

# Short introduction to use libGCM for ORCHIDEE offline configuration

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# libIGCM: a tool for running

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- Running the model is done using libIGCM.
- libIGCM is a script library developed at IPSL and used to run all different type of configurations, coupled as well as offline.
- Several predefined experiments are available for each configuration.
- **A training course in IPSL modeling tools and environment** (modipsl and libIGCM) is set up each year. This year it has been reported to April. It is highly recommended to follow this training.
- Documentation :  
**[http://forge.ipsl.jussieu.fr/igcmg\\_doc/wiki/Doc](http://forge.ipsl.jussieu.fr/igcmg_doc/wiki/Doc)**

# Before starting with libIGCM

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- You have installed a local modipsl
- You have already installed the configuration within modipsl
- Compilation is done with `./compile_orchidee_ol.sh` or main makefile
- Your executables are found in `modipsl/bin`

# Folder config/ORCHIDEE\_OL

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- In folder **modipsl/config/ORCHIDEE\_OL**, besides the compilation script, you'll find several folders with **predefined experiments ready to be used** with libIGCM. Choose the one you want and copy it to a new folder.
- Special case in coupled mode, you have to prepare this experiment folder using `ins_job`, by choosing a `config.card` among several in folder `EXPERIMENT`, read more here:  
[https://forge.ipsl.jussieu.fr/igcmg\\_doc/wiki/Doc/Setup](https://forge.ipsl.jussieu.fr/igcmg_doc/wiki/Doc/Setup)

# Offline experiences using libIGCM

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All experiments are set up to run global runs.

## **OOL\_SEC\_STO\_FG\***

Experiment set up with the full model, land use change activated. Different forcing files and parameter set up in the different folders.

## **SPINUP\_ANALYTIC\_FG1**

Experiment set up with the full model with spinup\_analytic activated. In this experiment, the forcing is set to loop over 10 years.

## **SPINUP and ENSEMBLE**

More complex experiences not taught here...

## **FORCESOIL**

Specific experiment to be used for spinup of the soil carbon pools, under development

# Example using OOL\_SEC\_STO\_FG2

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Choose an experiment and copy the folder.

```
> cd modipsl/config/ORCHIDEE_OL  
> cp -r OOL_SEC_STO_FG2 MyFG2  
> cd MyFG2
```

Now adapt the experiment, see next couple of slides.

# Example using OOL\_SEC\_STO\_FG2

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All experiment folders contain following:

- **config.card**: main file to configure the set up of the simulation. Contains start and end date, your job name, options for restart files, number of processors to be used, and more.
- **COMP** folder: contains comp.card and comp.driver for all components.
- **PARAM** folder: contains run.def, orchidee.def, orchidee\_pft.def files to be used during the simulation
- **POST** folder: contains files used for monitor time-series during simulation

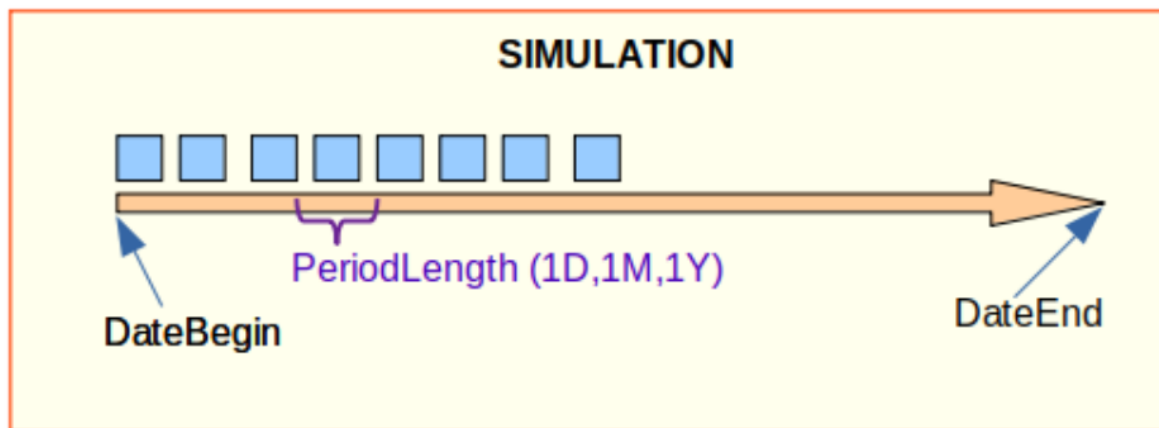
# Adapt config.card 1

Open the file and edit at least the JobName. You can choose what you want. We often set the same name as the experiment folder.  
**JobName=MyFG2**

Modify also

**DateBegin, DateEnd** : total length of the simulation.

**PeriodLength** : length of each execution. Often 1Y but for testing 1D.





## Adapt config.card 2

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**SpaceName, ExperimentName** : These variables will also be part of the path to the output files.

**OptMode**=prod or debug : the executable with this suffix will be used

In the section [**Executable**], number of processors to be used are set. Default set up is ok at irene/jean-zay. At ciclad/climserv and obelix, you can change 31MPI to 15MPI for orchidee\_ol.

**OOL= (orchidee\_ol\_\${OptMode}, orchidee\_ol, 31MPI)**

**IOS= (xios\_server\_\${OptMode}.exe, xios.x, 1MPI)**

In section [**Restarts**], set **OverRule=y** if you want to use restart files from a previous simulation. You need to inform RestartDate, RestartJobName, RestartPath.

# Folder COMP

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In folder COMP, you'll find `orchidee_ol.card`, `sechiba.card` and `stomate.card`. These files contains list with all input/output files that will be needed during the execution. You do not need to change these for a default run. But you can change these files if you need to change an input file or an option.

**orchidee\_ol.card**: specifies forcing files, parameter `.def` files and `.xml` files.

**sechiba.card and stomate.card**: specifies input files needed for the sechiba and stomate part of the model. Some option can also be set as for example `VEGET_UPDATE`. These options will then be written in `run.def` or `orchidee.def` file.

# Folder COMP 2

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**The activation of output files, their frequency and level of output are also set in sechiba.card and stomate.card. See comments in the files.**

For example, to have sechiba\_history.nc files with daily output and output\_level=5, set in sechiba.card :

```
output_level_sechiba_history = 5  
output_freq_sechiba_history = 1d
```

If you don't want to write a file, set the level to NONE :

```
output_level_sechiba_history=NONE
```

# Folder COMP 3

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In COMP folder, also **orchidee\_ol.driver**, **sechiba.driver** and **stomate.driver** files are stored. Note, in coupled configurations, these files are in the folder DRIVER.

**These files are not supposed to be modified.** They read what is set in the \*.card files and adapt the parameter files (run.def, orchidee.def and file\_def\_orchidee.xml) accordingly.

# Folder PARAM

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This folder contains parameter files needed to run ORCHIDEE :  
**run.def, orchidee.def, orchidee\_pft.def\_X.**

But the xml files which are very dependent of the revision of model and therefore copied directly from folder modipsl/modeles/ORCHIDEE/src\_xml/.

If you want to adapt your run, you can add or change parameters in run.def and orchidee.def.

If the parameter is already set and is equal AUTO or AUTOBLOCKER, these parameters will be changed according to what has been set in config.card or in COMP/\*.card, see next slide.

# Modify parameters with libIGCM

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The parameters marked with:

**AUTO** : These parameters can be changed using options in *comp.card* or *config.card*. You can also change them directly in the *run.def*, *orchidee.def* or *file\_def\_orchidee.xml*, for this case the drivers will not change them again.

**AUTOBLOCKER** : The job will stop if you modify these parameters. They are set by the *comp.driver* mainly using the information from *config.card*.

For example, in *PARAM/run.def*:

```
STOMATE_RESTART_FILEIN = _AUTOBLOCKER_  
XIOS_ORCHIDEE_OK = _AUTO_
```

# Create job and launch

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```
> cd modipsl/config/ORCHIDEE_OL
> cp -r OOL_SEC_STO_FG2 MyFG2
> cd MyFG2
> vi config.card    => Modify at least JobName=MyFG2, DateEnd

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

A script called Job\_JobName.ksh will be created.

```
> vi Job_MyFG2.ksh    => Check the headers
```

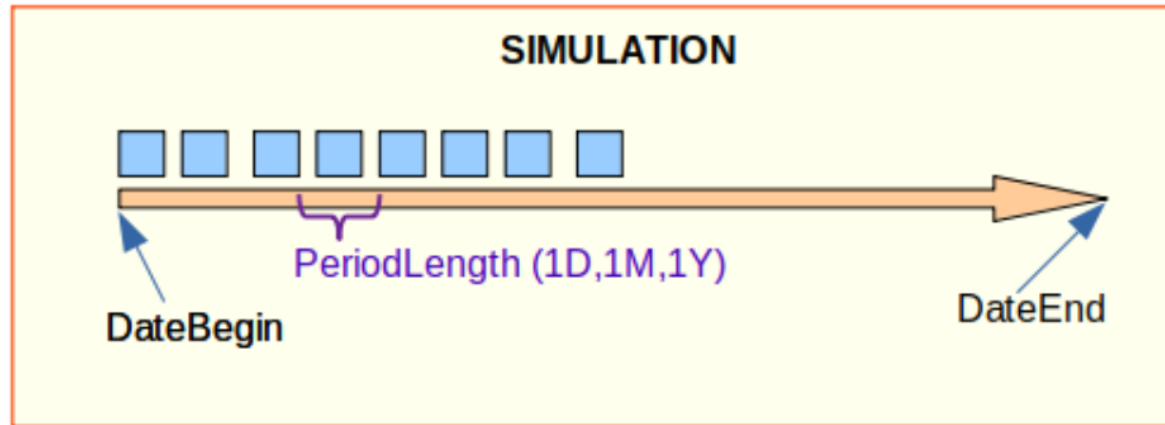
Launch the job using :

At ciclad/climserv/obelix : **qsub Job\_MyFG2.ksh**

At jean-zay : **sbatch Job\_MyFG2.ksh**

At irene : **ccc\_msub Job\_MyFG2.ksh**

# During run



\*\* A simulation is a succession of jobs chained by libIGCM to reach the DateEnd.

\*\* When the first job is come to the end, if DateEnd is not reached, the job will relauch automatically the next one.

\*\* By defaut, PeriodNb=1, which means that each job will launch 1 execution of PeriodLength

\*\* Set PeriodNb to loop over several PeriodLenght to optimize the time waiting in queue



# During run time

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**Script\_Output** file is written containing all information about file transfere and what libIGCM is realy doing.

When finished, **PeriodState=Completed** is set in **run.card**

If crash, a **Debug folder** is copied to the submit folder. Look into this and also in the **Script\_Output** file. Try to understand the error. Look for the first **ERROR** in **Script\_Output** file.

Before relauch after a crash, clean as follow :

**../../../../libIGCM/clean\_PeriodLengh.job**

Launch again as before.

# Where to find output files

The output will be stored in a folder created by libIGCM

***IGCM\_OUT/TagName/SpaceName/ExperimentName/JobName***

The place of this folder depends on the machine.

\*\* At **irene and jean-zay**, if SpaceName=TEST, all output will stay at \$CCCSCRATCHDIR or \$SCRATCH. If SpaceName=DEVT or PROD, output will first be stored at the scratch then sent to \$CCCSTORE or \$STORE.

\*\* At **ciclad** : IGCM\_OUT will be found in /data/login

\*\* At **Climserv** : IGCM\_OUT will be found in /homedata/login

\*\* At **obelix** : IGCM\_OUT will be found in /home/scratch01/login. Note that this is not a permanent folder so you can change this by adding in the config.card, in the same section as JobName, **ARCHIVE=/home/xxx/login** where xxx corresponds to a disk where you have write permission.

# Files in the output folder

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In IGCM\_OUT/...../JobName several sub-folders are created :

- **OOL/Debug** : copy of the \*.def and \*.xml files used at run time
- **SRF/Debug** : out\_orchidee text output
  
- **SRF/Output** and **SBG/Output** : diagnostic output files as written by the model : sechiba\_history.nc, stomate\_history.nc
  
- **SRF/Analyse/TS\_MO** and **SBG/Analyse/TS\_MO** : time-series created from files in the Output folders.

Output files related to sechiba part of the model is found in SRF folder.  
Output files related to stomate part is found in SBG folder.

# Time-series

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**« A Time Series file » is a file which contains a single variable over the whole simulation period.**

The files in folder SRF/Analyse and SBG/Analyse are created in post-processing jobs using the files from corresponding Output folder.

Times series are found in Analyse/TS\_MO.

**A selection of variables are produced by default as time-series.** These variables are set in sechiba.card and stomate.card, in the section called [Post\_1M\_filename], in list TimeSeriesVars2D and TimeSeriesVars3D.

# Repare time-series

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The time-series are not always created successfully. You can then launch the post-processing job again after the end of the simulation. This can also be done if you want more time-series than the default. Only variables in the history files written by the model can be used.

## # Go to the submit folder

```
> cd config/ORCHIDEE_OL/MyFG2
```

## # Create a new sub folder and copy COMP, POST and config.card

```
> mkdir REDO ; cd REDO
```

```
> cp -r ../COMP . ; cp -r ../POST .
```

```
> cp ../config.card .
```

## # Copy TimeSeries\_Checker.job from libIGCM and launch it in interactive mode

```
> cp ../../../../libIGCM/TimeSeries_Checker.job .
```

```
> ./TimeSeries\_Checker.job
```