

4.3 Assembled Coupled Models

The state of coupled model assembly at project end is summarised in three tables. Table 4.3 (see also URL²) lists the coupled models assembled or in the process of being assembled and their component models.

Coupled model	Atmosphere	Chemistry	Land-Surface	Ocean	Sea-Ice	Bio-Geo-Chemistry	Notes
TOYCLIM	TOYATM	TOYCHE		TOYOCE			no physics
OPATOY	TOY4OPA			OPA	LIM		no physics in atmosphere
MPI-AO(ECHO) ²	ECHAM5			MPI-OM			
MPI-AOB	ECHAM5			MPI-OM		HAMOCC	
MPI-OM				MPI-OM			standalone
MPI-OB				MPI-OM		HAMOCC	main/sub model
MPI-O-PISCES				MPI-OM		PISCES	main/sub model
MPI-AO-PISCES	ECHAM5			MPI-OM		PISCES	
MPI-AOB[-HAM]	ECHAM5	[HAM ¹]		MPI-OM		HAMOCC	field export HAMOCC-> HAM,
MPI-A-ORCA	ECHAM5			OPA	LIM		
IPSL-CM4	LMDZ		ORCHIDEE	OPA	LIM		
<i>RCM</i>	RCA		RCA-soil	RCO	RCI		online coupling to a pseudo-GCM
<i>Arpege-ORCA</i>	Arpege-Climat4			OPA	LIM		
<i>Arpege-TOY</i>	Arpege-Climat4			TOY4-ARPEGE			no ocean / sea ice physics
<i>MPI-AC</i>	ECHAM5	MOZART					main/sub model
<i>MPI-AO-TOYTM5</i>	ECHAM5	TOYTM5		MPI-OM			3 + 1 executables ³
<i>MPI-AO-TM5</i>	ECHAM5	TM5		MPI-OM			3 + 1 executables ³
<i>MPI-AOB-TM5</i>	ECHAM5	TM5		MPI-OM		HAMOCC	3 + 1 executables ³
<i>MPI-ACOB</i>	ECHAM5	MOZART		MPI-OM		HAMOCC	

Figure 4.3: Names of assembled coupled models (left column) and their component models (columns 2-7). The model name is in italic if the work is still in progress. ¹Only the data export in HAMOCC via PSMILE is included; the exported fields will be received by HAM when assembled into the configuration; ²ECHO is the old name of MPI-AO

Brief additional information on the coupling method as e.g. the number of executables or the main/sub model relationship is provided as well.

The table lists only those components of the coupled model which are adapted to the SCE. This requires that the package-rule is met (see Mangili et al. (2003)). In that case the submodel can be compiled

²http://prism.dkrz.de/Workpackages/WP3i/Assembled/Table_coupled_configurations.html

independently from the calling model and can be linked to any other model which is ready to call it. For example the marine biogeochemistry models HAMOCC and PISCES can optionally be coupled to MPI-OM by just linking the respective object libraries to MPI-OM. On the other hand, the sea ice source code is presently embedded in MPI-OM and is not listed separately. Similarly, there are surface schemes in ECHAM5 and Arpege_Climat4, but they are not listed as separate component models.

Coupled configurations comprising an atmosphere and an ocean are in most cases realized with 2 + 1 executables: one executable is used for the atmosphere, one for the ocean and the third executable is that of the coupler. The only exception is MPI-AO-TM5 which has 3 executables, one for the atmosphere, the chemistry, the ocean, and one for OASIS.

Coupled model name	[No.] Resolutions	Adapted to the SCE¹ on a NEC/SGI/FSE platform	Ported to a NEC/SGI/FSE platform	Adapted to the SRE² on a NEC/SGI/FSE platform
TOYCLIM	[1] Table	+ / + / +	+ / + / +	+ / + / +
OPATOY	[1] Table	+ / + / +	+ / + / +	+ / + / +
MPI-AO(ECHO)	[4] Table	+ / + / +	+ / + / +	+ / + / +
MPI-AOB	[3] Table	+ / + / +	+ / + / 0	+ / + / 0
MPI-OM	[3] Table	+ / + / +	+ / + / +	+ / + / 0
MPI-OB	[3] Table	+ / + / +	+ / + / 0	+ / + / 0
MPI-O-PISCES	[1] Table	+ / 0 / 0	+ / 0 / 0	0 / 0 / 0
MPI-AO-PISCES	[1] Table	+ / 0 / 0	+ / 0 / 0	0 / 0 / 0
MPI-AOB[-HAM]	[3] Table	+ / + / +	+ / + / 0	+ / + / 0
MPI-A-ORCA	[1] Table	0 / 0 / 0	+ / + / +	0 / 0 / 0
IPSL-CM4	[2] Table	+ / + / +	+ / + / +	+ / + / +
RCM		0 / 0 / 0	0 / + / 0	0 / 0 / 0
Arpege-ORCA		+ / + / +	0 / 0 / +	0 / 0 / 0
Arpege-TOY		+ / + / +	0 / 0 / +	+ / 0 / 0
MPI-AC		0 / 0 / 0	+ / 0 / 0	0 / 0 / 0
MPI-AO-TOYTM5		0 / + / 0	0 / + / 0	0 / + / 0
MPI-AO-TM5		0 / + / 0	0 / + / 0	0 / + / 0
MPI-AOB-TM5		0 / + / 0	0 / + / 0	0 / + / 0
MPI-ACOB		0 / 0 / 0	+ / 0 / 0	0 / 0 / 0

Figure 4.4: State of assembly of coupled PRISM models. The model name is in italic if the work is still in progress.

¹ +: all components are adapted to the SCE for at least one site with a platform from the respective project partner; 0 : not all components are adapted to the SCE for at least one with a platform from the respective project partner; ² +: the coupled model is adapted to the SRE for at least one site with a platform from the respective project partner; 0 : the coupled model is not yet adapted to the SRE for at least one site with a platform from the respective project partner; The 2nd column lists the number of different grid the model can run on in the SRE. The 'table' entry links to descriptions of the grids.

The process of model assembly starts with the adaptation of all component model's source code to the SCE and ends with the successful execution on all PRISM sites. Table 4.4 (see also URL³) gives details

³http://prism.dkrz.de/Workpackages/WP3i/Assembled/Table_coupled_configurations_state.html

on the stage of the assembly process for the individual PRISM coupled models.

The first column again contains the model name. The second column contains entries to tables with the possible grid resolutions of the models.

Column 3 has a '+' or a '0' entry depending on whether all components making up the coupled model have been adapted to the SCE for at least one site from each WP3i project partner from the computer industries NEC, SGI, and Fujitsu.

The next column 4 summarises the portability of the coupled models. It indicates whether the model can be run on at least one platforms provided by the three WP3i partners from the computer industries.

The last column gives information on the adaptation to the SRE in a way similar to that for the SCE (column 3).

The various platforms and sites used during the project to run coupled models are listed in Table 4.5 (see also URL⁴).

⁴http://prism.dkrz.de/Workpackages/WP3i/Assembled/Table_prism_sites.html

Vendor / Hardware	OS / Architecture	Node Name	Institute	Coupled models
NEC / SX-6	SUPER-UX / SX	barolo	INGV, Bologna	ECHO, OPATOY, TOYCLIM
NEC / SX-6	SUPER-UX / SX	cs	DKRZ, Hamburg	ECHO, IPSL_CM4, MPI-AOB, MPI-AOB-HAM, MPI-OB, MPI-OM, OPATOY, TOYCLIM
SGI /	IRIX64 / MIPS	dcm13/23	SGI, Munich	ECHO, IPSL_CM4, MPI-AOB, MPI-AOB-HAM, MPI-OB, MPI-OM, OPATOY, TOYCLIM
SGI / Altix 3000	IA64SGI /	dcm25	SGI, Munich	ECHO, IPSL_CM4, MPI-AOB, MPI-AOB-HAM, MPI-OB, MPI-OM, OPATOY, TOYCLIM
SGI /	IRIX64 / MIPS	elnino	CERFACS, Toulouse	TOYCLIM
IBM /	AIX / Power4	hpca	ECMWF, Reading	TOYCLIM
NEC / SX-6	SUPER-UX / SX	mercure	IPSL, Paris	IPSL_CM4, OPATOY
SGI / Origin 3800	IRIX64 / MIPS	p1	KNMI, De Bilt	ECHO, OPATOY, TOYCLIM
Fujitsu / HPcline	Linux / Opteron Cluster	total1	F.S.E. Toulouse	TOYCLIM
NEC / SX-5	SUPER-UX / SX	uqbar	IPSL, Paris	IPSL_CM4, OPATOY
Fujitsu / VPP5000	UXPV / VPP	xbar	Meteo France, Toulouse	ECHO, OPATOY, TOYCLIM, ARPEGE-TOY, ARPEGE-ORCA, IPSL_CM4

Figure 4.5: PRISM compute sites used with the scripting SCE/SRE.