IPSLCM6.2 configuration - the ESM configuration

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IPSLCM6.2_work is a configuration under construction. Contact one of the persons in charge before first use.

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The IPSLCM6.2 configuration is a part of the IPSLCM6 family model describes here

1. Resolutions and configurations

IPSLCM6.2 model is available for different resolutions and sub-configurations :

- **VLR** : LMDZ 96x95x39-ORCHIDEE - NEMO-LIM2-PISCES ORCA2xL31. **under development**
- **LR** : LMDZ 144x144x79-ORCHIDEE - NEMO-LIM3-PISCES eORCA1xL75
- **MR1** : LMDZ 256x256x79-ORCHIDEE - NEMO-LIM3-PISCES eORCA1xL75 **under development**
- **MR025** : LMDZ 256x256x79-ORCHIDEE - NEMO-LIM3 eORCA025xL75
- **ESMCO2** : LMDZ 144x144x79-ORCHIDEE - NEMO-LIM3-PISCES eORCA1xL75 with interactive carbon cycle ocean/atmosphere.
- **ESMAER** : LMDZ 144x144x79-ORCHIDEE-INCA - NEMO-LIM3-PISCES eORCA1xL75 with interactive aerosols on atmosphere.

IPSLCM6.2 is composed of following components and tools (Oct. 2019) :

```
#-H- IPSLCM6.2_work  IPSLCM6.2_work coupled configuration
#-H- IPSLCM6.2_work  This configuration is under construction
#-H- IPSLCM6.2_work  NEMOGCM branch nemo_v3_6_STABLE revision 9455
#-H- IPSLCM6.2_work  SHACONEMO revision 279
#-H- IPSLCM6.2_work  XIOS trunk revision 1659
#-H- IPSLCM6.2_work  IOIPSL src trunk 4432
#-H- IPSLCM6.2_work  LMDZ6 trunk rev 3489
#-H- IPSLCM6.2_work  ORCHIDEE version branches/ORCHIDEE_2_2/ORCHIDEE revision 6189
#-H- IPSLCM6.2_work  OASIS3-MCT 2.0_branch rev 1818
#-H- IPSLCM6.2_work  IPSLCM6.2 latest revision
#-H- IPSLCM6.2_work  libIGCM trunk rev 1482
#-M- IPSLCM6.2_work  arnaud.caubel@lsce.ipsl.fr
#-C- IPSLCM6.2_work  IOIPSL/trunk                                4432      8  IOIPSL      modeles
#-C- IPSLCM6.2_work  branches/ORCHIDEE_2_2/ORCHIDEE              6189     14  ORCHIDEE    modeles
#-C- IPSLCM6.2_work  branches/OASIS3-MCT_2.0_branch/oasis3-mct   1818     15  oasis3-mct  .
#-C- IPSLCM6.2_work  LMDZ6/trunk                                 3559     11  LMDZ        modeles
#-C- IPSLCM6.2_work  CONFIG/UNIFORM/v6/IPSLCM6.2                 HEAD      8  IPSLCM6     config
#-C- IPSLCM6.2_work  trunk/libIGCM                               1488     10  libIGCM     .
#-C- IPSLCM6.2_work  branches/2015/nemo_v3_6_STABLE/NEMOGCM      9455      7  .           modeles
#-C- IPSLCM6.2_work  trunk/ORCA1_LIM3_PISCES                      287     17  .           modeles/NEMOGCM/CONF
#-C- IPSLCM6.2_work  trunk/ORCA025_LIM3_PISCES                    287     17  .           modeles/NEMOGCM/CONF
#-C- IPSLCM6.2_work  trunk/INCA6                                          873       9  INCA      mode
#-C- IPSLCM6.2_work  XIOS/trunk                                  1659     12  XIOS        modeles
```

1.1. IPSLCM

The default configuration LR is close to IPSLCM6.1 described in IPSLCM6.1 configuration.

- To compile you will use the target the command `./compile_ipslcm6.sh` (see below for more details on compilation)
- For the experiments, you can choose between `EXPERIMENTS/IPSLCM/pdControl_TEST` and `EXPERIMENTS/IPSLCM/piControl_TEST`

1.2. IPSLESM

This configuration allows coupling with CO2 cycle or interactive aerosols calculated by Inca model.
On this page we will describe how to use these 2 existing **ESM** configurations : **ESMCO2** and **ESMAER**

2. Technicals Details

2.1. How to use it

To retrieve the configuration :

```
mkdir YOUR_DIRECTORY ; cd YOUR_DIRECTORY
svn_ano    # svn co http://forge.ipsl.jussieu.fr/igcmg/svn/modipsl/trunk modipsl
cd modipsl/util
./model  IPSLCM6.2_work
cd ../config/IPSLCM6.2
```

The compilation slightly differs from what has been done so far. Now we used a script named **compile_ipslcm6.sh** with several option (resolution, level of optimisation, full or partial recompilation) to compile the model

```
########################################################################
# Usage of the script compile_ipslcm6.sh
#
########################################################################


./compile_ipslcm6.sh [Options]


Options: [LR / VLR / MR1 / MR025] Model resolution, choose only one. Default: LR.
        [ESMCO2] Compile IPSLCM6 for CO2 interactif ocean/atmosphere.
        [ESMAER] Compile IPSLCM6 for AER interactif on atmosphere
        [-full] Full recompilation of all components. This option can be added to all other options.
        [-cleannemo] Full recompilation of NEMO component  only.
        [-debug / -dev / -prod] Level of optimization. One of these can be added to all other compile options. Default: -p


Example 1: Default compilation of IPSLCM6 for resoltion LR
         (Resolution atmos: 144x142x79, ocean: ORCA1)
./compile_ipslcm6.sh

Example 2: Compilation of IPSLCM6 for resolution MR025
          (atmos: 256x256x79, ocean: ORCA025, NOPISCES)
./compile_ipslcm6.sh MR025

Example 3: Compilation of IPSLCM6 for ESM CO2
./compile_ipslcm6.sh ESMCO2 -cleannemo

Example 4: Default resoltuion (LR) compiled in debug mode
./compile_ipslcm6.sh -debug

Example 5: Default compilation with full recompilation of all components. No clean is needed.
./compile_ipslcm6.sh -full

Example 6: Full recompilation of resolution MR05 in debug mode
./compile_ipslcm6.sh MR025 -debug -full
```

To compile and create the Job for **ESMCO2**

```
./compile_ipslcm6.sh ESMCO2

cp EXPERIMENTS/IPSLESM/CO2/piControl_TEST/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 NbPeriodsPerJob, adjust the time, headers ...
sbatch Job_MYJOBNAME # IDRIS
```

```
ccc_msub  Job_MYJOBNAME # TGCC
```

To compile and create the Job for **ESMAER**

```
./compile_ipslcm6.sh ESMAER

cp EXPERIMENTS/IPSLESM/AER/piControl_AER_TEST/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 NbPeriodsPerJob, adjust the time, headers ...
ccc_msub  Job_MYJOBNAME # TGCC
```

2.2. Restart files

- ESMCO2 configuration starts from IPSLCM6 **CM61-pre-pi-01** simulation (1849-12-31) available from RESTART/IPSLCM6/PROD/piControl-spinup for all the components, except for the Coupler. The latter is taken from $CCCSTOREDIR/../../gencmip6/p86cadul/IGCM_OUT/IPSLCM6/PROD/piControl-spinup/
- ESMAER configuration starts from IPSLCM6 **CM61-pre-pi-01** simulation (1849-12-31) available from RESTART/IPSLCM6/PROD/piControl-spinup for all the components, except for the atmosphere. The latter is taken restart of the same simulation adding the concentration fo tracers for Inca aerosols configuration. This specific restart file is actually store on p24cozic account.

2.3. Output level

By default, only **monthly outputs** and **low output levels** are activated.

2.4. Lengths, frequencies

2.4.1. Period length

Default period length is 1Y, i.e in config.card :

```
PeriodLength=1Y
```

Note that clean_PeriodLength.job will remove last period files, i.e last simulated year files.

2.4.2. Pack Frequency

Default pack frequency is 1Y, i.e in config.card :

```
PackFrequency=1Y
```

2.4.3. Rebuild frequency

Since we run with XIOS (server mode) as output library, **the rebuild step is not needed anymore**.

2.5. How to add a parameter in NEMO's namelist?

- let find the parameter in namelist_ref. For example in modeles/NEMOGCM/CONFIG/SHARED/namelist_ref
- let find the namelist's name : for example &namicedyn
- let add a line with the new of the parameter in the file PARAM/namcouple_ESMCO2_ORCA1xLMD144142 in the &namicedyn section

2.6. What is the maximum length for a simulation name?

Due to limitation in NEMO, a simulation should have **less than 39 characters**.

2.7. Computing centres

This configuration runs on TGCC-Irene-SKL and at IDRIS-JeanZay.

2.7.1. TGCC Bull Curie thin nodes (not anymore in service)

- ESMCO2 : Default configuration on **929 cores** allows you to run **13 simulated years per day**.

2.7.2. IDRIS-JeanZay

Because of JeanZay architecture (computing nodes based on sockets of 20 cores), we advice you to use 2, 4, 5, 10 or 20 OpenMP threads for LMDZ-ORCHIDEE component. By default, the number of OpenMP threads defined in config.card is 8. To change that, you have to edit and modify config.card as follows :

```
[Executable]
#D- For each component, Real name of executable, Name of executable for oasis
ATM= (gcm.e, lmdz.x, 71MPI, 10OMP)
```

Do not forget to install a new Job (command ins_job) in order to take into account these modifications.