI-M Max Planck Institute for Meteorology **Germany**	**MPI-ESM1-2-LR** **MPI-ESM1-2-HR**	**MPI-ESM** (Mauritsen et al., 2019) **MPI-ESM1-2-HR** (Müller et al., 2018)	1) ECHAM6.3 2) **LR:** 170 km, 47L **HR:** 80 km 95L 3) Top 80 km	2) prescribed MACv2-SP	none	**1)** MPIOM 1.63 **2)** **LR:**100 km, 40L **HR:** 40 km, 40L 3) z	1) (Notz et al., 2013b)	1) JSBACH3.20 2) (Reick et al., 2021)	**LR:** Land Carbon N cycle Prog. Veg. Fires **HR:** none	HAMOCC6
MRI Meteorological Research Institute **Japan**	**MRI-ESM-2.0**	**MRI-ESM-2.0** (Yukimoto et al., 2019) (Mizuta et al., 2012)	**1)** MRI-AGCM3.5 2) 100 km, 80L 3) Top 80 km	1) MASINGAR mk-2r4c 2) emission-driven 3) (Yukimoto et al., 2019; Oshima et al., 2020)	1) MRI-CCM2.1 2) interactive 3) (Deushi and Shibata, 2011)	**1)** MRI.COM4.4 2) 60 km, 61L 3) z 4) (Tsujino et al., 2017a)	**1)** MRI.COM4.4 (Tsujino et al., 2017b)	1) HAL 1.0 and MRI-LCCM2 2) (Obata and Shibata, 2012; Yukimoto et al., 2012; Obata and Adachi, 2019)	Land carbon Prog. veg. Fires	MRI.COM4.4 (Nakano et al., 2015)
NASA-GISS Goddard Institute for Space Studies **U.S.A.**	**GISS-E2-1-G** **GISS-E2-1-H** **GISS-E2.1-G-CC** **GISS-E2-2-G**	(Kelley et al., 2020) **GISS-E2-2-G:** (Rind et al., 2020)	**GISS-E2-1 :** 1) GISS-E2.1 2) 200 km, 40L 3) Top 66 km **GISS-E2-2-G :** 1) GISS-E2-2 2) 200km, 102L 3) Top 88 km	Varies with physics-version p1 p3 OMA, p5 MATRIX 3) (Bauer et al., 2020)	Varies with physics-version p1 None, p3, p5 GPUCCINI, interactive 3) (Shindell et al., 2006)	**GISS-E2-1-G, GISS-E2-2-G :** 1) GISS ocean 2) 100 km, 40L 3) z **GISS-E2-1-H :** 1) HYCOM 2) 70 km, 32L 3) hybrid	1) GISS-SI	1) GISS-LSM	none	**GISS-E2-1-G-CC:** NOBM Others: none
NCAR National Center for Atmospheric Research **U.S.A.**	**CESM2** **CESM2-FV2** **CESM2-WACCM** **CESM2-WACCM-FV2**	(Danabasoglu et al., 2020)	1) CAM6 **2) CESM2:** 100 km **FV2 variants**: 190 km 3) **CESM2:** 32L, Top 42 km **WACCM variants:** 70L, Top 80 km.	1) MAM4 2) emission-driven 3) (Liu et al., 2016)	**CESM2:** 2) prescribed oxidants **WACM variants**: 2) interactive 3) (Emmons et al., 2020)	1) POP2 2) 60 km, 60L 3) z	1) CICE5.1, (Hunke et al., 2015) 2) CISM2.1, (Lipscomb et al., 2019)	1) CLM5 **2)** (Lawrence et al., 2019)	Land carbon N cycle Permafrost Fires	MARBL, Moore et. al, 2013
NCC NorESM Climate Modelling Consortium **Norway**	**NorCPM1** **NorESM1-F**	**NorESM1-F:** (Guo et al., 2019)	1) CAM4 2) 190 km, 26L 3) Top 43 km	**NorCPM1:** 1) OsloAero4.1 2) emission-driven 3) **NorESM1-F:** 2) prescribed	**NorCPM1 :** 1) OsloAero4.1 2) prescribed oxidants for aerosols **NorESM1-F:** none	1) MICOM1.1 2) 60 km, 53L 3) isopycnal	1) CICE4	1) CLM4	Land carbon N cycle Fires	HAMOCC5.1 (Tjiputra et al., 2013; Schwinger et al., 2016)

NCC	**NorESM2-LM** **NorESM2-MM**	**NorESM2:** (Seland et al., 2020)	1) CAM6-Nor 2) **NorESM2-LM:** 190 km, 32L **NorESM2-MM:** 100km, 32L 3) Top 40 km	1) OsloAero6 2) emission-driven 3) (Kirkevåg et al., 2018; Seland et al., 2020)	1) OsloAero6 2) prescribed oxidants, interactive sulfur chemistry, SOA precursor chemistry	1) BLOM1.0 2) 60 km, 70L 3) isopycnal;	**1)** CICE5.1	1) CLM5	Land carbon N cycle Permafrost Fires	iHAMOCC (Tjiputra et al., 2020)
NIMS-KMA National Institute of Meteorological Sciences, Korea Meteorological Administration**,** **Korea**	**KACE-1-0-G**	(Lee et al., 2019)	1) MetUM-HadGEM3-GA7.1 2) 140 km, 85L 3) Top 85 km	1) UKCA-GLOMAP-mode 2) emission-driven	2) specified oxidants for aerosols	**1)** MOM4p1 2) 90 km, 50L 3) z	1) CICE-HadGEM3-GSI8	JULES-HadGEM3-GL7.1	none	none
NOAA-GFDL National Oceanic and Atmospheric Administration, Geophysical Fluid Dynamics Laboratory **U.S.A.**	**GFDL-CM4**	(Held et al., 2019)	1) GFDL-AM4.0.1 2) 100 km, 33L 3) Top 48 km (Zhao et al., 2018a, 2018c)	1) GFDL-AM4.0.1; 2) emission-driven 3) (Zhao et al., 2018a, 2018c)	1) GFDL-AM4.0.1; 2) specified oxidants, fast chemistry, aerosol only	1) GFDL-OM4p25 (GFDL-MOM6); **2)** 20 km, 75L 3) hybrid; 4) (Adcroft et al., 2019a)	1) GFDL-SIM4p25 (GFDL-SIS2.0); (Adcroft et al., 2019b)	GFDL-LM4.0.1 (Zhao et al., 2018b, 2018d)	Land carbon Prog. Veg. Fires	GFDL-BLINGv2 (Dunne et al., 2020a)
NOAA-GFDL	**GFDL-ESM4**	(Dunne et al., 2020b)	1) GFDL-AM4.1; 2) 100 km, 49L 3) Top 80 km 4) (Horowitz et al., 2020)	1) GFDL-AM4.1 2) emission-driven 3) (Horowitz et al., 2020)	1) GFDL-ATMCHEM4.1; 2) interactive 3) (Horowitz et al., 2020)	GFDL-OM4p5 (GFDL-MOM6); 2) 40 km, 75L 3) hybrid 4) (Adcroft et al., 2019a)	1) GFDL-SIM4p5 (GFDL-SIS2.0); (Adcroft et al., 2019a)	GFDL-LM4.1	Land carbon Prog. Veg. Fires	GFDL-COBALTv2 (Stock et al., 2020)
NUIST Nanjing University of Information Science and Technology **China**	**NESM3**	(Cao et al., 2018)	1) ECHAM v6.3 2) 170 km, 47L 3) Top 48 km	2) prescribed	none	1) NEMO v3.4 2) 70 km, 46L 3) z	1) CICE 4.1	JSBACH v3.1	Land carbon Prog. Veg.	none
SNU Seoul National University **Korea**	**SAM0-UNICON**	(Park et al., 2019)	**1)** CAM5.3 with UNICON 2) 100 km 30L 3) Top 43 km	1) MAM3 2) emission-driven 3) (Liu et al., 2012b)	none	1) POP2 2) 60 km, 60L 3) z	1) CICE4.0	CLM 4.0	Land carbon N cycle Fires	none
THU Department of Earth System Science **China**	**CIESM**	(Lin et al., 2020b)	1) CIESM-AM 2) 100 km, 30L 3) Top 42 km	2) Prescribed MACv2-SP 3) (Stevens et al., 2017)	none	1) CIESM-OM 2) 60 km, 46L 3) z	1) CICE4	CIESM-LM (modified CLM4.0)	none	none

University of Arizona (U.S.A.)	**MCM-UA-1-0**	(Delworth et al., 2002)	1) Manabe R30L14 2) 260 km, 14L 3) Top 29 km	none	none	**1)** MOM1.0 2) 190 km, 18L 3) z	1) thermo-dynamic simplified sea ice	Manabe bucket scheme (Manabe, 1969)	none	none

[END TABLE AII.5 HERE]

[START TABLE AII.6 HERE]

Table AII.6: High resolution coupled models participating in HighResMIP. Full names of the institutions are found in table AII.5. The horizontal resolution (rounded to 10 km, when larger than 10 km) is the square root of the number of grid points divided by the surface area of the Earth, or the number of surface ocean grid points divided by the area of the ocean surface, for the atmosphere and ocean respectively. When reported in hPa, the atmosphere top heights are converted into km assuming standard atmosphere (ISO 2533:1975, 1975).

Institution	**Model**	**Reference**	**Atmosphere top**	**Atmosphere resolution** *Horizontal (km), Number of vertical levels*	**Ocean resolution** *Horizontal (km), Number of vertical levels*
AWI	AWI-CM-1-1-HR	(Sein et al., 2017, 2018)	80 km	80 km, N=95	20 km, N=46
BCC	BCC-CSM2-HR	(Wu et al., 2020a)	66 km	40 km, N=56	20 km, N=40
CAS	FGOALS-f3-H		42 km	20 km, N=32	8 km, N=55
CMCC	CMCC-CM2-HR4	(Scoccimarro et al., 2020; Bellucci et al., 2021)	43 km	100 km, N=26	20 km, N=50
	CMCC-CM2-VHR4		43 km	20 km, N=26	20 km, N=50
CNRM	CNRM-CM6-1-HR	(Saint-Martin et al., 2020)	78 km	50 km, N=91	20 km, N=75
EC-Earth	EC-Earth3P-HR	(Haarsma et al., 2020)	80 km	40 km, N=91	20 km, N=75
ECMWF	ECMWF-IFS-MR	(Roberts et al., 2018)	80 km	60 km, N=91	20 km, N=75
	ECMWF-IFS-HR		80 km	30 km, N=91	20 km, N=75
INM	INM-CM5-H		61 km	50 km, N=73	10 km, N=40
MOHC	HadGEM3-GC31-MH	(Roberts et al., 2019)	85 km	60 km, N=85	7 km, N=75
	HadGEM3-GC31-HM		85 km	30 km, N=85	20 km, N=75
	HadGEM3-GC31-HH		85 km	30 km, N=85	7 km, N=75
MPI	MPI-ESM1-2-HR	(Gutjahr et al., 2019)	80 km	80 km, N=95	40 km, N=40
	MPI-ESM1-2-XR		80 km	40 km, N=95	40 km, N=40
NCAR	CESM1-CAM5-SE-HR	(Small et al., 2014; Meehl et al., 2019; Chang et al., 2020)	42 km	30 km, N=30	8 km, N=62
NOAA-GFDL	GFDL-CM4C192	(Zhao, 2020)	48 km	50 km, N=33	20 km, N=75

[END TABLE AII.6 HERE]

AII.3 Models used in Ice sheet and glacier model intercomparison studies

Ice sheet and glacier models are used to assess the contribution of ice sheets and glaciers to future sea level rise as described in Section 9.6.3. New to AR6, the projections of the future sea level contribution from ice sheets and glaciers comes from the ensemble of model intercomparison studies (Box 9.3; Section 9.4.1.2; Section 9.4.2.2; Section 9.5.1.3). The tables here describe the models used for Greenland ISMIP6 (Table AII.7), Antarctica ISMIP6 and LARMIP-2 (Table AII.8) and GlacierMIP (Table AII.9).

More specific information on the model capabilities and parameter choices used for each ice sheet and glacier MIPs are presented in the following papers: ISMIP6 initMIP-Greenland (Goelzer et al., 2018), ISMIP6 projection-Greenland (Goelzer et al., 2020), ISMIP6 initMIP-Antarctica (Seroussi et al., 2019), ISMIP6 Antarctica projection (Seroussi et al., 2020), LARMIP-2 Antarctica projections (Levermann et al., 2020), and GlacierMIP (Hock et al., 2019; Marzeion et al., 2020).

[START TABLE AII.7 HERE]

Table AII.7: Models used in Greenland model intercomparison studies (initMIP and/or ISMIP6 projections)

Institution **Full name** **Country**	**Model**	**Reference**	**Resolution** (min-max) (km)	**MIP activity**
AWI Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung, and University of Bremen **Germany**	AWI-ISSM	(Larour et al., 2012) (Rückamp et al., 2020)	0.75-7.5	initMIP ISMIP6
BGC Bristol Glaciology Center **UK**	BGC-BISICLES	(Lee et al., 2015) (Cornford et al., 2013)	1.2-4.8	initMIP ISMIP6
DMI Danish Meteorological Institute **Denmark**	DMI-PISM	(Bueler and Brown, 2009) (Aschwanden et al., 2016)	5	initMIP
GSFC Goddard Space Flight Center NASA **U.S.A.**	GSFC-ISSM	(Larour et al., 2012)	0.5-25	ISMIP6
IGE Institut des Géosciences de L'Environnement **France**	IGE-ELMER	(Gillet-Chaulet et al., 2012)	1-4.5	initMIP
ILTSPIK Institute of Low Temperature Science **Japan** Potsdam Institute for Climate Impact Research **Germany**	ILTSPIK-SICOPOLIS	(Greve and Blatter, 2016) (Greve and SICOPOLIS Developer Team, 2019) (Greve et al., 2020)	5	initMIP ISMIP6
IMAU Institute for Marine and Atmospheric research **The Netherlands**	IMAUICE	(de Boer et al., 2014)	8-16	initMIP ISMIP6
JPL Jet Propulsion Laboratory **U.S.A**	JPL-ISSM	(Larour et al., 2012) (Seroussi et al., 2013)	0.25 – 15	initMIP ISMIP6
JPL Jet Propulsion Laboratory	JPL-ISSMPALEO	(Larour et al., 2012)	3 – 30	initMIP ISMIP6

U.S.A		(Cuzzone et al., 2018)		
LSCE Laboratoire des Sciences du Climat et de l'Environnement **France**	LSCE-GRISLI	(Quiquet et al., 2018)	5	initMIP ISMIP6
MIROC Japan Agency for Marine-Earth Science and Technology The University of Tokyo **Japan**	MIROC-IcIES	(Saito et al., 2016)	10	initMIP
MPIM Max Planck Institute for Meteorology **Germany**	MPIM-PISM	(Bueler and Brown, 2009) (Aschwanden et al., 2016)	5	initMIP
MUN Memorial University of Newfoundland **Canada**	MUN-GSM	(Tarasov and Peltier, 1999) (Tarasov and Peltier, 2003)	5-14	ISMIP6
NCAR National Center for Atmospheric Research **U.S.A**	NCAR-CISM	(Lipscomb et al., 2019)	4	initMIP ISMIP6
UAF University of Alaska Fairbanks **U.S.A**	UAF-PISM	(Bueler and Brown, 2009) (Aschwanden et al., 2016)	0.9	initMIP ISMIP6
UCIJPL University of California Irvine Jet Propulsion Laboratory **U.S.A**	UCIJPL-ISSM	(Larour et al., 2012) (Morlighem et al., 2010)	0.2-30	initMIP ISMIP6
ULB Université Libre de Bruxelles **Belgium**	ULB-FETISH	(Pattyn, 2017)	10	initMIP
VUB Vrije Universiteit Brussel **Belgium**	VUB-GISM	(Huybrechts, 2002) (Fürst et al., 2015)	5	initMIP ISMIP6
VUW Victoria University of Wellington **New Zealand**	VUW-PISM	(Bueler and Brown, 2009) (Golledge et al., 2019)	2	initMIP ISMIP6

[END TABLE AII.7 HERE]

[START TABLE AII.8 HERE]

Table AII.8: Models used in Antarctica model intercomparison studies (initMIP and/or ISMIP6 projections and/or LARMIP-2 projections)

Institution **Full name** **Country**	**Model**	**Reference**	**Resolution** (min-max) (km)	**MIP activity**
AWI Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung, and	AWI-PISM	(Bueler and Brown, 2009) (Winkelmann et al., 2011)	8-16	initMIP ISMIP6 LARMIP-2

University of Bremen **Germany**				
LBL Lawrence Berkeley National Laboratory, **U.S.A** Swansea University, **UK**	LBL-BISICLES	(Cornford et al., 2013) (Cornford et al., 2015)	0.5-8	initMIP ISMIP6 LARMIP-2
DOE Los Alamos National Laboratory **U.S.A**	DOE-MALI	(Hoffman et al., 2018)	2-20	initMIP ISMIP6 LARMIP-2
DMI Danish Meteorological Institute **Danmark**	DMI-PISM	(Bueler and Brown, 2009)	5-16	initMIP LARMIP-2
IGE Institut des Géosciences de L'Environnement **France**	IGE-ELMER	(Gillet-Chaulet et al., 2012)	1-4.5	initMIP
ILTSPIK Institute of Low Temperature Science **Japan** Potsdam Institute for Climate Impact Research **Germany**	ILTSPIK-SICOPOLIS	(Greve and Blatter, 2016) (Greve and SICOPOLIS Developer Team, 2019) (Greve et al., 2020)	8	initMIP ISMIP6 LARMIP-2
IMAU Institute for Marine and Atmospheric research **The Netherlands**	IMAUICE	(de Boer et al., 2014)	32	initMIP ISMIP6 LARMIP-2
JPL Jet Propulsion Laboratory **U.S.A**	JPL-ISSM	(Larour et al., 2012) (Seroussi et al., 2013)	2-50	initMIP ISMIP6 LARMIP-2
LSCE Laboratoire des Sciences du Climat et de l'Environnement **France**	LSCE-GRISLI	(Quiquet et al., 2018)	16	initMIP ISMIP6 LARMIP-2
NCAR National Center for Atmospheric Research **U.S.A**	NCAR-CISM	(Lipscomb et al., 2019)	4	initMIP ISMIP6 LARMIP-2
PIK Potsdam Institute for Climate Impact Research **Germany**	PIK-PISM	(Winkelmann et al., 2011)	4-8	initMIP ISMIP6 LARMIP-2
PSU Pennsylvania State University **U.S.A**	PSUICE3D	(Pollard and DeConto 2012) (Pollard et al., 2015)	16	initMIP LARMIP-2
UCIJPL University of California Irvine Jet Propulsion Laboratory **U.S.A**	UCIJPL-ISSM	(Larour et al., 2012) (Morlighem et al., 2010)	3-50	initMIP ISMIP6 LARMIP-2
ULB Université Libre de Bruxelles **Belgium**	ULB-FETISH	(Pattyn, 2017)	16-32	initMIP ISMIP6 LARMIP-2
UNN University of Northumbria **UK**	UNN-UA	(Gudmundsson et al., 2012)	1-40	LARMIP-2

UTAS University of Tasmania, **Australia** University of Lapland, **Finland** CSC-IT Center for Science, **Finland**	UTAS-ELMER	(Gillet-Chaulet et al., 2016)	4-40	ISMIP6
VUB Vrije Universiteit Brussel **Belgium**	VUB-AISPALEO	(Huybrechts, 2002)	20	initMIP ISMIP6 LARMIP-2
VUW Victoria University of Wellington **New Zealand**	VUW-PISM	(Bueler and Brown, 2009) (Golledge et al., 2019)	16	initMIP ISMIP6 LARMIP-2

[END TABLE AII.8 HERE]

[START TABLE AII.9 HERE]

Table AII.9: Models used in the GlacierMIP2 model intercomparison.

Institution Full name, Country	**Model name**	**Reference**	**Resolution** (km)	**Domain** (global/regional)
Nagoya University, **Japan**	GLIMB	(Sakai and Fujita, 2017)	0.5° grid and 50 m elevation bands for mass balance, each glacier for geometry change	Global
ETH Zurich, **Switzerland** University of Fribourg, **Switzerland** University of Alaska Fairbanks, **USA** Uppsala University, **Sweden**	GloGEM	(Huss and Hock, 2015)	Each glacier, 10m elevation bands	Global
University of British Columbia, **Canada** University of Alaska Fairbanks, **USA** Scott Polar Research Institute, **UK** Trent University, **Canada**	RAD2014	(Radić et al., 2014)	Each glacier, 20-25 m elevation bands	Global
Utrecht University, **Netherlands** ETH Zurich, **Switzerland**	WAL2001	(Van de Wal and Wild, 2001)	Each glacier	Global
University of Exeter, **UK** University of Bristol, **UK** University of Reading, **UK** Met Office, **UK** University of Fribourg, **Switzerland** ETH Zurich, **Switzerland** University of Crete, **Greece** University of Exeter, **UK**	JULES	(Shannon et al., 2019)	0.5° grid, 250 m elevation bands	Global except Antarctica
University of Innsbruck,	MAR2012	(Marzeion et al.,	Each glacier, considering	Global except

Austria		2012)	elevation range	Antarctica
University of Innsbruck, **Austria** University of Bremen, **Germany** University of Grenoble Alpes, **France** ETH Zurich, **Switzerland** WSL, **Switzerland** University of Natural Resources and Life Sciences, **Austria** University of Canterbury, **New Zealand**	OGGM	(Maussion et al., 2019)	Each glacier, 20 - 400 m spacing of grid points on flow line	Global except Antarctica
Utrecht University, **Netherlands** FutureWater, **Netherlands** ICIMOD, **Nepal**	KRA2017	(Kraaijenbrink et al., 2017)	Each glacier, variable elevation bands	High Mountain Asia
University of Alaska Fairbanks, **USA** University of Washington, **USA**	PyGEM	(Rounce et al., 2020)	Each glacier, 20 m elevation bands	High Mountain Asia
Victoria University of Wellington, **New Zealand**	AND2012	(Anderson and Mackintosh, 2012)	100 m	New Zealand
ETH Zurich, **Switzerland** WSL, **Switzerland** University of Fribourg, **Switzerland**	GloGEMflow	(Zekollari et al., 2019)	Each glacier, 10 - 202 m spacing of grid points on flow line	Central Europe

[END TABLE AII.9 HERE]

AII.4 CMIP model datasets used in the report

[START TABLE AII.10 HERE]

Table AII.10: List of CMIP6 model datasets used in this report

Institute: Model	Activity ID	Data citation and DOI Link
AER:LBLRTM-12-8	RFMIP	Mlawer et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.2003
AER:RRTMG-LW-4-91	RFMIP	Mlawer et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.9961
AER:RRTMG-SW-4-02	RFMIP	Mlawer et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.9963
AS-RCEC:HiRAM-SIT-HR	HighResMIP	Tu (2020), https://doi.org/10.22033/ESGF/CMIP6.13301
AS-RCEC:HiRAM-SIT-LR	HighResMIP	Tu (2020), https://doi.org/10.22033/ESGF/CMIP6.13303
AS-RCEC:TaiESM1	AerChemMIP	Tsai et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.9682
AS-RCEC:TaiESM1	CFMIP	Shiu et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.9683
AS-RCEC:TaiESM1	CMIP	Lee et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.9684
AS-RCEC:TaiESM1	GMMIP	Wang et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.9685
AS-RCEC:TaiESM1	PAMIP	Hong et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.15214

AS-RCEC:TaiESM1	ScenarioMIP	Lee et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.9688
AWI:AWI-CM-1-1-HR	HighResMIP	Semmler et al. (2017), https://doi.org/10.22033/ESGF/CMIP6.1202
AWI:AWI-CM-1-1-LR	HighResMIP	Semmler et al. (2017), https://doi.org/10.22033/ESGF/CMIP6.1209
AWI:AWI-CM-1-1-MR	CMIP	Semmler et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.359
AWI:AWI-CM-1-1-MR	PAMIP	Semmler et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.12021
AWI:AWI-CM-1-1-MR	ScenarioMIP	Semmler et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.376
AWI:AWI-ESM-1-1-LR	CMIP	Danek et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.9301
AWI:AWI-ESM-1-1-LR	PMIP	Shi et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.9302
BCC:BCC-CSM2-HR	HighResMIP	Jie et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.1722
BCC:BCC-CSM2-MR	C4MIP	Zhang et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1723
BCC:BCC-CSM2-MR	CFMIP	Zhang et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1724
BCC:BCC-CSM2-MR	CMIP	Xin et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.1725
BCC:BCC-CSM2-MR	DAMIP	Xin et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1726
BCC:BCC-CSM2-MR	DCPP	Fang et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1727
BCC:BCC-CSM2-MR	GMMIP	Zhang et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1728
BCC:BCC-CSM2-MR	LS3MIP	Li et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1729
BCC:BCC-CSM2-MR	LUMIP	Zhang et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1730
BCC:BCC-CSM2-MR	ScenarioMIP	Xin et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1732
BCC:BCC-ESM1	AerChemMIP	Zhang et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1733
BCC:BCC-ESM1	CMIP	Zhang et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.1734
CAMS:CAMS-CSM1-0	CMIP	Rong (2019), https://doi.org/10.22033/ESGF/CMIP6.1399
CAMS:CAMS-CSM1-0	GMMIP	Chinese Academy of Meteorological Sciences (CAMS) (2019), https://doi.org/10.22033/ESGF/CMIP6.11002
CAMS:CAMS-CSM1-0	HighResMIP	Rong (2020), https://doi.org/10.22033/ESGF/CMIP6.11003
CAMS:CAMS-CSM1-0	ScenarioMIP	Rong (2019), https://doi.org/10.22033/ESGF/CMIP6.11004
CAS:CAS-ESM2-0	CMIP	Chai (2020), https://doi.org/10.22033/ESGF/CMIP6.1944
CAS:CAS-ESM2-0	FAFMIP	Chai (2020), https://doi.org/10.22033/ESGF/CMIP6.1948
CAS:CAS-ESM2-0	OMIP	Chai (2020), https://doi.org/10.22033/ESGF/CMIP6.1954
CAS:FGOALS-f3-H	HighResMIP	Bao et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.2041
CAS:FGOALS-f3-H	OMIP	Lin (2020), https://doi.org/10.22033/ESGF/CMIP6.13261
CAS:FGOALS-f3-L	CMIP	YU (2018), https://doi.org/10.22033/ESGF/CMIP6.1782
CAS:FGOALS-f3-L	GMMIP	He et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.2043
CAS:FGOALS-f3-L	HighResMIP	Bao et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.12001
CAS:FGOALS-f3-L	OMIP	Lin (2019), https://doi.org/10.22033/ESGF/CMIP6.2044
CAS:FGOALS-f3-L	PAMIP	He et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.11497
CAS:FGOALS-f3-L	PMIP	Zheng et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.12002
CAS:FGOALS-f3-L	ScenarioMIP	YU (2019), https://doi.org/10.22033/ESGF/CMIP6.2046
CAS:FGOALS-g3	CMIP	Li (2019), https://doi.org/10.22033/ESGF/CMIP6.1783
CAS:FGOALS-g3	DAMIP	Li (2020), https://doi.org/10.22033/ESGF/CMIP6.2048
CAS:FGOALS-g3	FAFMIP	Lin (2020), https://doi.org/10.22033/ESGF/CMIP6.2050

CAS:FGOALS-g3	GMMIP	Li (2020), https://doi.org/10.22033/ESGF/CMIP6.2051
CAS:FGOALS-g3	LS3MIP	Jia et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.2052
CAS:FGOALS-g3	PMIP	Zheng et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.2054
CAS:FGOALS-g3	ScenarioMIP	Li (2019), https://doi.org/10.22033/ESGF/CMIP6.2056
CCCR-IITM:IITM-ESM	CMIP	AG et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.44
CCCR-IITM:IITM-ESM	GMMIP	AG et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.825
CCCR-IITM:IITM-ESM	ScenarioMIP	Panickal et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.14741
CCCma:CanESM5	C4MIP	Swart et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1301
CCCma:CanESM5	CDRMIP	Swart et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.10201
CCCma:CanESM5	CFMIP	Cole et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1302
CCCma:CanESM5	CMIP	Swart et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1303
CCCma:CanESM5	DAMIP	Swart et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1305
CCCma:CanESM5	DCPP	Sospedra-Alfonso et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1306
CCCma:CanESM5	FAFMIP	Swart et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1308
CCCma:CanESM5	GMMIP	Swart et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1309
CCCma:CanESM5	GeoMIP	Cole et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1310
CCCma:CanESM5	LUMIP	Swart et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1313
CCCma:CanESM5	OMIP	Swart et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1314
CCCma:CanESM5	PAMIP	Sigmond et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.13942
CCCma:CanESM5	RFMIP	Cole et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1315
CCCma:CanESM5	ScenarioMIP	Swart et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1317
CCCma:CanESM5	VolMIP	Cole et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.10202
CCCma:CanESM5-CanOE	C4MIP	Swart et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.10203
CCCma:CanESM5-CanOE	CDRMIP	Swart et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.10204
CCCma:CanESM5-CanOE	CMIP	Swart et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.10205
CCCma:CanESM5-CanOE	OMIP	Swart et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.10206
CCCma:CanESM5-CanOE	ScenarioMIP	Swart et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.10207
CMCC:CMCC-CM2-HR4	CMIP	Scoccimarro et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.1358
CMCC:CMCC-CM2-HR4	HighResMIP	Scoccimarro et al. (2017), https://doi.org/10.22033/ESGF/CMIP6.1359
CMCC:CMCC-CM2-HR4	OMIP	Fogli et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.13161
CMCC:CMCC-CM2-SR5	CMIP	Lovato et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.1362
CMCC:CMCC-CM2-SR5	DCPP	Nicolý et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.1363
CMCC:CMCC-CM2-SR5	OMIP	Fogli et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.13162
CMCC:CMCC-CM2-SR5	ScenarioMIP	Lovato et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.1365
CMCC:CMCC-CM2-VHR4	HighResMIP	Scoccimarro et al. (2017), https://doi.org/10.22033/ESGF/CMIP6.1367

CMCC:CMCC-ESM2	C4MIP	Lovato et al. (2021), https://doi.org/10.22033/ESGF/CMIP6.13163
CMCC:CMCC-ESM2	CMIP	Lovato et al. (2021), https://doi.org/10.22033/ESGF/CMIP6.13164
CMCC:CMCC-ESM2	LS3MIP	Peano et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.13165
CMCC:CMCC-ESM2	LUMIP	Peano et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.13166
CMCC:CMCC-ESM2	OMIP	Lovato et al. (2021), https://doi.org/10.22033/ESGF/CMIP6.13167
CMCC:CMCC-ESM2	ScenarioMIP	Lovato et al. (2021), https://doi.org/10.22033/ESGF/CMIP6.13168
CMCC:CMCC-ESM2-SR5	LS3MIP	Peano et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1372
CMCC:CMCC-ESM2-SR5	LUMIP	Peano et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1373
CNRM-CERFACS:CNRM-CM6-1	CFMIP	Voldoire (2019), https://doi.org/10.22033/ESGF/CMIP6.1374
CNRM-CERFACS:CNRM-CM6-1	CMIP	Voldoire (2018), https://doi.org/10.22033/ESGF/CMIP6.1375
CNRM-CERFACS:CNRM-CM6-1	DAMIP	Voldoire (2019), https://doi.org/10.22033/ESGF/CMIP6.1376
CNRM-CERFACS:CNRM-CM6-1	DCPP	Voldoire (2019), https://doi.org/10.22033/ESGF/CMIP6.1377
CNRM-CERFACS:CNRM-CM6-1	GMMIP	Voldoire (2019), https://doi.org/10.22033/ESGF/CMIP6.1379
CNRM-CERFACS:CNRM-CM6-1	HighResMIP	Voldoire (2019), https://doi.org/10.22033/ESGF/CMIP6.1925
CNRM-CERFACS:CNRM-CM6-1	LS3MIP	Voldoire (2019), https://doi.org/10.22033/ESGF/CMIP6.1381
CNRM-CERFACS:CNRM-CM6-1	OMIP	Voldoire (2019), https://doi.org/10.22033/ESGF/CMIP6.10336
CNRM-CERFACS:CNRM-CM6-1	PAMIP	Voldoire (2021), https://doi.org/10.22033/ESGF/CMIP6.9561
CNRM-CERFACS:CNRM-CM6-1	PMIP	Voldoire (2020), https://doi.org/10.22033/ESGF/CMIP6.1382
CNRM-CERFACS:CNRM-CM6-1	RFMIP	Voldoire (2019), https://doi.org/10.22033/ESGF/CMIP6.1383
CNRM-CERFACS:CNRM-CM6-1	ScenarioMIP	Voldoire (2019), https://doi.org/10.22033/ESGF/CMIP6.1384
CNRM-CERFACS:CNRM-CM6-1-HR	CMIP	Voldoire (2019), https://doi.org/10.22033/ESGF/CMIP6.1385
CNRM-CERFACS:CNRM-CM6-1-HR	GMMIP	Voldoire (2019), https://doi.org/10.22033/ESGF/CMIP6.13921
CNRM-CERFACS:CNRM-CM6-1-HR	HighResMIP	Voldoire (2019), https://doi.org/10.22033/ESGF/CMIP6.1387

CNRM-CERFACS:CNRM-CM6-1-HR	OMIP	Voldoire (2021), https://doi.org/10.22033/ESGF/CMIP6.10337
CNRM-CERFACS:CNRM-CM6-1-HR	ScenarioMIP	Voldoire (2019), https://doi.org/10.22033/ESGF/CMIP6.1388
CNRM-CERFACS:CNRM-ESM2-1	AerChemMIP	Seferian (2019), https://doi.org/10.22033/ESGF/CMIP6.1389
CNRM-CERFACS:CNRM-ESM2-1	C4MIP	Seferian (2018), https://doi.org/10.22033/ESGF/CMIP6.1390
CNRM-CERFACS:CNRM-ESM2-1	CDRMIP	Seferian (2021), https://doi.org/10.22033/ESGF/CMIP6.9562
CNRM-CERFACS:CNRM-ESM2-1	CMIP	Seferian (2018), https://doi.org/10.22033/ESGF/CMIP6.1391
CNRM-CERFACS:CNRM-ESM2-1	GMMIP	Seferian (2019), https://doi.org/10.22033/ESGF/CMIP6.13922
CNRM-CERFACS:CNRM-ESM2-1	GeoMIP	Seferian (2019), https://doi.org/10.22033/ESGF/CMIP6.1392
CNRM-CERFACS:CNRM-ESM2-1	LS3MIP	Seferian (2019), https://doi.org/10.22033/ESGF/CMIP6.9564
CNRM-CERFACS:CNRM-ESM2-1	LUMIP	Seferian (2019), https://doi.org/10.22033/ESGF/CMIP6.1393
CNRM-CERFACS:CNRM-ESM2-1	OMIP	Seferian (2019), https://doi.org/10.22033/ESGF/CMIP6.1394
CNRM-CERFACS:CNRM-ESM2-1	RFMIP	Seferian (2019), https://doi.org/10.22033/ESGF/CMIP6.9565
CNRM-CERFACS:CNRM-ESM2-1	ScenarioMIP	Seferian (2019), https://doi.org/10.22033/ESGF/CMIP6.1395
CSIRO-ARCCSS:ACCESS-CM2	CMIP	Dix et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.2281
CSIRO-ARCCSS:ACCESS-CM2	FAFMIP	Savita et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.2282
CSIRO-ARCCSS:ACCESS-CM2	RFMIP	Dix et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.2284
CSIRO-ARCCSS:ACCESS-CM2	ScenarioMIP	Dix et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.2285
CSIRO:ACCESS-ESM1-5	C4MIP	Ziehn et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.2286
CSIRO:ACCESS-ESM1-5	CDRMIP	Ziehn et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.2287
CSIRO:ACCESS-ESM1-5	CMIP	Ziehn et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.2288
CSIRO:ACCESS-ESM1-5	DAMIP	Ziehn et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.14362

CSIRO:ACCESS-ESM1-5	PMIP	Yeung et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.13701
CSIRO:ACCESS-ESM1-5	RFMIP	Ziehn et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.2290
CSIRO:ACCESS-ESM1-5	ScenarioMIP	Ziehn et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.2291
DKRZ:MPI-ESM1-2-HR	ScenarioMIP	Schupfner et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.2450
DWD:MPI-ESM1-2-HR	ScenarioMIP	Steger et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1869
E3SM-Project:E3SM-1-0	CMIP	Bader et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.2294
E3SM-Project:E3SM-1-1	C4MIP	Bader et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.11441
E3SM-Project:E3SM-1-1	CMIP	Bader et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.11442
E3SM-Project:E3SM-1-1	ScenarioMIP	Bader et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.15103
E3SM-Project:E3SM-1-1-ECA	C4MIP	Bader et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.11443
E3SM-Project:E3SM-1-1-ECA	CMIP	Bader et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.11444
EC-Earth-Consortium:EC-Earth3	CMIP	EC-Earth Consortium (EC-Earth) (2019), https://doi.org/10.22033/ESGF/CMIP6.181
EC-Earth-Consortium:EC-Earth3	DAMIP	EC-Earth Consortium (EC-Earth) (2020), https://doi.org/10.22033/ESGF/CMIP6.14701
EC-Earth-Consortium:EC-Earth3	DCPP	EC-Earth Consortium (EC-Earth) (2019), https://doi.org/10.22033/ESGF/CMIP6.227
EC-Earth-Consortium:EC-Earth3	LS3MIP	EC-Earth Consortium (EC-Earth) (2020), https://doi.org/10.22033/ESGF/CMIP6.218
EC-Earth-Consortium:EC-Earth3	OMIP	EC-Earth Consortium (EC-Earth) (2020), https://doi.org/10.22033/ESGF/CMIP6.14702
EC-Earth-Consortium:EC-Earth3	RFMIP	EC-Earth Consortium (EC-Earth) (2020), https://doi.org/10.22033/ESGF/CMIP6.242
EC-Earth-Consortium:EC-Earth3	ScenarioMIP	EC-Earth Consortium (EC-Earth) (2019), https://doi.org/10.22033/ESGF/CMIP6.251
EC-Earth-Consortium:EC-Earth3-AerChem	AerChemMIP	EC-Earth Consortium (EC-Earth) (2020), https://doi.org/10.22033/ESGF/CMIP6.699
EC-Earth-Consortium:EC-Earth3-AerChem	CMIP	EC-Earth Consortium (EC-Earth) (2020), https://doi.org/10.22033/ESGF/CMIP6.639
EC-Earth-Consortium:EC-Earth3-AerChem	RFMIP	EC-Earth Consortium (EC-Earth) (2020), https://doi.org/10.22033/ESGF/CMIP6.15326
EC-Earth-Consortium:EC-Earth3-AerChem	ScenarioMIP	EC-Earth Consortium (EC-Earth) (2020), https://doi.org/10.22033/ESGF/CMIP6.724
EC-Earth-Consortium:EC-Earth3-CC	C4MIP	EC-Earth Consortium (EC-Earth) (2020), https://doi.org/10.22033/ESGF/CMIP6.650
EC-Earth-Consortium:EC-Earth3-CC	CMIP	EC-Earth Consortium (EC-Earth) (2020), https://doi.org/10.22033/ESGF/CMIP6.640
EC-Earth-Consortium:EC-Earth3-CC	ScenarioMIP	EC-Earth Consortium (EC-Earth) (2021), https://doi.org/10.22033/ESGF/CMIP6.15327
EC-Earth-Consortium:EC-	CMIP	EC-Earth Consortium (EC-Earth) (2019), https://doi.org/10.22033/ESGF/CMIP6.202

Earth3-LR		
EC-Earth-Consortium:EC-Earth3-LR	PMIP	EC-Earth Consortium (EC-Earth) (2020), https://doi.org/10.22033/ESGF/CMIP6.247
EC-Earth-Consortium:EC-Earth3-Veg	CMIP	EC-Earth Consortium (EC-Earth) (2019), https://doi.org/10.22033/ESGF/CMIP6.642
EC-Earth-Consortium:EC-Earth3-Veg	LS3MIP	EC-Earth Consortium (EC-Earth) (2020), https://doi.org/10.22033/ESGF/CMIP6.672
EC-Earth-Consortium:EC-Earth3-Veg	LUMIP	EC-Earth Consortium (EC-Earth) (2020), https://doi.org/10.22033/ESGF/CMIP6.692
EC-Earth-Consortium:EC-Earth3-Veg	ScenarioMIP	EC-Earth Consortium (EC-Earth) (2019), https://doi.org/10.22033/ESGF/CMIP6.727
EC-Earth-Consortium:EC-Earth3-Veg-LR	CMIP	EC-Earth Consortium (EC-Earth) (2020), https://doi.org/10.22033/ESGF/CMIP6.643
EC-Earth-Consortium:EC-Earth3-Veg-LR	PMIP	EC-Earth Consortium (EC-Earth) (2020), https://doi.org/10.22033/ESGF/CMIP6.718
EC-Earth-Consortium:EC-Earth3-Veg-LR	ScenarioMIP	EC-Earth Consortium (EC-Earth) (2020), https://doi.org/10.22033/ESGF/CMIP6.728
EC-Earth-Consortium:EC-Earth3P	HighResMIP	EC-Earth Consortium (EC-Earth) (2019), https://doi.org/10.22033/ESGF/CMIP6.2322
EC-Earth-Consortium:EC-Earth3P-HR	HighResMIP	EC-Earth Consortium (EC-Earth) (2018), https://doi.org/10.22033/ESGF/CMIP6.2323
EC-Earth-Consortium:EC-Earth3P-VHR	CMIP	EC-Earth Consortium (EC-Earth) (2020), https://doi.org/10.22033/ESGF/CMIP6.2326
ECMWF:ECMWF-IFS-HR	HighResMIP	Roberts et al. (2017), https://doi.org/10.22033/ESGF/CMIP6.2461
ECMWF:ECMWF-IFS-LR	HighResMIP	Roberts et al. (2017), https://doi.org/10.22033/ESGF/CMIP6.2463
ECMWF:ECMWF-IFS-MR	HighResMIP	Roberts et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.2465
FIO-QLNM:FIO-ESM-2-0	CMIP	Song et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.9047
FIO-QLNM:FIO-ESM-2-0	GMMIP	Song et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.9049
FIO-QLNM:FIO-ESM-2-0	ScenarioMIP	Song et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.9051
HAMMOZ-Consortium:MPI-ESM-1-2-HAM	AerChemMIP	Neubauer et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1621
HAMMOZ-Consortium:MPI-ESM-1-2-HAM	CMIP	Neubauer et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1622
HAMMOZ-Consortium:MPI-ESM-1-2-HAM	RFMIP	Neubauer et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.14724
INM:INM-CM4-8	CMIP	Volodin et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1422
INM:INM-CM4-8	PMIP	Volodin et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.2295

INM:INM-CM4-8	ScenarioMIP	Volodin et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.12321
INM:INM-CM5-0	CMIP	Volodin et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1423
INM:INM-CM5-0	ScenarioMIP	Volodin et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.12322
INM:INM-CM5-H	HighResMIP	Volodin et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.14041
IPSL:4AOP-v1-5	RFMIP	Boucher et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.12340
IPSL:IPSL-CM5A2-INCA	CMIP	Boucher et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.13642
IPSL:IPSL-CM5A2-INCA	LUMIP	Boucher et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.15666
IPSL:IPSL-CM5A2-INCA	ScenarioMIP	Boucher et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.15667
IPSL:IPSL-CM6A-ATM-HR	HighResMIP	Boucher et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.2361
IPSL:IPSL-CM6A-LR	C4MIP	Boucher et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.1521
IPSL:IPSL-CM6A-LR	CFMIP	Boucher et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.1522
IPSL:IPSL-CM6A-LR	CMIP	Boucher et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.1534
IPSL:IPSL-CM6A-LR	DAMIP	Boucher et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.13801
IPSL:IPSL-CM6A-LR	DCPP	Boucher et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1523
IPSL:IPSL-CM6A-LR	GMMIP	Boucher et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.1525
IPSL:IPSL-CM6A-LR	GeoMIP	Boucher et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.1526
IPSL:IPSL-CM6A-LR	HighResMIP	Boucher et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.13803
IPSL:IPSL-CM6A-LR	LS3MIP	Boucher et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1527
IPSL:IPSL-CM6A-LR	LUMIP	Boucher et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1528
IPSL:IPSL-CM6A-LR	OMIP	Boucher et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1529
IPSL:IPSL-CM6A-LR	PAMIP	Boucher et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.13802
IPSL:IPSL-CM6A-LR	PMIP	Boucher et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.1530
IPSL:IPSL-CM6A-LR	RFMIP	Boucher et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.1531
IPSL:IPSL-CM6A-LR	ScenarioMIP	Boucher et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1532
IPSL:IPSL-CM6A-LR-INCA	AerChemMIP	Boucher et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.13581
IPSL:IPSL-CM6A-LR-INCA	CMIP	Boucher et al. (2021), https://doi.org/10.22033/ESGF/CMIP6.13582
IPSL:IPSL-CM6A-LR-INCA	RFMIP	Boucher et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.14583
KIOST:KIOST-ESM	CMIP	Kim et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1922
KIOST:KIOST-ESM	ScenarioMIP	Kim et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.11241
LLNL:E3SM-1-0	CFMIP	Qin et al. (2021), https://doi.org/10.22033/ESGF/CMIP6.15093
MIROC:MIROC-	CMIP	Watanabe et al. (2021),

ES2H		https://doi.org/10.22033/ESGF/CMIP6.901
MIROC:MIROC-ES2H	GeoMIP	Watanabe et al. (2021), https://doi.org/10.22033/ESGF/CMIP6.907
MIROC:MIROC-ES2H-NB	AerChemMIP	Sudo et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.13305
MIROC:MIROC-ES2L	C4MIP	Hajima et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.906
MIROC:MIROC-ES2L	CDRMIP	Hajima et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.2161
MIROC:MIROC-ES2L	CMIP	Hajima et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.902
MIROC:MIROC-ES2L	DAMIP	Ohgaito et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.15241
MIROC:MIROC-ES2L	LUMIP	Hajima et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.922
MIROC:MIROC-ES2L	OMIP	Watanabe et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.934
MIROC:MIROC-ES2L	PMIP	Ohgaito et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.932
MIROC:MIROC-ES2L	ScenarioMIP	Tachiiri et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.936
MIROC:MIROC-ES2L	VolMIP	Abe et al. (2021), https://doi.org/10.22033/ESGF/CMIP6.918
MIROC:MIROC6	AerChemMIP	Takemura (2019), https://doi.org/10.22033/ESGF/CMIP6.9121
MIROC:MIROC6	CFMIP	Ogura et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.885
MIROC:MIROC6	CMIP	Tatebe et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.881
MIROC:MIROC6	DAMIP	Shiogama (2019), https://doi.org/10.22033/ESGF/CMIP6.894
MIROC:MIROC6	DCPP	Mochizuki et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.890
MIROC:MIROC6	FAFMIP	Suzuki (2019), https://doi.org/10.22033/ESGF/CMIP6.892
MIROC:MIROC6	GMMIP	Watanabe et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.886
MIROC:MIROC6	LS3MIP	Onuma et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.887
MIROC:MIROC6	OMIP	Komuro (2019), https://doi.org/10.22033/ESGF/CMIP6.897
MIROC:MIROC6	PAMIP	Mori (2019), https://doi.org/10.22033/ESGF/CMIP6.2162
MIROC:MIROC6	RFMIP	Sekiguchi et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.895
MIROC:MIROC6	ScenarioMIP	Shiogama et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.898
MIROC:NICAM16-7S	HighResMIP	Kodama et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1033
MIROC:NICAM16-8S	HighResMIP	Kodama et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1034
MIROC:NICAM16-9S	HighResMIP	Kodama et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1036
MOHC:HadGEM3-GC31-HH	HighResMIP	Roberts (2018), https://doi.org/10.22033/ESGF/CMIP6.445
MOHC:HadGEM3-GC31-HM	HighResMIP	Roberts (2017), https://doi.org/10.22033/ESGF/CMIP6.446
MOHC:HadGEM3-GC31-LL	CFMIP	Webb (2019), https://doi.org/10.22033/ESGF/CMIP6.435
MOHC:HadGEM3-GC31-LL	CMIP	Ridley et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.419
MOHC:HadGEM3-GC31-LL	DAMIP	Jones (2019), https://doi.org/10.22033/ESGF/CMIP6.471
MOHC:HadGEM3-GC31-LL	HighResMIP	Roberts (2017), https://doi.org/10.22033/ESGF/CMIP6.1901
MOHC:HadGEM3-GC31-LL	LS3MIP	Wiltshire et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.14460
MOHC:HadGEM3-GC31-LL	LUMIP	Wiltshire et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.14461

MOHC:HadGEM3-GC31-LL	RFMIP	Andrews (2019), https://doi.org/10.22033/ESGF/CMIP6.475
MOHC:HadGEM3-GC31-LL	ScenarioMIP	Good (2019), https://doi.org/10.22033/ESGF/CMIP6.10845
MOHC:HadGEM3-GC31-LM	HighResMIP	Roberts (2017), https://doi.org/10.22033/ESGF/CMIP6.1321
MOHC:HadGEM3-GC31-MH	HighResMIP	Roberts (2017), https://doi.org/10.22033/ESGF/CMIP6.1762
MOHC:HadGEM3-GC31-MM	CMIP	Ridley et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.420
MOHC:HadGEM3-GC31-MM	DCPP	Hermanson (2020), https://doi.org/10.22033/ESGF/CMIP6.456
MOHC:HadGEM3-GC31-MM	HighResMIP	Roberts (2017), https://doi.org/10.22033/ESGF/CMIP6.1902
MOHC:HadGEM3-GC31-MM	PAMIP	Eade (2020), https://doi.org/10.22033/ESGF/CMIP6.14627
MOHC:HadGEM3-GC31-MM	ScenarioMIP	Jackson (2020), https://doi.org/10.22033/ESGF/CMIP6.10846
MOHC:UKESM1-0-LL	AerChemMIP	O'Connor (2019), https://doi.org/10.22033/ESGF/CMIP6.1561
MOHC:UKESM1-0-LL	C4MIP	Liddicoat et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1562
MOHC:UKESM1-0-LL	CDRMIP	Jones et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.12181
MOHC:UKESM1-0-LL	CMIP	Tang et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1569
MOHC:UKESM1-0-LL	DAMIP	Rumbold et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.14830
MOHC:UKESM1-0-LL	GeoMIP	Jones (2019), https://doi.org/10.22033/ESGF/CMIP6.1563
MOHC:UKESM1-0-LL	LS3MIP	Wiltshire et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.14462
MOHC:UKESM1-0-LL	LUMIP	Wiltshire et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1564
MOHC:UKESM1-0-LL	RFMIP	O'Connor et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.11061
MOHC:UKESM1-0-LL	ScenarioMIP	Good et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1567
MPI-M:MPI-ESM1-2-HR	CMIP	Jungclaus et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.741
MPI-M:MPI-ESM1-2-HR	DCPP	Pohlmann et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.768
MPI-M:MPI-ESM1-2-HR	FAFMIP	Haak et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.774
MPI-M:MPI-ESM1-2-HR	GeoMIP	Niemeier et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.15294
MPI-M:MPI-ESM1-2-HR	HighResMIP	von Storch et al. (2017), https://doi.org/10.22033/ESGF/CMIP6.762
MPI-M:MPI-ESM1-2-LR	C4MIP	Brovkin et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.748
MPI-M:MPI-ESM1-2-LR	CMIP	Wieners et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.742
MPI-M:MPI-ESM1-2-LR	DAMIP	M³ller et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.15016
MPI-M:MPI-ESM1-2-LR	GeoMIP	Niemeier et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.751
MPI-M:MPI-ESM1-2-LR	LS3MIP	Stracke et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.760
MPI-M:MPI-ESM1-2-	LUMIP	Pongratz et al. (2019),

LR		https://doi.org/10.22033/ESGF/CMIP6.772
MPI-M:MPI-ESM1-2-LR	PMIP	Jungclaus et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.787
MPI-M:MPI-ESM1-2-LR	RFMIP	Fiedler et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.784
MPI-M:MPI-ESM1-2-LR	ScenarioMIP	Wieners et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.793
MPI-M:MPI-ESM1-2-XR	HighResMIP	von Storch et al. (2017), https://doi.org/10.22033/ESGF/CMIP6.10290
MRI:MRI-AGCM3-2-H	HighResMIP	Mizuta et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.10942
MRI:MRI-AGCM3-2-S	HighResMIP	Mizuta et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1625
MRI:MRI-ESM2-0	AerChemMIP	Yukimoto et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.633
MRI:MRI-ESM2-0	C4MIP	Yukimoto et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.623
MRI:MRI-ESM2-0	CFMIP	Yukimoto et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.625
MRI:MRI-ESM2-0	CMIP	Yukimoto et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.621
MRI:MRI-ESM2-0	DAMIP	Yukimoto et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.634
MRI:MRI-ESM2-0	DCPP	Yukimoto et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.630
MRI:MRI-ESM2-0	FAFMIP	Yukimoto et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.632
MRI:MRI-ESM2-0	GMMIP	Yukimoto et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.626
MRI:MRI-ESM2-0	OMIP	Yukimoto et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.637
MRI:MRI-ESM2-0	PMIP	Yukimoto et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.636
MRI:MRI-ESM2-0	RFMIP	Yukimoto et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.635
MRI:MRI-ESM2-0	ScenarioMIP	Yukimoto et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.638
NASA-GISS:GISS-E2-1-G	AerChemMIP	NASA Goddard Institute for Space Studies (NASA/GISS) (2019), https://doi.org/10.22033/ESGF/CMIP6.2059
NASA-GISS:GISS-E2-1-G	C4MIP	NASA Goddard Institute for Space Studies (NASA/GISS) (2019), https://doi.org/10.22033/ESGF/CMIP6.2060
NASA-GISS:GISS-E2-1-G	CFMIP	NASA Goddard Institute for Space Studies (NASA/GISS) (2018), https://doi.org/10.22033/ESGF/CMIP6.2061
NASA-GISS:GISS-E2-1-G	CMIP	NASA Goddard Institute for Space Studies (NASA/GISS) (2018), https://doi.org/10.22033/ESGF/CMIP6.1400
NASA-GISS:GISS-E2-1-G	DAMIP	NASA Goddard Institute for Space Studies (NASA/GISS) (2018), https://doi.org/10.22033/ESGF/CMIP6.2062
NASA-GISS:GISS-E2-1-G	ISMIP6	NASA Goddard Institute for Space Studies (NASA/GISS) (2018), https://doi.org/10.22033/ESGF/CMIP6.2066
NASA-GISS:GISS-E2-1-G	LS3MIP	NASA Goddard Institute for Space Studies (NASA/GISS) (2018), https://doi.org/10.22033/ESGF/CMIP6.2067
NASA-GISS:GISS-E2-1-G	LUMIP	NASA Goddard Institute for Space Studies (NASA/GISS) (2018), https://doi.org/10.22033/ESGF/CMIP6.2068
NASA-GISS:GISS-E2-1-G	PMIP	NASA Goddard Institute for Space Studies (NASA/GISS) (2019), https://doi.org/10.22033/ESGF/CMIP6.2071
NASA-GISS:GISS-E2-1-G	RFMIP	NASA Goddard Institute for Space Studies (NASA/GISS) (2019), https://doi.org/10.22033/ESGF/CMIP6.2072
NASA-GISS:GISS-E2-1-G	ScenarioMIP	NASA Goddard Institute for Space Studies (NASA/GISS) (2020), https://doi.org/10.22033/ESGF/CMIP6.2074

NASA-GISS:GISS-E2-1-G-CC	C4MIP	NASA Goddard Institute for Space Studies (NASA/GISS) (2019), https://doi.org/10.22033/ESGF/CMIP6.11656
NASA-GISS:GISS-E2-1-G-CC	CMIP	NASA Goddard Institute for Space Studies (NASA/GISS) (2019), https://doi.org/10.22033/ESGF/CMIP6.11657
NASA-GISS:GISS-E2-1-H	CFMIP	NASA Goddard Institute for Space Studies (NASA/GISS) (2019), https://doi.org/10.22033/ESGF/CMIP6.13941
NASA-GISS:GISS-E2-1-H	CMIP	NASA Goddard Institute for Space Studies (NASA/GISS) (2018), https://doi.org/10.22033/ESGF/CMIP6.1421
NASA-GISS:GISS-E2-2-G	CFMIP	NASA Goddard Institute for Space Studies (NASA/GISS) (2019), https://doi.org/10.22033/ESGF/CMIP6.11659
NASA-GISS:GISS-E2-2-G	CMIP	NASA Goddard Institute for Space Studies (NASA/GISS) (2019), https://doi.org/10.22033/ESGF/CMIP6.2081
NASA-GISS:GISS-E3-G	RFMIP	NASA Goddard Institute for Space Studies (NASA/GISS) (2019), https://doi.org/10.22033/ESGF/CMIP6.2098
NCAR:CESM1-1-CAM5-CMIP5	DCPP	Danabasoglu (2019), https://doi.org/10.22033/ESGF/CMIP6.11542
NCAR:CESM1-CAM5-SE-HR	HighResMIP	Gent (2020), https://doi.org/10.22033/ESGF/CMIP6.14220
NCAR:CESM1-CAM5-SE-LR	HighResMIP	Gent (2020), https://doi.org/10.22033/ESGF/CMIP6.14262
NCAR:CESM1-WACCM-SC	PAMIP	Peings (2020), https://doi.org/10.22033/ESGF/CMIP6.12281
NCAR:CESM2	AerChemMIP	Danabasoglu (2019), https://doi.org/10.22033/ESGF/CMIP6.2181
NCAR:CESM2	C4MIP	Danabasoglu (2019), https://doi.org/10.22033/ESGF/CMIP6.2182
NCAR:CESM2	CDRMIP	Danabasoglu (2019), https://doi.org/10.22033/ESGF/CMIP6.2183
NCAR:CESM2	CFMIP	Danabasoglu (2019), https://doi.org/10.22033/ESGF/CMIP6.2184
NCAR:CESM2	CMIP	Danabasoglu (2019), https://doi.org/10.22033/ESGF/CMIP6.2185
NCAR:CESM2	DAMIP	Danabasoglu (2019), https://doi.org/10.22033/ESGF/CMIP6.2187
NCAR:CESM2	FAFMIP	Danabasoglu (2020), https://doi.org/10.22033/ESGF/CMIP6.14052
NCAR:CESM2	GMMIP	Danabasoglu (2019), https://doi.org/10.22033/ESGF/CMIP6.2190
NCAR:CESM2	ISMIP6	Danabasoglu (2019), https://doi.org/10.22033/ESGF/CMIP6.2193
NCAR:CESM2	LS3MIP	Danabasoglu (2019), https://doi.org/10.22033/ESGF/CMIP6.2194
NCAR:CESM2	LUMIP	Danabasoglu (2019), https://doi.org/10.22033/ESGF/CMIP6.2195
NCAR:CESM2	OMIP	Danabasoglu (2019), https://doi.org/10.22033/ESGF/CMIP6.2196
NCAR:CESM2	PAMIP	Danabasoglu (2019), https://doi.org/10.22033/ESGF/CMIP6.2197
NCAR:CESM2	PMIP	Danabasoglu (2019), https://doi.org/10.22033/ESGF/CMIP6.2198
NCAR:CESM2	RFMIP	Danabasoglu (2019), https://doi.org/10.22033/ESGF/CMIP6.2199
NCAR:CESM2	ScenarioMIP	Danabasoglu (2019), https://doi.org/10.22033/ESGF/CMIP6.2201
NCAR:CESM2-FV2	CMIP	Danabasoglu (2019), https://doi.org/10.22033/ESGF/CMIP6.11281
NCAR:CESM2-WACCM	AerChemMIP	Danabasoglu (2019), https://doi.org/10.22033/ESGF/CMIP6.10023
NCAR:CESM2-WACCM	CMIP	Danabasoglu (2019), https://doi.org/10.22033/ESGF/CMIP6.10024
NCAR:CESM2-WACCM	GeoMIP	Danabasoglu (2019), https://doi.org/10.22033/ESGF/CMIP6.10025
NCAR:CESM2-WACCM	RFMIP	Danabasoglu (2019), https://doi.org/10.22033/ESGF/CMIP6.14053
NCAR:CESM2-WACCM	ScenarioMIP	Danabasoglu (2019), https://doi.org/10.22033/ESGF/CMIP6.10026
NCAR:CESM2-WACCM-FV2	CMIP	Danabasoglu (2019), https://doi.org/10.22033/ESGF/CMIP6.11282
NCC:NorCPM1	CMIP	Bethke et al. (2019),

		https://doi.org/10.22033/ESGF/CMIP6.10843
NCC:NorCPM1	DCPP	Bethke et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.10844
NCC:NorESM1-F	CMIP	Guo et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.11543
NCC:NorESM1-F	PMIP	Guo et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.11544
NCC:NorESM2-LM	AerChemMIP	OliviÞ et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.574
NCC:NorESM2-LM	C4MIP	Schwinger et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.13721
NCC:NorESM2-LM	CDRMIP	Tjiputra et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.13722
NCC:NorESM2-LM	CMIP	Seland et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.502
NCC:NorESM2-LM	DAMIP	Seland et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.580
NCC:NorESM2-LM	LUMIP	Cai et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.562
NCC:NorESM2-LM	OMIP	Bentsen et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.598
NCC:NorESM2-LM	PAMIP	Graff et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.13723
NCC:NorESM2-LM	PMIP	Zhang et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.592
NCC:NorESM2-LM	RFMIP	OliviÞ et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.586
NCC:NorESM2-LM	ScenarioMIP	Seland et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.604
NCC:NorESM2-MM	CMIP	Bentsen et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.506
NCC:NorESM2-MM	RFMIP	OliviÞ et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.590
NCC:NorESM2-MM	ScenarioMIP	Bentsen et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.608
NERC:HadGEM3-GC31-HH	HighResMIP	Coward et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.1822
NERC:HadGEM3-GC31-HM	HighResMIP	Schiemann et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1824
NERC:HadGEM3-GC31-LL	FAFMIP	Gregory (2021), https://doi.org/10.22033/ESGF/CMIP6.12065
NERC:HadGEM3-GC31-LL	PMIP	Williams et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.12067
NERC:UKESM1-0-LL	AerChemMIP	O'Connor (2020), https://doi.org/10.22033/ESGF/CMIP6.405
NIMS-KMA:KACE-1-0-G	CMIP	Byun et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.2241
NIMS-KMA:KACE-1-0-G	ScenarioMIP	Byun et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.2242
NIMS-KMA:UKESM1-0-LL	AerChemMIP	Shim et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.2243
NIMS-KMA:UKESM1-0-LL	CMIP	Shim et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.2245
NIMS-KMA:UKESM1-0-LL	ScenarioMIP	Shim et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.2250
NIWA:UKESM1-0-LL	AerChemMIP	Dalvi et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1741
NOAA-GFDL:GFDL-AM4	CMIP	Zhao et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.1401
NOAA-GFDL:GFDL-CM4	CFMIP	Silvers et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.1641
NOAA-GFDL:GFDL-CM4	CMIP	Guo et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.1402
NOAA-GFDL:GFDL-CM4	DAMIP	Ploshay et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.11383
NOAA-GFDL:GFDL-CM4	GMMIP	Xiang et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.1642
NOAA-GFDL:GFDL-CM4	OMIP	Adcroft et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.1403

NOAA-GFDL:GFDL-CM4	RFMIP	Paynter et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.1643
NOAA-GFDL:GFDL-CM4	ScenarioMIP	Guo et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.9242
NOAA-GFDL:GFDL-CM4C192	HighResMIP	Zhao et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.2262
NOAA-GFDL:GFDL-ESM2M	FAFMIP	Hurlin et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.1645
NOAA-GFDL:GFDL-ESM4	AerChemMIP	Horowitz et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.1404
NOAA-GFDL:GFDL-ESM4	C4MIP	Krasting et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.1405
NOAA-GFDL:GFDL-ESM4	CDRMIP	John et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.1981
NOAA-GFDL:GFDL-ESM4	CMIP	Krasting et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.1407
NOAA-GFDL:GFDL-ESM4	DAMIP	Horowitz et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.1408
NOAA-GFDL:GFDL-ESM4	LUMIP	Malyshev et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.1411
NOAA-GFDL:GFDL-ESM4	RFMIP	Paynter et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.11961
NOAA-GFDL:GFDL-ESM4	ScenarioMIP	John et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.1414
NOAA-GFDL:GFDL-GRTCODE	RFMIP	Paynter et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.10404
NOAA-GFDL:GFDL-OM4p5B	OMIP	Zadeh et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.2264
NOAA-GFDL:GFDL-RFM-DISORT	RFMIP	Paynter et al. (2018), https://doi.org/10.22033/ESGF/CMIP6.10406
NTU:TaiESM1-TIMCOM	OMIP	Tseng et al. (2020), https://doi.org/10.22033/ESGF/CMIP6.14323
NUIST:NESM3	CMIP	Cao et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.2021
NUIST:NESM3	PMIP	Cao (2019), https://doi.org/10.22033/ESGF/CMIP6.2026
NUIST:NESM3	ScenarioMIP	Cao (2019), https://doi.org/10.22033/ESGF/CMIP6.2027
RTE-RRTMGP-Consortium:RTE-RRTMGP-181204	RFMIP	Pincus (2019), https://doi.org/10.22033/ESGF/CMIP6.10124
SNU:SAM0-UNICON	CMIP	Park et al. (2019), https://doi.org/10.22033/ESGF/CMIP6.1489
THU:CIESM	CMIP	Huang (2019), https://doi.org/10.22033/ESGF/CMIP6.1352
THU:CIESM	GMMIP	Xue (2020), https://doi.org/10.22033/ESGF/CMIP6.1354
THU:CIESM	ScenarioMIP	Huang (2019), https://doi.org/10.22033/ESGF/CMIP6.1357
UA:MCM-UA-1-0	CMIP	Stouffer (2019), https://doi.org/10.22033/ESGF/CMIP6.2421
UA:MCM-UA-1-0	ScenarioMIP	Stouffer (2019), https://doi.org/10.22033/ESGF/CMIP6.13816
UHH:ARTS-2-3	RFMIP	Brath (2019), https://doi.org/10.22033/ESGF/CMIP6.2001

[END TABLE AII.10 HERE]

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