Annex III: Models

Contributors:
Paul Durack (USA), Seita Emori (Japan), Eric Guilyardi (France), José Manuel Gutiérrez (Spain), Anne Marie Treguier (France)

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

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

The Coordinated Regional Climate Downscaling Experiment (CORDEX, (Gutowski et al., 2016)) coordinates regional downscaling experiments worldwide over a number of domains, which are defined as regions for which the regional downscaling is taking place (note that regional downscaling is performed over limited geographical domains, driven at the boundaries by global model simulations). Table AIII.1: shows the details of the current CORDEX domains illustrating the different resolutions (from the lowest 0.44º, to the highest 0.11º) with data available at the Earth System Grid Federation (ESGF), for any of the following experiments: "evaluation" (ERA-Interim driven simulations), "historical", "rcp26", "rcp45", "rcp85". Note that 0.44º is the prioritized resolution and only some domains provide information for higher resolutions. The Regional Climate Models (RCMs) contributing to CORDEX (as available from ESGF) are listed in Table AIII.2: Table AIII.3: shows the different CMIP5 models used as boundary conditions for the different CORDEX domains (the numbers in each cell indicate the available simulations –RCM runs– for each scenario).

[START TABLE AIII.1 HERE]

Table AIII.1: CORDEX regional domains
[*This table contains incomplete information, from ESGF server as of march 2019. To be cleaned and updated*].

CORDEX domains. Column 1: name, Column2: code (as in ESGF specification); Column3: horizontal grid resolutions. Interpolated domains not considered. (a) MED-CORDEX data is stored in a dedicated server (details at http://www.medcordex.eu).

Domain	Code	Resolution (deg)
Region 1: South America	SAM	0.44
Region 2: Central America	CAM	0.44
Region 3: North America	NAM	0.11, 0.22, 0.44
Region 4: Africa	AFR	0.44
Region 5: Europe	EURO	0.11, 0.22, 0.44
Region 6: South Asia	WAS	0.44
Region 7: East Asia	EAS	0.44
Region 8: Central Asia	CAS	0.44
Region 9: Australasia	AUS	0.44
Region 10: Antarctica	ANT	0.44
Region 11: Arctic	ARC	0.44
Region 12: Mediterranean	MED	(a)
Region 13: Middle East North Africa	MENA	0.22, 0.44
Region 14: South-East Asia	SEA	0.22

[END TABLE AIII.1 HERE]

[START TABLE AIII.2 HERE]

Table AIII.2: Regional Climate Models (RCMs) participating in CORDEX

[*This table contains incomplete information, from ESGF server as of march 2019. To be updated and completed with information from the modelling centers and further model details*].

Regional Climate Models (RCMs) participating in CORDEX. Column 1: sponsoring institution(s); Column2: names of models; Column3: model versions and/or different configurations of the same model (e.g. model parameterizations). (*) Indicate community models.

Institution	Model	Versions (if several)
	ALADIN	52, 53, 63
	ALARO-0	
	CCAM	
	CCLM(*)	4-8-17, 5-0-2, 5-0-6
	CRCM	5, 5-SN
	Eta	Eta
	HadGEM3-RA	
	HadRM3P	
	HIRHAM5	
	MAR36	
	RACMO	21P, 22E, 22T
	RCA	4, 4-SN
	RegCM4	1, 2, 3, 4
	REMO	2009, 2015
	RRCM	
	WRF(*)	331F, 331G, 341E, 341I, 361H, 360J, 360K, 360L, 381P

[END TABLE AIII.2 HERE]

[START TABLE AIII.3 HERE]

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

[*This table contains incomplete information, from ESGF server as of march 2019. To be updated and completed with detailed information on the particular runs available for the different scenarios*].

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 |historical|rcp45|rcp85|rcp26| scenarios. Salient features of these models are described in IPCC-AR5 Appendix 9.A (model names are taken from table 9.A.1).

	AFR-44	ANT-44	ARC-44	AUS-44	CAM-44	EAS-44	EUR-11	EUR-44	MNA-22	MNA-44	NAM-44	SAM-44	SEA-22	WAS-44
ACCESS1-0-r1i1p1				|3|-|-|-										
ACCESS1-3-r1i1p1				|3|-|-|-										
CanESM2-r0i0p0	|1|1|1|-		|1|1|1|-		|1|-|1|-			|1|2|1|-			|1|1|1|-	|1|1|1|-		|1|1|1|-
CanESM2-r1i1p1											|1|1|1|-			
CNRM-CM5-r0i0p0	|2|2|2|-				|1|-|1|-		|2|2|2|-	|2|1|2|-		|1|1|1|-				|1|1|1|-
CNRM-CM5-r1i1p1						|1|1|1|-	|4|1|3|1	|2|1|1|-						
CSIRO-Mk3-6-0-r0i0p0	|1|1|1|-				|1|-|1|-			|1|1|1|-				|1|1|1|-		|1|1|1|-
EC-EARTH-r0i0p0	|3|3|3|2		|2|1|2|1		|1|1|1|1		|3|2|3|3	|2|1|2|1	|1|-|1|-	|1|1|1|1	|1|1|1|1	|1|1|1|1		|1|1|1|1
EC-EARTH-r1i1p1	|1|1|1|-	|1|1|1|-					|2|1|2|-	|1|1|1|-						
EC-EARTH-r3i1p1	|1|1|1|-	|1|1|1|-	|1|1|1|-			|1|1|1|-	|2|1|2|-	|1|1|1|-			|1|1|1|-			
EC-EARTH-r12i1p1	|1|-|-|1	|1|-|-|1		|1|1|1|-		|1|1|1|-	|2|1|2|1	|1|-|-|1						
GFDL-ESM2G-r0i0p0	|1|-|-|1						|1|-|-|1							
GFDL-ESM2M-r0i0p0	|1|1|1|-				|1|-|1|-			|1|1|1|-	|1|-|1|-	|1|1|1|-		|1|1|1|-		|1|1|1|-
HadGEM2-ES-r0i0p0	|3|2|3|2				|1|1|1|1		|2|2|2|2	|2|1|2|1				|1|1|1|1	|1|1|1|-	|1|1|1|1
HadGEM2-ES-r1i1p1	|1|1|1|1	|1|1|1|1				|1|1|1|-	|2|1|2|1	|1|1|1|1						
IPSL-CM5A-LR-r0i0p0	|1|-|1|1						|1|-|-|1							
IPSL-CM5A-MR-r0i0p0	|1|1|1|-				|1|-|1|		|2|2|2|-	|2|2|2|-				|1|1|1|-		|1|1|1|-

MIROC5-r0i0p0	|2|1|2|2				|1|-|1|1		|-|-|-|2	|2|1|2|1				|1|1|1|1		|1|1|1|1
MPI-ESM-LR-r0i0p0	|3|3|3|2		|2|1|2|-		|1|1|1|1		|3|3|4|2	|4|3|4|2				|2|2|2|2		|1|1|1|1
MPI-ESM-LR-r1i1p1			|-|-|1|-	|1|1|1|-		|1|1|1|-					|1|1|-|-			|1|1|1|1
NorESM1-M-r0i0p0	|1|1|1|1		|1|1|1|-		|1|-|1|1		|2|-|2|1	|1|1|1|1				|1|1|1|1		|1|1|1|1
NorESM1-M-r1i1p1	|1|1|1|-						|1|1|1|-							

[END TABLE AIII.3 HERE]

AIII.2 Models participating in CMIP6

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 a science that purports to be mature, credible, open and transparent (Guilyardi et al., 2013). Scientific publications remain an essential way of documenting models but remain largely inaccessible by the growing community of model output users. 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 CMIP and ESGF via the World Climate Research Programme work group on Climate Modelling (WGCM) and its Infrastructure Panel WIP (Balaji et al., 2018).

ES-DOC is documenting all aspects of CMIP6 (Hassell et al. 2019, to be submitted). 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 (Eyring et al., 2016) and Pascoe et al. 2019 (in revision) for CMIP6 experiments) and other important aspects of the CMIP6 model data. 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/). Another entry point to the database is provided by the one-stop-shop “further_info_url” global attribute in each data file. ES-DOC also includes the CMIP6 errata system which tracks issues with the model data and the potential corrections made. [Note: at the time of the FOD writing, some aspects of CMIP6 documentation are still in development or test and some groups are still providing the documentation for their models and simulations].

[*To be confirmed*] It is expected that a “frozen” version of ES-DOC will be designed for AR6 and will contain a full documentation of the models used in this report. Table 8 is a summary of the main features of these models.

[START TABLE AIII.4 HERE]

Table AIII.4: Models participating in CMIP6 Deck and ScenarioMIP

[*This table contains incomplete information, from the CMIP6 server as of march 2019. To be cleaned and updated*].

Salient features of the General Circulation Models (GCMs) and Earth System Models (ESMs) participating in CMIP6. Column 1: sponsoring institution(s), Column2: names of model configurations; Column3: 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. A blank entry indicates that information was not available.

institution **full name** **country**	**Models**	**Main references**	**Atmosphere** **Component name** **nominal horizontal resolution** **number of levels** **Top** **references**	**Aerosol** **1) component name** **2) interactive or prescribed** **3) references**	**Atmospheric Chemistry** **1) component name** **2) references**	**Ocean** **1) component name** **2) nominal horizontal resolutions** **3) vertical grid** **4) number of levels** **5) references**	**Sea Ice** **1) component name** **2) reference**	**Land Ice** **1) component name** **2) reference**	**Land surface** **1) component name** **2) reference**	**land interactive vegetation**	**ocean interactive biogeochemistry**
AS-RCEC Research Center for Environmental Changes, Academia Sinica, **Taiwan**	**TaiESM1.0**		TaiAM1 (0.9x1.25 degree; 288 x 192 30 levels; top level ~2 hPa)	SNAP	SNAP	1) POP2 2) 320x384 3) z 4) 60 levels;	CICE4	none	CLM4.0		**none**
AWI Alfred Wegener Institute, **Germany**	**AWI-CM-1-1-LR** **AWI-CM-1-1-MR** **AWI-CM-1-1-HR** **AWI-ESM-1-1-LR**		ECHAM6.3.04p1 **HR &MR**: T127, 95 levels; top level 80 km **LR:** T63, 47 levels; top level 80 km AGCM3	none	none	1) FESOM1.4 2) HR &MR: 25km LR : 50km 3) z 4) 47 levels	FESOM1.4	none	JSBACH 3.20		none
BCC Beijing Climate Center, **China**	**BCC-CSM2-HR** **BCC-CSM2-MR** **BCC-ESM1**		**HR**: T266, 56 levels; top level 0.1 hPa **MR**: T106, 46 levels; top level 1.46 hPa **ESM1**: T42; 26 levels; top level 2.19 hPa	none	CSM2: none ESM1: BCC-AGCM3-Chem	1) MOM4 2) 1° 3) z 4) 40 levels	SIS2	none	BCC_AVIM2		none

BNU Beijing Normal University **China**	**BNU-ESM-1-1**	CAM4 (2deg; 144 x 96; 26 levels; top level 2.194 mb)	CAM-chem; semi-interactive	none	1) MOM4 2) 1° 3) z 4) 50 levels	CICE4.1	none	ColM	Dynamic ecosystem-carbon model version 1
CAMS Chinese Academy of Meteorological Sciences **China**	**CAMS-CSM1-0**	ECHAM5_CAMS (T106; 320 x 160; 31 levels; top level 10 mb)	none	none	1) MOM4 2) 1° 3) z 4) 50 levels	SIS1.0	none	CoLM 1.0	none
CAS Chinese Academy of Sciences **China**	**CAS-ESM1-0**	IAP AGCM4.1 (Finite difference 256 x 128; 30 levels; top level 2.2 hPa)	IAP AACM	IAP AACM	1) LICOM2.0 2) 1deg; 362 x 196 longitude/latitude; 3) z 4) 30 levels	CICE4	none	ColM	IAP OBGCM
CAS	**FGOALS-f3-H** **FGOALS-f3-L** **FGOALS-g3**	**Fgoals-f3 :** FAMIL2.2 H: c384; L: c96 32 levels; top level 2.16 hPa **FGOALS-g3** GAMIL2 (180 x 90 longitude/latitude; 26 levels; top level 2.19hPa	none	none	LICOM3.0, 2) Fgoalsf3-H: 0.1°; Fgoals-F3-L & g3: 1deg; 360 x 218 longitude/latitude; 3) z 4) 30 levels	CICE4.0	none	CLM4.0	none
CCCMa Canadian Centre for Climate Modelling and Analysis **Canada**	**CanESM5** **CanESM5-CanOE**	CanAM5 (T63L49 native atmosphere, T63 Linear Gaussian Grid; 128 x 64; 49 levels; top level 1 hPa)	interactive	specified oxidants for aerosols	NEMO3.4.1 2) ORCA1° 361 x 290 3) z 4) 45 vertical levels	LIM2	specified ice sheets	CLASS3.6/CTEM1.2	CanESM5: CMOC CanESM5-CanOE: CanOE
CCCR-IITM Centre for Climate Change Research, Indian Institute of Tropical Meteorology, **India**	**IITM-ESM**	IITM-GFSv1 (T62L64, Linearly Reduced Gaussian Grid; 192 x 94; 64 levels; top level 0.2 mb)	prescribed MAC-v2	none	MOM4p1 (tripolar, primarily 1deg; 360 x 200 longitude/latitude; 3) z 4) 50 levels	SISv1.0	none	NOAH LSMv2.7.1	TOPAZv2.0
CMCC Centro Euro-Mediterraneo sui Cambiamenti Climatici **Italy**	**CMCC-CM2-HR4** **CMCC-CM2-VHR4**	CAM4 HR4: 1deg; VHR4: 1/4°, 26 levels; top at ~2 hPa)	prescribed MACv2-SP	none	NEMO3.6 2) (ORCA0.25 1/4° 1442 x 1051; 3) z 4) 50 levels	CICE4.0	none	CLM4.5 SP mode	

CMCC	**CMCC-CM2-HR5** **CMCC-CM2-SR5** **CMCC-ESM2-HR5** **CMCC-ESM2-SR5**	CAM5.3 (1deg; 288 x 192; 30 levels; top at ~2 hPa)	MAM3	none	NEMO3.6 2) HR5: ORCA0.25 1/4° SR5: ORCA 1° 3) z 4) 50 levels	CICE4.0	none	CLM4.5 BGC model	ESM2: BFM5.1 CM2: none
CNRM Centre National de Recherches Meteorologiques, **and CERFACS** Centre Europeen de Recherche et de Formation Avancee en Calcul Scientifique **France**	**CNRM-CM6.1** **CNRM-CM6.1-HR** **CNRM-ESM2-1** **CNRM-ESM2-1-HR**	Arpege 6.3; T127: 150km ; **for HR**: T359 50km 91 levels, top 78.4km	TACTIC_v2 interactive, (prescribed for CNRM-CM6.1-HR)	1) OZL_V2 (CNRM-CM6); REPROBUS-C-V2 (CNRM-ESM2)	1) NEMO3.6 2) 100 km (e-ORCA1) and **HR**: 25 km (e-ORCA025) 3) z coordinate 4) 75 levels	1) gelato 6.1	none	Surfex 8.0c	1) Pisces 2.s for CNRM-ESM2
CSIRO Commonwealth Scientific and Industrial Research Organisation **and BOM** Bureau of Meteorology **Australia**	**ACCESS-CM2** **ACCESS-ESM1-5**	**CM2:** HadGEM3-GA7.1 (N96; 85 levels; top level 85 km **ESM1-5:** HadGAM2 (r1.1, N96; 192 x 145 longitude/latitude; 38 levels; top level 39255 m	**CM2:** UKCA-GLOMAP-mode **ESM1-5:** CLASSIC (v1.0)	none	ACCESS-OM2 GFDL-MOM5 2) 1deg; 360 x 300 longitude/latitude 3) z 4) 50 levels	CICE5.1	none	**CM2:** CABLE2.3.5 **ESM1-5:** CABLE2.2.3	**CM2:** none **ESM1-5:** Wombat1.0
CSIR-CSIRO Council for Scientific and Industrial Research - Natural Resources and the Environment, **South Africa,** Commonwealth Scientific and Industrial Research Organisation and Bureau of Meteorology, **Australia**	**VRESM-1-0**	**VCAM-1.0** (C192; 192 x 192 x 6; 35 levels; top level 35km)	Rotstayn-1.0		VCOM-1.0 C192- 25km 384 x 384 x 6; 3) z 4) 35 levels	CSIR-ICE (visco-plastic)		CABLE v2.2.3	PISCES v3.4socco
E3SM National laboratories consortium **U.S.A**	**E3SM 1.0**	E3M v1.0 C90 72 levels; top level 0.1 hPa	MAM4 with resuspension, marine organics, and secondary organics	Troposphere specified oxidants for aerosols. Stratosphere linearized interactive ozone (LINOZ	MPAS-Ocean v6.0 2) resolution 60 km to 30 km; 3) z 4) 60 levels	MPAS-Seaice v6.0	none	ELM v1.0	none

		v2)								
EC-Earth consortium Europe	**EC-Earth3 EC-Earth3-HR EC-Earth3-LR**	**IFS cy36r4 EC-Earth3** TL255, 512 x 256 91 levels; top level 0.01 hPa) **EC-Earth3-HR** T511 91 levels; top level 0.01 hPa **EC-Earth3-LR** TL159, 320 x 160 62 levels; top level 5 hPa	none; TM5 for EC-Earth3-AerChem	none; TM5 for EC-Earth3-AerChem and EC-Earth3-CC	**NEMO3.6** 2) **EC-Earth3 & LR** ORCA1 1° **EC-Earth3-HR** ORCA025 1/4° 3) z 4) 75 levels	LIM3	none ; PISM 0.7 for EC-Earth3-GrIS	HTESSEL	none; LPJ-GUESS v4 for EC-Earth3-Veg	none; PISCES v2 for EC-Earth3-CC
FIO-QNLM First Institute of Oceanography and Qingdao National Laboratory for Marine Science **China**	**FIO-ESM-2-0**	CAM4 (0.9x1.25 finite volume grid; 192 x 288 longitude/latitude; 26 levels; top level ~2 hPa)	prescribed		POP2-W with MASNUM surface wave model, 320 x 384 3) z 4) 60 levels;	CICE4.0	none	CLM4.0		none
INM Institute for Numerical Mathematics **Russia**	**INM-CM4-8**	INM-AM4-8 (2x1.5; 180 x 120 longitude/latitude; 21 levels; top level sigma = 0.01)	INM-AER1		INM-OM5 2) 1°, 360 x 318; 3) sigma coordinate 4) 40 levels	INM-ICE1	none	INM-LND1		none
INPE National Institute for Space ResearchNational Institute for Space Research **Brazil**	**BESM-2-7**	BAM (v1.0, T062L28; 192 x 96 longitude/latitude; 28 levels; top level 3 hPa	none	none	MOM-5 2) 1°, 360 x 300 3) z 4) 50 levels	SIS1.0	none	SSIB 2.0		TOPAZ2.0
IPSL Institut Pierre-Simon Laplace **France**	**IPSL-CM6A-LR**	LMDZ (NPv6, N96; 144 x 143 longitude/latitude; 79 levels; top level 40000 m	none	none	NEMO 3.6 2) eORCA1.3, 1deg; 362 x 332 3) z 4) 75 levels;	NEMO-LIM3	none	ORCHIDEE (v2.0, Water/Carbon/ Energy mode)		PISCES
KIOST Korea Institute of Ocean Science & Technology **Korea**	**KIOST-ESM**	GFDL-AM2.0 (cubed sphere (C48); 192 x 96 longitude/latitude; 32 vertical levels; top level 2 hPa	Simple carbon aerosol model (emission type)	none	GFDL-MOM5.0 (tripolar - nominal 1.0 deg; 360 x 200 longitude/latitude; 52 levels	GFDL-SIS		NCAR-CLM4		TOPAZ2

MIROC consortium JAMSTEC, AORI, NIES, R-CCS **Japan**	**MIROC-ES2L MIROC-ES2H MIROC6**		CCSR AGCM **ES2L**: T42; 128 x 64 ;40 levels; top level 3 hPa **ES2H & MIROC6:** T85; 256 x 128; 81 levels; top level 0.004 hPa	SPRINTARS	none	COCO4.9 2) 1deg; 360 x 256; 3) z 4) 63 levels	COCOA4.9	none	MATSIRO6.0 visit-e ver 1.0	OECO v2.0
MOHC Met Office Hadley Centre **U.K.**	**HADGEM3-GC31 versions: LL,LM,MH,MM,HH,HM** **UK-ESM1.0-MMh UK-ESM1.0-LL**	(Williams et al., 2018)	MetUM-HadGEM3-GA7.1 **LL & LM**: N96; 192 x 144 **MH &MM**: N216; 432 x 324 **HH & HM** : N512; 1024 x 768 85 levels; top level 85 km	UK-GLOMAP	none; UKCA-StratTrop for UK-ESM1.0	NEMO-HadGEM3-GO6.0 2) **LL** : eORCA1 **LM, MM & HM**: eORCA025 1/4° **MH, HH**: eORCA12 1/12° 3) z 4) 75 levels	CICE-HadGEM3-GSI8	none	JULES-HadGEM3-GL7.1	none; MEDUSA2 for UK-ESM
MPI-M Max Planck Institute for Meteorology **Germany**	**MPI-ESM1-2-LR MPI-ESM1-2-HR MPI-ESM1-2-XR**	(Mauritsen et al., 2019)	**ECHAM6.3 LR:** T63; 192 x 96 47 levels; top level 0.01 hPa **HR:** spectral T127; 384 x 192; 95 levels; top level 0.01 hPa **XR:** T255; 768 x 384 95 levels; top level 0.01 hPa	prescribed MACv2-SP		**MPIOM 1.63** **2) LR:** GR1.5, 1.5deg; 256 x 220 **HR & XR**: TP04, 0.4deg; 802 x 404 3) z 4) 40 levels	Notz et al 2013		JSBACH3.20	HAMOCC6
MPI-M	**ICON-ESM-LR**		ICON-A (icosahedral/triangles; 160 km; 47 levels; top level 80 km			ICON-O (icosahedral/triangles; 40 km; 40 levels;	Notz et al 2013		JSBACH3.20	HAMOCC6
MRI Meteorological Research Institute **Japan**	**MRI-ESM-2.0**		**MRI-AGCM3.5** (TL159; 320 x 160 longitude/latitude; 80 levels; top level 0.01 hPa)	MASINGAR mk2r4	MRI-CCM2.1	**MRI.COM4.4** 2) 1° 360 x 364 3) z 4) 61 levels;	**MRI.COM4.4**		HAL 1.0	MRI.COM4.4
NASA-GISS Goddard Institute for Space Studies **U.S.A.**	**GISS-E2-1-G GISS-E2-1-H GISS-E2-1-MA-G**		**GISS-E2.1** (2.5x2 degree; 144 x 90 longitude/latitude; 40 levels; top level 0.1 hPa) **GISS-E2-1-MA:** 2.5x2°, 102 levels; top level 0.002 hPa	Varies with physics-version (p==1 none, p==3 OMA, p==4 TOMAS, p==5 MATRIX)	Varies with physics-version (p==1 Non-interactive, p>1 GPUCCINI)	**GISS-E2-1-G : GISS ocean** 1°, 32 levels **GISS-E2-1-H HYCOM** 1°, hybrid coordinate, 26 levels	**GISS-SI**		**GISS-LSM**	
NASA-GISS	**GISS-E3-G**		**GISS-E3** Cubed sphere, C90;; 102 levels; top level 0.002 hPa)	Varies with physics-version (p==1 none, p==3 OMA,	Varies with physics-version (p==1 Non-interactive, p>1 GPUCCINI)	**GISS ocean** 1°, 32 levels	**GISS-SI**		**GISS-LSM**	

			p==4 TOMAS, p==5 MATRIX)							
NCAR National Center for Atmospheric Research **U.S.A.**	**CESM2 CESM2-SE**	**CAM6 CESM2:** 0.9x1.25 288 x 192 32 levels; top level 2.25 mb **CESM2-SE**: 0.25° 777602 cells; 30 levels; top level 2.25 mb)	MAM4	MAM4	POP2 320x384 z 60 levels	CICE5.1	CISM2.1	CLM5		MARBL
NCC Consortium Norway	**NorESM2-HH NorESM2-LM NorESM2-LME NorESM2-LMEC NorESM2-MH NorESM2-MM**	**CAM-OSLO LM, LME, LMEC:** 2 degree resolution; 144 x 96; 32 levels; top level 3 mb) **MH, MM: 1**°; 288 x 192; 32 levels; top level 3 mb **HH:** 0.25 degree resolution; 1152 x 768; 32 levels; top level 3 mb	OsloAero	OsloChemSimp	**MICOM** 2) LM, LME, LMEC, MM: 1° 360 x 384; MH: 0.25° 1440 x 1152; 70 levels; 3) isopycnal; 4) 70 levels;	CICE	CICSM	CLM		HAMMOC
NIMS-KMA National Institute of Meteorological Sciences, Korea Meteorological Administration**, Korea**	**KACE-1-0-G**	**MetUM-HadGEM3-GA7.1** (N96; 192 x 144 longitude/latitude; 85 levels; top level 85 km)	UKCA-GLOMAP-mode		**MOM4p1** 1deg; 360 x 200; 50 levels	CICE-HadGEM3-GSI8		JULES-HadGEM3-GL7.1		
NOAA-GFDL National Oceanic and Atmospheric Administration, Geophysical Fluid Dynamics Laboratory **U.S.A.**	**GFDL-CM4 GFDL-CM4C192 GFDL-ESM4**	**GFDL-AM4.0.1 CM4:** C96) - 1 °; 360 x 180 **CM4C192**: C192-05° 33 levels; top level 1 hPa	**interactive**	fast chemistry, aerosol only	**GFDL-MOM6, GFDL-CM4:** 0.25 deg; 1440 x 1080**; 75 levels;**	GFDL-SIM4p25 GFDL-SIS2.0	GFDL-LM4.0.1	GFDL-LM4.0.1		GFDL-Bling
NOAA-GFDL	**GFDL-ESM2M**	**GFDL-AM2** (144 x 90 24 levels; top level 1 hPa)	prescribed	prescribed	**GFDL-MOM4p1** (tripolar - nominal 1 deg; 360 x 200 longitude/latitude; 50 levels;	GFDL-SIM2	GFDL-LM3.0	GFDL-LM3.0		GFDL-TOPAZ2
NUIST Nanjing University of Information Science and	**NESM3**	**ECHAM v6.3** (T63; 192 x 96 longitude/latitude; 47 levels; top level 1 Pa)	none	none	**NEMO v3.4** 1deg; 384 x 362 longitude/latitude46 levels	CICE 4.1	none	JSBACH v3.1	none	none

Technology **China**										
SNU Seoul National University **Korea**	**SAM-UNICON**	**CAM5.3 with** UNICON (1deg; 288 x 192 30 levels; top level ~2 hPa	MAM3	none	**POP2** 2) 320 x 384 3) z 4) 60 levels	CICE4.0	none	CLM 4.0	none	none
THU Department of Earth System Science **China**	**CIESM**	**CIESM-AM** (FV/FD; 288 x 192 longitude/latitude; 30 levels; top level 2.255 hPa)	MAM4	none	**CIESM-OM** 2) 0.5° 720 x 560; 3) z 4) 46 levels	CICE4	none	CIESM-LM (modified CLM4.5)	none	none
University of Toronto **Canada**	**UofT-CCSM4** (CCSM4 with nonstandard ocean parameters)	**CAM4** (finite-volume dynamical core; 288 x 192 longitude/latitude; 26 levels; top level ~2 hPa)	none	none	**POP2** 2) 384 x 320 3) z 4) 60 levels	CICE4	none	CLM4	none	none

[END TABLE AIII.4 HERE]

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