

Wikiprint Book

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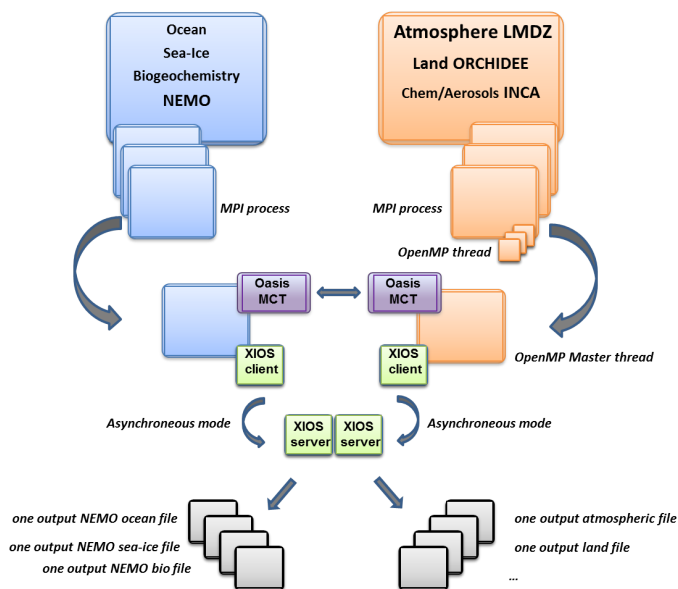
IPSLCM6 configurations

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1. IPSLCM6 model

IPSLCM6 is the **IPSL coupled climate model** under development for the CMIP6 simulations including atmosphere, land, ocean, sea ice and carbon cycle. This configuration includes :

- model components :
 - LMDZ as atmospheric model ;
 - NEMO as ocean model including sea ice (LIM2/LIM3) and marine biogeochemistry (PISCES) ;
 - ORCHIDEE as land model ;
- tools :
 - OASIS3-MCT as parallel coupler ;
 - XIOS as I/O library ;
 - libGCM as running environment (scripts) to run the model and to perform post processing ;



2. Resolutions and configurations

IPSLCM6 model will be available at different resolutions/configurations :

- **IPSLCM6A-VLR_rc0** : LMDZ (Old Physics) 96x95x39 - NEMO-LIM2-PISCES ORCA2
- **IPSLCM6-LR** (under development, not available) : LMDZ 144x144x79 - NEMO-LIM3-PISCES ORCA1xL75

2.1. IPSLCM6A-VLR_rc0

The resolution of LMDZ is 96x95 (3,75° in longitude and 1,875° in latitude) with 39 vertical levels. The ocean configuration is ORCA2 : global ocean with a tripolar grid with one South pole, one North pole above Siberia and one North pole above northern America. The resolution is 2°. In the tropical region, the latitudinal resolution decreases to 1/2°. There are 31 vertical levels.

IPSLCM6-VLR_rc0 is composed of following components and tools :

```
#-H- IPSLCM6_rc0  IPSLCM6_rc0 coupled configuration
#-H- IPSLCM6_rc0  Working configuration started 17/04/2013
#-H- IPSLCM6_rc0  with 5 NEMO sub-domains
```

```

#-H- IPSLCM6_rc0 NEMOGCM trunk revision 4859
#-H- IPSLCM6_rc0 XIOS branch xios-1.0 revision 592
#-H- IPSLCM6_rc0 IOIPSL/src svn tags/v2_2_2
#-H- IPSLCM6_rc0 LMDZ5 LMDZ6_rc0 branch revision 2283
#-H- IPSLCM6_rc0 ORCHIDEE version trunk rev 2247
#-H- IPSLCM6_rc0 OASIS3-MCT 2.0_branch rev 1129
#-H- IPSLCM6_rc0 IPSLCM6 v6_rc0 svn
#-H- IPSLCM6_rc0 libIGCM trunk 1174
#-M- IPSLCM6_rc0 arnaud.caubel@lsce.ipsl.fr
#-C- IPSLCM6_rc0 IOIPSL/tags/v2_2_2/src HEAD 8 IOIPSL/src modeles
#-C- IPSLCM6_rc0 trunk/ORCHIDEE 2247 14 ORCHIDEE modeles
#-C- IPSLCM6_rc0 branches/OASIS3-MCT_2.0_branch/oasis3-mct 1129 15 oasis3-mct .
#-C- IPSLCM6_rc0 LMDZ5/branches/LMDZ6_rc0 2283 11 LMDZ modeles
#-C- IPSLCM6_rc0 CONFIG/UNIFORM/v6_rc0/IPSLCM6 HEAD 8 IPSLCM6 config
#-C- IPSLCM6_rc0 trunk/libIGCM 1174 10 libIGCM .
#-C- IPSLCM6_rc0 trunk/NEMOGCM 4859 7 . modeles
#-C- IPSLCM6_rc0 XIOS/branchs/xios-1.0 592 12 XIOS modeles

```

2.1.1. How to use it

Here are the commands you need to know if you want to retrieve and compile the IPSLCM6 model and if you want to setup and run an piControl experiment (only piControl experiment is available):

```

mkdir MONREPERTOIRE ; cd MONREPERTOIRE
svn_ano # svn co http://forge.ipsl.jussieu.fr/igcmg/svn/modipsl/trunk modipsl
cd modipsl/util
./model IPSLCM6_rc0
cd ../config/IPSLCM6
gmake # by default ORCA2xLMD9695-L39
cp EXPERIMENTS/IPSLCM5/EXP00/config.card .
vi config.card # modify JobName (at least) : MYJOBNAME, restarts
../../util/ins_job # Check and complete job's header
cd MYJOBNAME
vi Job_MYJOBNAME # modify PeriodNb, adjust the time, headers ...
llsubmit Job_MYJOBNAME # IDRIS
ccc_msub Job_MYJOBNAME # TGCC

```

2.1.1.1. Specific command on TGCC Bull Curie thin nodes

The basic configuration (default configuration) uses 128 computing cores or 8 nodes: 1 for XIOS, 19 for NEMO, and 27 MPI and 4 OpenMP for LMDZ. You have to modify header of the Job script as follow :

```

#MSUB -n 128 # reservation des coeurs pour le job (ce doit etre egal a l'ensemble de process/threads : par exemple 27x4 +
#MSUB -x # Specifier que le noeud doit être dédié
#MSUB -E '--cpu_bind=none'

```

2.1.1.2. Specific command on IDRIS IBM Ada

The basic configuration uses 56 computing cores or 2 nodes: 1 for XIOS, 7 for NEMO, and 24 MPI and 2 OpenMP for LMDZ. You have to modify headers of the Job script as follows :

```

# Nombre de processus MPI demandes (ici 24 + 7 + 1 = 32)
#@ total_tasks = 32
# Nombre de coeurs réellement utilisés (ici 24 x 2 + 7 + 1 = 56)
#@ environment = "BATCH_NUM_PROC_TOT=56"
# Nombre de taches OpenMP/pthreads par processus MPI
#@ parallel_threads = 2

```

and config.card as follows :

```

=====
#D-- Executable -
[Executable]
#D- For each component, Real name of executable, Name of executable for oasis
ATM= (gcm.e, lmdz.x, 24MPI, 2OMP)
SRF= ( " " , " " )
SBG= ( " " , " " )
OCE= (opa, opa.xx , 7MPI)
ICE= ( " " , " " )
MBG= ( " " , " " )
CPL= ( " " , " " )
IOS= (xios_server.exe, xios.x, 1MPI)

```

2.1.2. Restart files

IPSLCM6 configuration could restart from any IPSLCM5A restart file.

2.1.3. Computing performances

2.1.3.1. TGCC Bull Curie thin nodes

Default configuration on 128 cores allows you to run 27 simulated years per day. You can reach 39 simulated years per day on 160 cores by modifying header of your Job as follows :

```

#MSUB -n 160 # reservation des coeurs pour le job (ce doit etre egal a l'ensemble de process/threads : par exemple 27x4 +
#MSUB -x # Specifier que le noeud doit être dédié
#MSUB -E '--cpu_bind=none'

```

and config.card as follows :

```

=====
#D-- Executable -
[Executable]
#D- For each component, Real name of executable, Name of executable for oasis
ATM= (gcm.e, lmdz.x, 32MPI, 4OMP)
SRF= ( " " , " " )
SBG= ( " " , " " )
OCE= (opa, opa.xx , 31MPI)
ICE= ( " " , " " )
MBG= ( " " , " " )
CPL= ( " " , " " )
IOS= (xios_server.exe, xios.x, 1MPI)

```

2.1.3.2. IDRIS IBM Ada

Configuration on 56 cores allows you to run 16 simulated years per day.

2.1.4. Evaluation

2.1.4.1. Results comparaison between IPSLCM5 and IPSLCM6 simulations

Here are simulations performed to validate IPSLCM6-VLR_rc0 configuration :

- CTL6M6G (default configuration)** : IPSLCM6-VLR_rc0 model (CM6 routing scheme, pmagic=-0.01, start from 2349-12-31 piControl2pm01)
 - Output and Analyse files : /ccc/store/cont003/dsm/p86caub/IGCM_OUT/IPSLCM6/PROD/piControl/CTL6M6G correspondants sur Curie :
- CTL6M6F : IPSLCM6-VLR_rc0 model(CM5 routing scheme, start from 2499-12-31 piControl2)
 - Output and Analyse files : /ccc/store/cont003/dsm/p86caub/IGCM_OUT/IPSLCM6/PROD/piControl/CTL6M6F
- CTL6M6H : IPSLCM6-VLR_rc0 model (CM6 routing scheme, pmagic=-0.01, without NEMO TKE IPSLCM5 parameters, start from 3199-12-31 CTL6M6G)
 - Output and Analyse files : /ccc/store/cont003/dsm/p86caub/IGCM_OUT/IPSLCM6/PROD/piControl/CTL6M6H

These simulations have been compared with IPSLCM5 simulations results :

- piControl2 : IPSLCM5A reference simulation
- CTLCM5V5v5 : IPSLCM5_v5 configuration(aerosols v5)
- piControl2pm01 : IPSLCM5A reference simulation with pmagic=-0,01.

2.1.4.2. Results comparaison between TGCC Curie and IDRIS Ada supercomputers