

## **Wikiprint Book**

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## The LMDZOR\_v6 configuration

LMDZOR\_v6 is a configuration under construction. It can already be used but it is not in its final version. More information to come...

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### 1. Description

#### 1.1. Different versions

LMDZOR\_v6 configuration contains the atmospheric model LMDZ and the land surface model ORCHIDEE. This configuration is under construction towards the version that will be used for CMIP6. You need the latest version of modipsl to extract the latest version of LMDZOR\_v6. You can also extract a previous version of LMDZOR\_v6. For that case you need to set the right version of source codes for the models and the corresponding version of the configuration files. See the table here to know which is the current state of the configuration and how to install older versions. ORCHIDEE offline configuration directory is also extracted (in config/ORCHIDEE\_OL) but it is not used for LMDZOR simulations.

	Corresponding coupled model	LMDZ	ORCHIDEE	XIOS	IOIPSL	libIGCM	LMDZOR_v6 configuration files	ORCHIDEE_OL configuration files	modipsl	Comments
Default version	<a href="#">■IPSLCM6.0.8-LR</a>	IPSLCM6.0.8 rev 2791	trunk rev 4067	trunk rev 1043	tag v2_2_2	trunk libIGCM 1379	rev 3141	trunk rev 4112	trunk rev 3150	New physics NPv6.0.8, new vegetation forcing file, new albedo background file, new options in Orchidee for stress and albedo
Older versions	<a href="#">■IPSLCM6.0.7-LR</a>	testing rev 2729	trunk rev 3934	trunk rev 965	tag v2_2_2	trunk libIGCM 1373	rev 3075	trunk rev 3947	trunk rev 3078	New physics NPv6.0.7, new 2D ozone forcing files
	<a href="#">■IPSLCM6.0.6-LR</a>	testing rev 2720	trunk rev 3823	trunk rev 965	tag v2_2_2	tag libIGCM_v2.8.2	rev 3052	trunk rev 3945	trunk rev 3048	New default options all as IPSLCM6.0.6: resolution 144x142x79, NPv5.80bz0, CWRR
	<a href="#">■IPSLCM6.0.5-LR</a>	testing rev 2595	trunk rev 3623	trunk rev 858	tag v2_2_2	trunk rev 1333	rev 2958	trunk rev 3761	trunk rev 2990	Default options as CMIP5 (*). This version of LMDZ can not be used with XIOS/trunk 965.

	IPSLCM6.0.4-LR	testing rev 2546	trunk rev 3525	trunk rev 858	tag v2_2_2	trunk rev 1330	rev 2938	trunk rev 3551	trunk rev 2917	Default options as CMIP5 (*)
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(\*) Default options for CMIP5 are : resolution 96x96x39, old physics in LMDZ and 2-layer hydrology in ORCHIDEE. These options can be changed.

See below in the section [Quick installation](#) how to extract an old version.

## 1.2. Main differences between LMDZOR\_v6 and LMDZOR\_v5, LMDZOR\_v5.2

LMDZOR\_v6 :

- is adapted to the latest versions of LMDZ and ORCHIDEE.
- is only using XIOS for writing diagnostics. All diagnostics are configured in the xml files read by XIOS. The use of XIOS in server mode(default set up) removes the need for rebuild.
- is compiling the hybrid parallelization mode (mixed MPI-OPenMP) which means that more cores can be used during run time to speed up the computing reel time.
- has a clearer method for changing parameter files : the drivers can only change parameters set equal AUTO in the parameter files
  - variables marked as `_AUTO_` in the parameter files can be changed by the users. They can not be changed again by the scripts (the drivers). For example this is the case for all variables concerning the output. The user can set the output level as she wants directly into the `PARAM/file_def_...xml` files and it can not be overwritten by the drivers.
  - variables marked as `_AUTOBLOCKER_` must not be changed. If still they are changed, the simulation will stop with error message because the drivers are not allowed to make hidden modifications.

## 1.3. Compiling

Default compilation is 144x142x79 but other resolutions can be compiled. To compile 96x95x39 grid do as follow :

```
gmake LMD9695-L39
```

By default the compiling is done for hybrid MPI and OMP parallelism. It is not necessary but possible to activate OMP threads during run time.

## 1.4. Launching

The default set up is using 47 MPI \* 8 OMP for the gcm.e and 1 MPI for the xios server. Following is set in config.card :

```
[Executable]
ATM= (gcm.e, lmdz.x, 47MPI, 8OMP)
SRF= ("", "")
SBG= ("", "")
IOS= (xios_server.exe, xios.x, 1MPI)
```

Using the resolution 96x95 it is not possible to use more than 31MP for the gcm.e. Following is recommended for the resolution 96x95x39, set in config.card:

```
#D-- Executable -
[Executable]
ATM= (gcm.e, lmdz.x, 31MPI, 4OMP)
SRF= ("", "")
SBG= ("", "")
IOS= (xios_server.exe, xios.x, 1MPI)
```

## 1.5. XIOS and output control

XIOS is the new component used for output writing. It consists of a library linked to the model and an external server executable (xios\_server.exe). It can be launched in attached mode or in server mode. The default set up in LMDZOR\_v6 is using the server mode with 1 MPI for the server. 2 executables are launched: gcm.e and xios\_server.exe. No reconstruction is needed for the output files. The rebuild tool detects automatically that this is not needed.

LMDZOR\_v6 is only using XIOS for writing diagnostic output files. The output level is managed by xml files. The files beginning with file\_def....xml are controlling the variables and the files that are written. These files are stored in the model source directories, look into lmdz.card and orchidee.card to have the exact information.

A basic level of output control is done from config.card with the variables WriteFrequency. Finer control of the output must be done directly in the file\_def....xml files. Where it is set \_AUTO\_, it can be replaced manually if wanted.

For example in LMDZ/DefLists/file\_def\_histday\_lmdz.xml :

```
<file id="histday" name="histday" output_freq="1d" output_level="5" enabled="_AUTO_">
```

can be changed into

```
<file id="histday" name="histday" output_freq="1800s" output_level="2" enabled=".TRUE.">
```

## 1.6. Parameter files

Most parameter file are found in PARAM/ directory as for the v5 configurations. But some files are now also copied from the model directories. This is the case for some of the xml files. In lmdz.card and orchidee.card you can see where the files are taken from.

In the parameter files, some of the variables will be modified after the job is submitted. This is done by the *comp.driver*: lmdz.driver, orchidee.driver, stomate.driver and xios.driver. All the variables that might be modified are set equal \_AUTO\_ or \_AUTOBLOCKER\_. No variable can be modified without having this key word. The values are set according to the options from lmdz.card, orchidee.card, stomate.card and config.card.

A variable which is set to \_AUTO\_ can also be changed manually in the corresponding file in the PARAM directory. For this case, the driver can not change it again. Some variables are set equal \_AUTOBLOCKER\_. They cannot be changed. If still they are changed, the job will exit with error message.

### New physics in LMDZ:

Different versions of physics for LMDZ exist in PARAM directory. The choice is done from lmdz.card by setting the variable LMDZ\_Physics. The physiq.def and gcm.def files are suffixed by the version of the physics.

### CWRR 11-layer hydrology in ORCHIDEE:

Change between CWRR 11-layer(default) and Choissnel 2-layer in orchidee.card by setting DefSuffix=CWRR or DefSuffix=Choi. Note that this change implies to copy orchidee.def\_CWRR(default) or orchidee.def\_Choi. The differences between these files are more than just the hydrology. The choice DefSuffix=Choi are close the the version for CMIP5 and DefSuffix=CWRR is the current best choice for CMIP6.

## 1.7. COSP and NMC output

Default compiling is done with COSP. Options to activate COSP are available in lmdz.card but running with COSP output has not been tested.

NMC monthly output are activated by default.

## 2. Quick installation

```
# Install modipsl
svn co http://forge.ipsl.jussieu.fr/igcmg/svn/modipsl/trunk modipsl
cd modipsl/util

# Before next command, modify the file mod.def if you want to extract an old version (*)

# Download and compile configuration LMDZOR_v6
./model LMDZOR_v6
cd ../config/LMDZOR_v6
gmake          [or gmake LMD9695-L39]

# Experiment setup
cp EXPERIMENT/LMDZOR/clim/config.card .      # => modify at least JobName=MyJobname, DateBegin, DateEnd in config.card
../libIGCM/ins_job
cd MyJobname
```

```
# Modify default setup: change physics in lmdz.card
# Change hydrology(2- or 11- layer) in orchidee.card
ccc_msub Job_MyJobname / llsubmit Job_MyJobname
```

## 2.1. Extract a different version

Modify the file util/mod.def if you do not want the default set up. This must be done at step (\*) above, before the command `./model LMDZOR_v6`. Look for the lines starting with **#C- LMDZOR\_v6**. Each of these lines describes the extraction of one component which is included in the configuration LMDZOR\_v6. Change the revision number to correspond to the revision you need. See the [section Different versions](#) in the begging of this page for reference versions.

## 3. Simulations

- [10-year amip simulations done with LMDZ testing rev 2314 and ORCHIDEE rev 2724](#). Two simulations with old physics in LMDZ comparing Choisisnel (2 layer) and CWRR (11 layer) hydrology in ORCHIDEE.
- [10-year amip simulations done with LMDZ testing rev 2168 and ORCHIDEE rev 2724](#). The simulations are done with old physics (CL1 simulations) and NPv3.2 physics (CL2) in LMDZ and with both Choisisnel (2 layer) versus CWRR (11 layer) hydrology in ORCHIDEE.
- [Inter-monitoring with the simulations comparing LMDZ testing revision 2314 and 2168](#)

## 4. How to reproduce a coupled simulation with the forced model ?

You have run a simulation with IPSLCM6 and you would like to launch the same with LMDZOR\_v6 with limit conditions (SST and seaice) coming from the same or another IPSLCM6 simulation. In practice this is needed to estimate radiative forcing from MyIPSLCM6 experiment using SST and sea-ice from the same simulation or from a reference simulation

For this you need to follow all these steps :

- Create limit.nc using sst / sic and land-sea mask from your IPSLCM6 simulation, as described [here](#)
- Create your new experiment directory

```
cd modipsl/config/IPSLCM6
cp -r MyIPSLCM6 MyLmdzor6
cd MyLmdzor6
rm -rf Script* run.card Job* Debug
```

- modify config.card :
  - modify the JobName as you want
  - modify the TagName to LMDZOR
  - modify the Restart section to use Restart from MyIPSLCM6
  - remove or comment out all lines for the ocean component(OCE, MBG) and the coupler(CPL) in ListOfComponents and Executable section :

```
#####
#D-- ListOfComponents -
[ListOfComponents]
#D- For each component, Name of component, Tag of component
ATM= (lmdz, LMDZ4-dev)
SRF= (orchidee, ORCHIDEE_1_9_5)
SBG= (stomate, ORCHIDEE_1_9_5)
#OCE= (opa9, CMIP5_IPSL)
#ICE= (lim2, CMIP5_IPSL)
#MBG= (pisces, CMIP5_IPSL)
#CPL= (oasis, OASIS3-MCT)
IOS= (xios, XIOS)

#####
#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)
```

- Add the path of your new limit.nc files in [BoundaryFiles] Section of lmdz.card
- (If you are working with IPSLCM5A you need to put "type\_ocean=force" in PARAM/run.def)
- create your new job

```
../../../../libIGCM/ins_job
```