

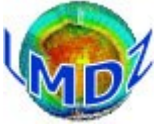
# *Installing the LMDZ model. Tutorial 1*

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LMDZ Training course, December 2017





# *First steps with LMDZ GCM: install\_lmdz.sh (1)*

```
wget http://www.lmd.jussieu.fr/~lmdz/pub/install_lmdz.sh  
chmod u+x install_lmdz.sh
```

```
./install_lmdz.sh -v 20171119.trunk -d 32x32x39
```

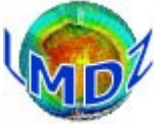
**1/ Get sources (netcdf, IOIPSL, LMDZ, ORCHIDEE)**

```
modipsl.20171119.trunk.tar.gz
```

```
bench_lmdz_32x32x39.tar.gz
```

**2/ Prepares makefiles and compiles the codes**

**3/ Launch a 1-day long test run at 32x32x39**



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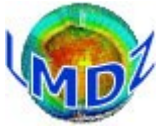
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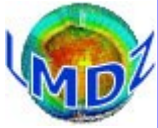
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*First steps with LMDZ GCM:  
install\_lmdz.sh options (2)*

**`./install_lmdz.sh -h`**



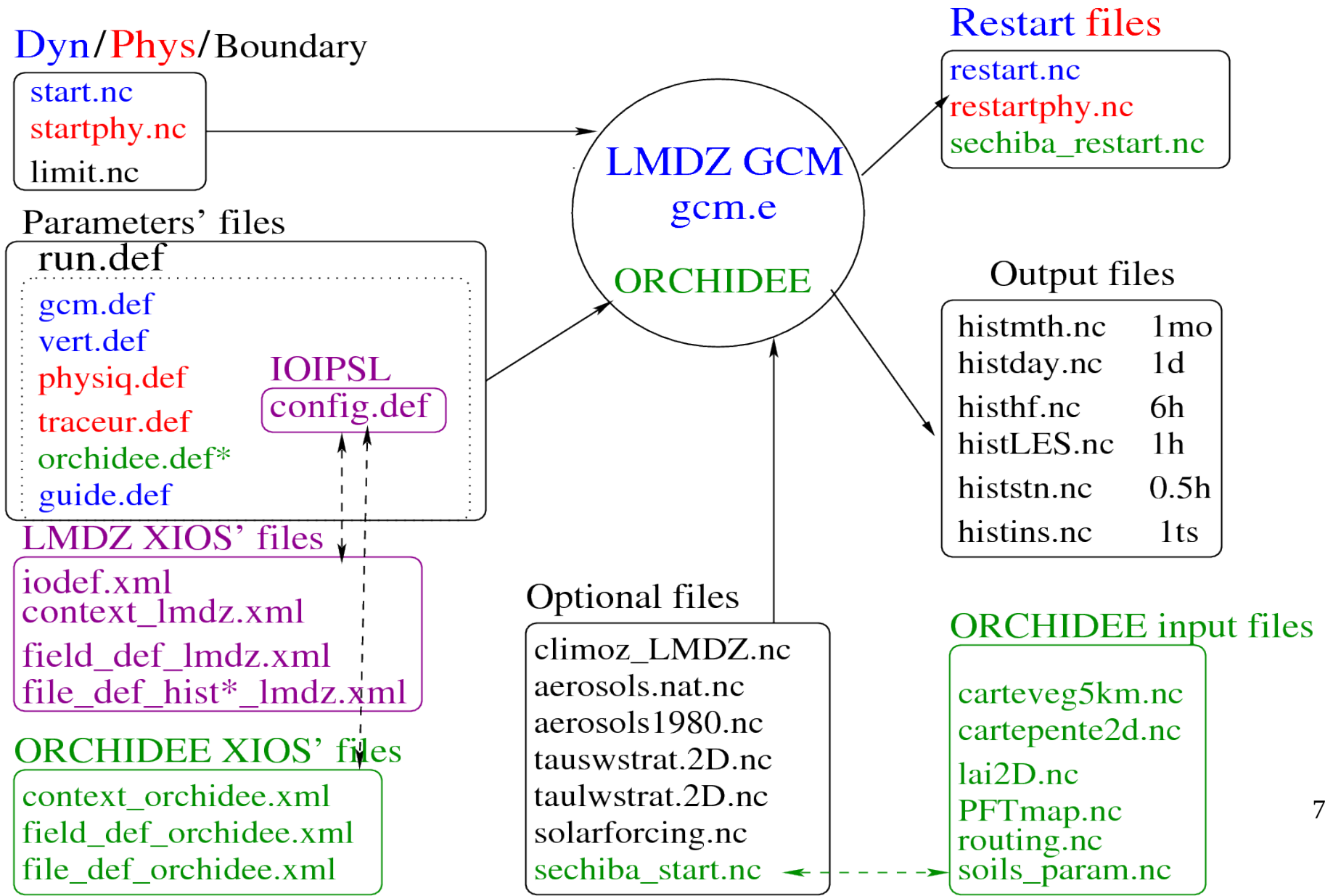
# *First steps: What you need to run the LMDZ GCM (1)*

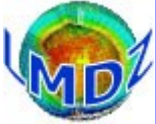
- Executable (LMDZ) file :  
gcm.e
- Parameters files :  
run.def, gcm.def, physiq.def, config.def, traceur.def
- Start files v :
  - start.nc, startphy.ncThese files are created by the ce0l.e program or may be the result of previous runs
- Boundary conditions file v :  
limit.nc  
Created by ce0l.e
- Some optional input files v (depending on the simulation) :
  - aerosols.nc, climoz\_LMDZ.nc, nudging input files (u.nc, v.nc,..), etc

v : these files have to be interpolated on the horizontal grid of the model

# First steps: What you need to run the LMDZ ORCHIDEE GCM (2)

## I/O files for a LMDZ run





# *Installing the model LMDZ*

There are 3 ways to install LMDZ ; right choice depends on the machine you are using and the type of simulation (long, test or development) you run.

## **1) Installing LMDZ by hand**

- get source code for each component you need (IOIPSL, ORCHIDEE, LMDZ) and link them with the netcdf library installed on your machine.

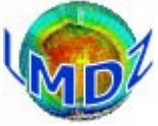
## **2) Installing LMDZ using MODIPSL and libIGCM**

- you will need to install one of the configuration defined by modipsl (for example LMDZOR\_v5)  
⇒ follow the IPSL Training course.
- this is recommended for IDRIS, TGCC, CINES and for long simulations, as it provides tested reference versions and scripts for launching and monitor long simulations.

## **3) Installing LMDZ using the install\_lmdz.sh script**

- this is what you're about to do.
- the script will download the source codes needed and will compile them
- recommended method for Linux PC ; used for developments and tests.





# *Using MODIPSL to install the model*

## **1) Installing LMDZ by hand**

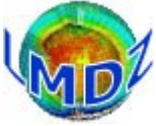
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- this is what you're about to do.
- the script will download the source codes needed and will compile them
- recommended method for Linux PC ; used for developments and tests.



# *Using MODIPSL to install the model*

- Recommended for IDRIS, TGCC and CINES for long runs. See :  
[https://forge.ipsl.jussieu.fr/igcmg\\_doc/wiki/Doc](https://forge.ipsl.jussieu.fr/igcmg_doc/wiki/Doc)

## **Main configurations** defined in modipsl :

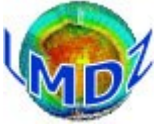
- **LMDZOR\_v5.2** : LMDZ coupled with ORCHIDEE (**MPI-OMP**)
- **LMDZOR\_v5** : LMDZ coupled with ORCHIDEE
- **LMDZINCA** : LMDZ coupled with INCA
- CMIP5 ocean-atmosphere : **IPSLCM5A, IPSLCM5B, IPSLCM5\_v5**

## **Main points** :

- Download modipsl
- Choose a given configuration (containing the different models)
- Compile all models using one main Makefile
- Launch the run (simulation and post-treatment) using libIGCM
- **modipsl and libIGCM courses - highly recommended ! also for false beginners -** are given at “Maison de la simulation” by the IPSL Plateforme group.

► Next courses : **To Be Determined**

[https://forge.ipsl.jussieu.fr/igcmg\\_doc/wiki/Train](https://forge.ipsl.jussieu.fr/igcmg_doc/wiki/Train)



# Using MODIPSL to install the model

More information on the LMDZ site (in French) :

<http://lmdz.lmd.jussieu.fr/utilisateurs/guides/lmdz-pas-a-pas>

To do once and for all :

Install netcdf

Install IOIPSL

```
svn co http://forge.ipsl.jussieu.fr/igcmg/svn/modipsl/trunk modipsl
cd modipsl/util
./model IOIPSL
Modify AA_make.gdef
./ins_make [-t g95 ou -t egi]
cd ../modeles/IOIPSL/src
gmake
```

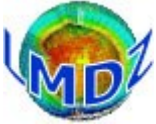
Get LMDZ

`svn co http://svn.lmd.jussieu.fr/LMDZ/LMDZ5/branches/testing LMDZ5`

Compile LMDZ

Fill in the paths for netcdf, IOIPSL et ORCHIDEE libraries in the arch-XXX.path used by `makelmdz_fcm` or `makelmdz` scripts.

```
./makelmdz_fcm -d <grid_resolution> -arch <XXX> gcm
./makelmdz -d <grid_resolution> -arch <XXX> gcm
```



# Getting the source codes and compiling

## 1) Installing LMDZ by hand

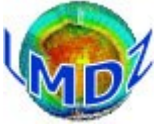
- get source code for each component you need (IOIPSL, ORCHIDEE, LMDZ) and link them with the netcdf library installed on your machine.

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⇒ follow the IPSL Training course.
- this is recommended for IDRIS, TGCC, CINES and for long simulations, as it provides tested reference versions and scripts for launching and monitor long simulations.

## 3) Installing LMDZ using the install\_lmdz.sh script

- this is what you're about to do.
- the script will download the source codes needed and will compile them
- recommended method for Linux PC ; used for developments and tests.



# Using `install_lmdz.sh` – Contents

Further details (in French), in particular the main modifications between versions:

<http://www.lmd.jussieu.fr/~lmdz/Distrib/LISM0I.trunk>

It will do most of the work for you, using standard shell tools and commands (gcc, wget, gunzip, tar, ...):

- Download the required codes archives
- **Install** ancillary **libraries** (netcdf, modipsl, ioipsl)
- Install land surface model ORCHIDEE if needed
- Choose adequate compiler options and build a Makefile
- **Install LMDZ** using any of **make\_lmdz\_fcm** and **make\_lmdz** scripts
- **Run a test bench**

Some parameters can be modified using command line options (short manual if you launch the script with **-h** option):

- **-v version:** choose a version/branch [YYMMDD.]trunk/testing
- **-r release\_nb:** choose a particular svn release
- **-parallel mode:** sequential/mixed parallelism **mpi\_omp** or **none**
- **-d grid\_resolution:** choose model grid resolution **nlonxnlatxnlev**
- **-bench:** launch or not a test bench **1/0**
- **-name MODEL:** choose model folder name **LMDZversion.release**
- ...



## *Using install\_lmdz.sh – Options*

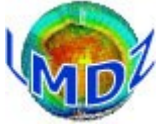
Some other parameters are defined in the script itself only ; you have to edit them:

- **compilo** choose compiler **gfortran / mpif90 / pgf90 / ifort**
- **getlmdzor** get a LMDZ archive **0/1**
- **netcdf** install NetCDF library **0/1**
- **check\_linux** check basic tools availability **0/1**
- **ioipsl** install IOIPSL I/O library **0/1**
- **veget** install ORCHIDEE land surface model **0/1**
- **compile\_with\_fcm** use makelmdz\_fcm or makelmdz **0/1**
- ...

•If you need to recompile later, use makelmdz[\_fcm].

This script is in constant evolution. Currently: OK for ADA (IDRIS) and a linux PC.

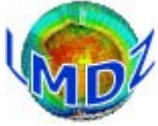
•Later: more machines, with XIOS.



# Using *install.sh* – Download and launch it

```
wget http://www.lmd.jussieu.fr/~lmdz/Distrib/install_lmdz.sh
chmod +x install.sh
    (possibly modify some variables in the script)
./install.sh
```


➡ **TP1**



## *Choosing which LMDZ version to work with*

Choose between the different available versions on the LMDZ web site:

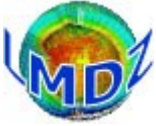
<http://lmdz.lmd.jussieu.fr/utilisateurs/distribution-du-modele> (in French)

**NB:** use the  flag to switch from a French to an English page, for existing translated pages.

Ask the LMDZ team for more information on which versions are actually used :

[lmdz-svp@lmd.jussieu.fr](mailto:lmdz-svp@lmd.jussieu.fr)





# Choosing which LMDZ version to work with

## 1 – *production or reference versions* :

### - LMDZ4\_AR5

`svn co http://svn.lmd.jussieu.fr/LMDZ/LMDZ4/branches/LMDZ4\_AR5`

- the most tested/validated version
- production version used for CMIP5
- runs with **old physics** package (*ancienne physique*)

### - LMDZ5\_AR5

`svn co http://svn.lmd.jussieu.fr/LMDZ/LMDZ5/branches/LMDZ5\_AR5`

- **new physics** version used for CMIP5

## 2 – *testing version* :

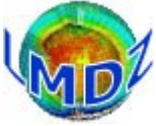
`svn co http://svn.lmd.jussieu.fr/LMDZ/LMDZ5/branches/testing LMDZ5`

- less tested than reference version but more tested than development version
- runs with **old** or **new physics** packages (*ancienne* et *nouvelle physique*)

## 3 - *development version* :

`svn co http://svn.lmd.jussieu.fr/LMDZ/LMDZ5/trunk`

- Beware! This is often updated and may not be thoroughly tested !
- Some revisions are more tested than others; these development versions eventually become **testing** versions.



# *Running the model*

```
ls
```

```
start.nc startphy.nc limit.nc config.def gcm.def orchidee.def  
physiq.def run.def traceur.def gcm.e L??.def
```

```
./gcm.e
```

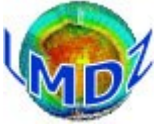
or

```
./gcm.e > lmdz.out 2>&1
```

To carry on a simulation that has been run, you have to copy the restart files obtained at the end of the previous run as new initial start files:

```
mv restart.nc start.nc  
mv restartphy.nc startphy.nc
```

```
./gcm.e
```



# *Has your run completed successfully ?*

## **YES**

▶ you will then have a message saying ***Everything is cool*** on the standard output or in the output text file.

▶ The code will have created 2 restart files

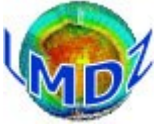
`restart.nc` and `restartphy.nc`

needed to carry on your run

▶ and some output diagnostic files

`histday.nc`, `histmth.nc`, etc. ...

to explore/view using `ferret`, `grads`, ...



# *Has your run completed successfully ?*

**NO**

You must find out what the problem is...

Look for an error message in the output text file.

Search for one of the following key words/phrase: ***Houston, we have a problem, STOP, hgardfou, integrd: negative surface pressure,*** etc.

## **Different typical errors :**

- technical problem : a missing input file, an error in one of the \*.def file
- ***problem with the model's stability.***

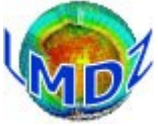
Instability in the physics are likely to be detected by **hgardfou**, which checks the model temperature has realistic values.

Instability in the dynamics most often end up the run with a ***negative surface pressure*** error message.

- ▶ ***In any of these cases you will most probably have to adjust some flags in the .def files. See the talk tomorrow.***

- ***you have some source code modifications that might not have been thoroughly tested or validated.***

# Some basic svn commands



# *Some basic svn commands* (1)

To get last revision of a directory with its sub-directories :

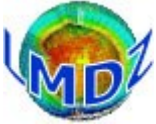
```
svn co http://svn.lmd.jussieu.fr/LMDZ/LMDZ5/trunk LMDZ5
```

Or for the last “robust” version :

```
svn co http://svn.lmd.jussieu.fr/LMDZ/LMDZ5/branches/testing LMDZ5
```

To get a particular revision, for example :

```
svn co -r 2692 http://svn.lmd.jussieu.fr/LMDZ/LMDZ5/trunk LMDZ5
```

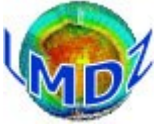


## *Some basic svn commands* (2)

To know what revision and branches you've downloaded:

```
svn info
```

```
Path: .  
URL: http://svn.lmd.jussieu.fr/LMDZ/LMDZ5/trunk/libf  
Repository Root: http://svn.lmd.jussieu.fr/LMDZ  
Repository UUID: e51f81be-29bc-408f-98e3-ee85b5628ff9  
Revision: 2699  
Node Kind: directory  
Schedule: normal  
Last Changed Author: oboucher  
Last Changed Rev: 2699  
Last Changed Date: 2016-11-07 22:23:46 +0100 (Mon, 07 Nov 2016)
```



## *Some basic svn commands* (3)

To know which files have been modified with respect to the extracted version:

```
svn stat
```

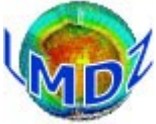
```
[rdzt079@ada337: misc]$ svn stat
?      regr_lint_m.F90
!      regr1_lint_m.F90
!      regr3_lint_m.F90
?      regr_conserv_m.F90
!      regr1_conserv_m.F90
M      slopes_m.F90
```

To see modifications with respect to last version on svn server:

```
svn -u stat
```

```
[rdzt079@ada337: misc]$ svn -u stat
?      regr_lint_m.F90
!      2699  regr1_lint_m.F90
!      2699  regr3_lint_m.F90
?      regr_conserv_m.F90
!      2699  regr1_conserv_m.F90
M      2699  slopes_m.F90
Status against revision: 2723
```





# *Some basic svn commands* (4)

To check the differences between different versions:

```
svn diff
```

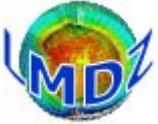
```
Index: regr_pr_int_m.F90
```

```
=====
--- regr_pr_int_m.F90 (revision 2699)
+++ regr_pr_int_m.F90 (working copy)
@@ -27,7 +27,7 @@
     use netcdf95, only: nf95_inq_varid, handle_err
     use netcdf, only: nf90_get_var
     use assert_m, only: assert
-    use regr1_lint_m, only: regr1_lint
+    use regr_lint_m, only: regr_lint
     use mod_phys_lmdz_mpi_data, only: is_mpi_root
     use mod_grid_phy_lmdz, only: nbp_lon, nbp_lat, nbp_lev
     use mod_phys_lmdz_transfert_para, only: scatter2d
@@ -96,7 +96,8 @@

! Regrid in pressure at each horizontal position:
do i = 1, klon
-    v3(i, nbp_lev:1:-1) = regr1_lint(v2(i, :), (/0., plev/), pplay(i, nbp_lev:1:-1))
+    call regr_lint(1,v2(i,:),(/0.,plev/),pplay(i,nbp_lev:1:-1), &
+    v3(i,nbp_lev:1:-1))
! (invert order of indices because "pplay" is in descending order)
end do
```

To check the differences between revision x1 and the working version:

```
svn diff -r x1
```



## *Some basic svn commands* (5)

To check the differences between x1 and x2 revisions:

```
svn diff -r x1:x2
```

Use **HEAD** to point to the last revision

To update your version with respect to the last revision of the branch you initially downloaded from:

```
svn update
```

To update your version with respect to revision x1 of the branch you initially downloaded from:

```
svn update -r x1
```

*Note that this **update** can be towards an older revision.*