Training Course : Ideal case

MesoNH Tutorial Class 1-4 December 2025

Presentation

Objectives

- run an ideal case
- discover and modify namelists

For each simulation :

- create a new directory
- modify namelists to change the name of the backup files

Preparation

cd ∼/MNH-V5-7-1/MY_RUN/KTEST
mkdir TP_CAS_IDEAL
cd TP_CAS_IDEAL
tar xvf ∼rodierq/tp_ideal_makefile.tar
cd SIMULATION1

For each new working terminal

Load the profile :
source ∼/MNH-V5-7-1/conf/profile_mesonh-LXgfortran-R8I4-MNH-V5-7-1-MPIAUTO-DEBUG

Simulation 1

1. Modify the namelists to have :
   - a square domain of 24x24 points with a mesh of 1 km
   - a time step of 15s
   - 1 hour of simulation
   - a numerical diffusion for momentum
   - 4 backup files (at 1200s, 1800s, 2400s and 3600s)
2. Run the simulation (run_prep_ideal_case_xyz + run_mesonh_xyz)
3. Modify the python script to plot graphics for the 1800s backup

Note on how to execute the program

./run_prep_ideal_case_xyz

```
#!/bin/sh
set -x
set -e
rm -f KWRAIN* OUTPUT_LISTING* pipe* *.tex
time ${MONORUN} PREP_IDEAL_CASE${XYZ}
~
~
```

./run_mesonh_xyz

```
#!/bin/sh
set -x
set -e
ln -fs ../001_prep_ideal_case/KWRAIN.* .
rm -f KWRAI.1.SEG* OUT*
time ${MPIRUN} MESONH${XYZ}
~
```

Simulation 2

1. From the namelists created for the **simulation 1**, modify the namelists to add orography with this features :
   - a bell orography
   - in the center of the domain
   - with a heigth of 2000m
   - and a width of 2000m in x and y
2. Run the simulation
3. Plot the figures and compare with the simulation 1

Simulation 3

1. From the namelists created for the **simulation 1**, modify the namelists to remove the perturbation in θ
2. Run the simulation
3. Plot the figures and compare with the simulation 1

Technical checks : "Did my simulation work ?"

1. Check the listing OUTPUT_LISTINGn files : look for "ENDS CORRECTLY" and/or the computing time-analysis ending Table

OUTPUT_LISTING0

```
|-------------------------------------------------------------------------------------------------------|
|                                                                                                       |
|                              COMPUTING TIME ANALYSIS in MODEL1                                        |
|                                                                                                       |
|-------------------------------------------------------------------------------------------------------|
|    CPUTIM/ELAPSE                    ||   SUM(PROC)   |MEAN(PROC)| MIN(PROC | MAX(PROC)| PERCENT %|
|-------------------------------------------------------------------------------------------------------|
|=======================================================================================================|
| STORE-FIELDS                | CPUTIM ||         0.020|     0.020|     0.020|     0.020|     6.701|
| STORE-FIELDS                | ELAPSE ||         0.029|     0.029|     0.029|     0.029|     9.231|
|+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++|
|+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++|
|+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++|
| MODEL1                      | CPUTIM ||         0.292|     0.292|     0.292|     0.292|   100.000|
| MODEL1                      | ELAPSE ||         0.316|     0.316|     0.316|     0.316|   100.000|
|+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++|
|+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++|
|+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++|

 ************************************************
 * PREP_IDEAL_CASE: PREP_IDEAL_CASE ENDS CORRECTLY. *
 ************************************************
```

Technical checks : "Did my simulation work ?"

2. Check the presence of the output NetCDF files
3. Check the global attributes "MNH_cleanly_closed" of the NetCDF files with

ncdump -h file.nc

```
// global attributes:
                :Conventions = "CF-1.7 COMODO-1.4" ;
                :MNH_REAL = "8" ;
                :MNH_INT = "4" ;
                :history = "2020-08-25T16:25:52+0200: /home/rodierq/E
I4-MNH-V5-4-3-MPIAUTO-O3/MASTER/PREP_IDEAL_CASE" ;
                :MNH_cleanly_closed = "yes" ;
}
```

How to debug a simulation ?

Common errors come from

- namelist : unclosed "", missing /, &, or wrong data input (see user's guide)
- missing or wrong input files

Look for error message or warnings on

1. the screen
2. the end of the OUTPUT_LISTINGn files
3. or the *.eo.* file (on supercomputer)

Contact the support team

mesonhsupport@utoulouse.fr

Bonus

If you have finished early, here are extra exercices.

Simulation 4

- Run the simulation 1 with the turbulence scheme turned on (name it simulation 4)
- Plot an horizontal section of the TKE at model level=5