Wikiprint Book

Title: 1. Description

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Table of Content

The LMDZOR configurations: LMDZOR_v5 and LMDZOR_v5.2

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1. Description

LMDZOR is a configuration with LMDZ and ORCHIDEE models coupled together. There are different versions and the recommended version is LMDZOR_v5 or LMDZOR_v5.2. The 2 configurations LMDZOR_v5 and LMDZOR_v5.2 differs for the version of ORCHIDEE.

- In LMDZOR_v5 the CMIP5 version of ORCHIDEE is used. This configuration is the most closest to CMIP5 AMIP simulations. New physics in LMDZ can be activated. In this configuration ORCHIDEE is compiled with options in util/AA_make.gdef file.
- In LMDZOR_v5.2 a trunk version of ORCHIDEE is used. This configuration can use the CWRR hydrology scheme in ORCHIDEE. For LMDZ, same possiblities as LMDZOR_v5 are available. This configuration can be compiled and used in hybrid parallelization mode (MPI-OpenMP) after recompiling. In this configuration ORCHIDEE is compiled using makeorchidee_fcm. The compile options are found in models/ORCHIDEE/arch

LMDZOR_v5 is an update of the LMDZOR_v4 version, which is an update of LMDZ4OR_v3.

2. The components' source

Using an unreferenced trunk version of LMDZ or ORCHIDEE might be difficult. All versions on the trunk are not evaluated.

2.1. LMDZ

The default version is a revision called *testing* on the LMDZ5 trunk. This revision is regularly updated. LMDZOR_v5 is compatible with all versions from LMDZ4_AR5. Each user must think about which version to use and adapt it to his/her scientific goal. See chapter Download for more details.

The LMDZ4_AR5 version is used for CMIP5 at IPSL. To retrieve this version with configuration LMDZOR_v5, change in `mod.def` as follow before extracting:

```
#-C- LMDZOR_v5   LMDZ4/branches/LMDZ4_AR5     XXXX     11 LMDZ     models
```

To retrieve the LMDZ5 trunk (default) :

```
#-C- LMDZOR_v5   LMDZ5/trunk                  XXXX     11 LMDZ     models
```

In both cases, `XXXX` must be replaced by the revision number you want or by HEAD for the latest version. **Be careful, all revisions on the trunk is not guaranteed.**

2.2. ORCHIDEE

- LMDZOR_v5: The ORCHIDEE version used is the 1.9.5. tag. This tag has been used for CMIP5.
- LMDZOR_v5.2: The ORCHIDEE version is a revision on the trunk. You can update to a later revision or a branch of ORCHIDEE. In that case, be aware that the configuration might not have been tested before. See chapter Download for more details.

3. The resolutions

The model resolution must be chosen during the compiling phase. There are different predefined resolutions to compile. The default resolution is called *basse résolution* (low resolution) 96x95x39. The existing resolutions have a target in the main Makefile, in modipsl/config/LMDZOR_v5. For example LMD144142-L39 corresponding to the resolution 144x142x39 is also called *la moyenne résolution* (medium resolution). If you want to add a new resolution, use an existing target as an example.

Some resolutions are not defined to run a simulation. If you want to change this you must add the corresponding gcm.def file see here for the details.

4. Experiments

4.1. Initial and boundary conditions

By default you must create initial and boundary condition files for LMDZOR. See the details of LMDZ. You can perform an experiment with ORCHIDEE with or without restart file. See the details of ORCHIDEE. The predefined experiments have different boundary conditions specified in the `limit.nc` file.

4.2. Predefined experiments

There are two predefined experiments: clim and amip. The difference is for the boundary conditions.

- clim : the experiment uses boundary conditions (`limit.nc` file: surface temperature and sea ice fraction) produced with climatic amip. The same `limit.nc` file is used in the whole simulation. These files are created with job CREATE_clim in `EXPERIMENTS/LMDZ/CREATE_clim`.
- amip : the experiment has interannual boundary conditions produced by interannual amip files. These files are created with `CREATE_amip` in `EXPERIMENTS/LMDZ/CREATE_amip`.

There is a predefined experiment using LMDZ only in `EXPERIMENTS/LMDZ/clim`. It corresponds to the experiment `LMDZOR/clim` without ORCHIDEE and with a simplified land model in LMDZ.

4.3. ORCHIDEE experiments without stomate

In the ORCHIDEE experiments the sechiba and stomate sections are switched on by default. To deactivate the stomate component, see the ORCHIDEE model here.

5. Parallelism

Both configurations LMDZOR_v5 and LMDZOR_v5.2 compile by default for running mode with MPI parallelization. It is possible in the 2 configurations to change into sequential run mode.

In LMDZOR_v5.2 it is also possible to compile for hybrid MPI-OpenMP run mode at curie or ada. In that case you must change the main makefile and recompile:

```
cd modipsl/config/LMDZOR_v5.2
# Change in AA_make all 3 occurences for "-parallel mpi" into "-parallel mpi_omp"
../../util/ins_make
gmake clean
gmake
```

Read more about compiling in Chapter Compile.
Read more about parallelization in LMDZ in Chapter LMDZ.

6. Summary of the commands

See here a summary of the minimum of commands to install and run LMDZOR_v5. The same can be done by changing LMDZOR_v5 into LMDZOR_v5.2.

```
svn co http://forge.ipsl.jussieu.fr/igcmg/svn/modipsl/trunk modipsl
cd modipsl/util
./model LMDZOR_v5
cd ../config/LMDZOR_v5
gmake # par défaut LMD9695-L39

# Creating start and limit.nc files (to be done once per resolution)
cp EXPERIMENTS/LMDZ/CREATE_clim/config.card .
../../util/ins_job # Check and complete job's header
cd ELC-96x95x39
ccc_msub Job_ELC-96x95x39   / llsubmit Job_ELC-96x95x39

# Simulation with the gcm
cp EXPERIMENTS/LMDZOR/clim/config.card .
vi config.card # modify JobName (at least) : MYJOBNAME
../../util/ins_job # Check and complete job's header
cd MYJOBNAME
```

```
vi Job_MYJOBNAME
ccc_msub Job_MYJOBNAME  / llsubmit Job_MYJOBNAME
```

7. How to retrieve ORCHIDEE_OL in a LMDZOR configuration?

In case you want to work with LMDZOR simulations and ORCHIDEE offline simulations with the same model version, you will find it useful to have two configurations sharing the same **modipsl**. That's why by default in configuration LMDZOR_v5.2 the offline ORCHIDEE driver is also compiled and the directory config/ORCHIDEE_OL is installed. In ORCHIDEE_OL, set up for some offline ORCHIDEE experiments are found.

Once the compiling is done, you can work in config/LMDZOR_v5.2 for a coupled LMDZ-ORCHIDEE experiment or in modipsl/config/ORCHIDEE_OL for an offline ORCHIDEE experiment. You will therefore use the same sources for the two configurations.