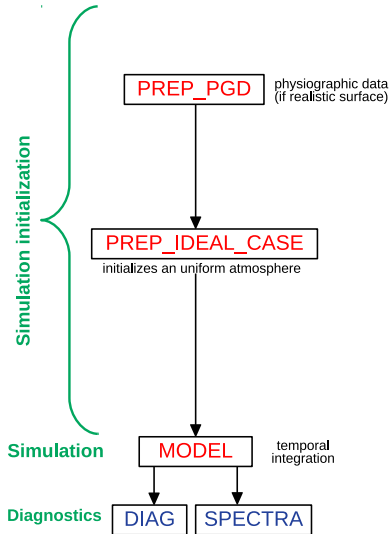


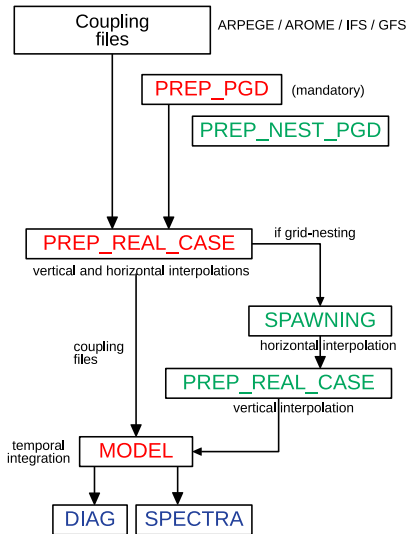
## Real case

MesoNH Tutorial Class 12-15 November 2024

## IDEAL CASE



## REAL CASE



## One-domain simulation

# Creation of PGD file

## Program PREP\_PGD

interpolation on horizontal grid of input fields

Output PGD : FM file with projection, domain and 2D fields

Input files for :

- ▶ orography
- ▶ cover
- ▶ sand fraction
- ▶ clay fraction

# Namelist PRE\_PGD1.nam

&NAM\_PGDFILE CPGDFILE='PGD\_DAD' / *PGD file name*

&NAM\_CONF\_PROJ XLAT0=37., XLON0=5.1, *lat/lon reference*  
cone factor XRPK=0.58, XBETA=0 / *rotation angle*

&NAM\_CONF\_PROJ\_GRID XLATCEN=38., XLONCEN=5., *center lat/lon*  
NIMAX=12, NJMAX=10, *number of points in I and J*  
XDX=2000., XDY=2000. /  $\Delta X$  and  $\Delta Y$

&NAM\_PGD\_SCHEMES CNATURE='ISBA', CSEA='SEAFLX',  
*surface schemes* CWATER='WATFLX', CTOWN='TEB' /

&NAM\_COVER YCOVER='ecoclimats\_v2' / *surface cover database*

&NAM\_ZS YZS='gtopo30' / *orography database*

&NAM\_ISBA YCLAY='clay\_fao', YSAND='sand\_fao' / *clay and sand fractions*

NIMAX and NJMAX must be equal to  $2^n 3^m 5^p$

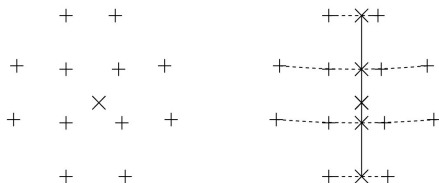
# Atmospherical fields

Atmospherical data are issued from :

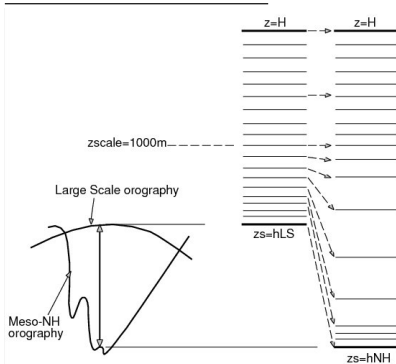
- ▶ model forecasts (GRIB) :
  - ▶ IFS, ERA5 : [extractecmwf](#)
  - ▶ ARPEGE, AROME, AROME-OM : [extractMF](#)
  - ▶ GFS
  - ▶ MOCAGE
- ▶ other MesoNH simulation

# PREP\_REAL\_CASE

- Horizontal interpolation  
for GRIB files (IFS, ERA5, ARPEGE, ALADIN, AROME or MOCAGE) : interpolation (U,V,T,q,Ps, 2D fields) on PGD grid from the nearest 12 points.



## ► Vertical interpolation



déplacement vertical selon la fonction 'shift'

entre  $hLS$  et  $zscale$



# Namelist PRE\_REAL1.nam

It must be made for the initial file and **all** coupling files

## &NAM\_FILE\_NAMES

HATMFILE ='arpege.FC.20110128.21' , *atmospherical file*

HATMFILETYPE='GRIBEX' , *type of atmospherical file*

HPGDFILE ='PGD\_DAD' , *PGD file name*

CINIFILE='28JANVIER\_21H' / *name of output file*

&NAM\_VER\_GRID NKMAX=120 , *number of points in Z*

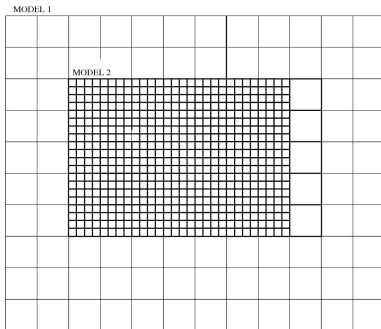
YZGRID\_TYPE='FUNCTN' , *FUNCTN or MANUAL*

ZDZGRD=10. , ZDZTOP=500. ,  $\Delta Z$  at ground/at top

ZZMAX\_STRGRD=2500. , *Height for stretching change*

ZSTRGRD=5. , ZSTRTOP=7. / *stretching at ground/at top*

## two-domain simulation



## 2 domains simulation : Grid-nesting

We need :

- ▶ a PGD file for every model
- ▶ All the PGDs must have the same averaged orography over their common area :  
PREP\_NEST\_PGD (the mean of orography for a SON file in the overlapping domain of its DAD file must be equal to the orography of the dad file at its resolution).

ALL PGD FILES MUST BE MADE AND "NESTED" BEFORE THE SIMULATION

- ▶ prepare initial file for the son's domain(s)
  - ▶ SPAWNING : horizontal interpolation of 3D fields from dad's model to son's model
  - ▶ PREP\_REAL\_CASE : vertical interpolation from DAD to SON
- ▶ a file EXSEGn.nam for every domain

## son's PGD : PREP\_PGD

### ► PRE\_PG1.nam :

&NAM\_PGDFILE

CPGDFILE='PGD\_SON' /

&NAM\_CONF\_PROJ /

&NAM\_CONF\_PROJ\_GRID /

&NAM\_PGD\_GRID

YINIFILE='PGD\_DAD',

YINIFILETYPE='MESONH',

/

&NAM\_INIFILE\_CONF\_PROJ IXOR=3, IYOR=4,

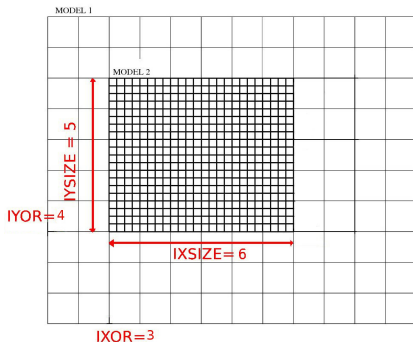
IXSIZE=6, IYSIZE=5,

IDXRATIO=4, IDYRATIO=4 /

&NAM\_COVER YCOVER='ecoclimats\_v2' /

&NAM\_ZS YZS='gtopo30' /

&NAM\_ISBA YCLAY='clay\_fao', YSAND='sand\_fao' /



# PREP\_NEST\_PGD

&NAM\_PGD1 YPGD1= 'PGD\_DAD' / *DAD PGD file*

&NAM\_PGD2 YPGD2= 'PGD\_SON' , IDAD = 1 /  
*First SON PGD file / number of the DAD file*

&NAM\_PGD3 /

...

&NAM\_PGD8 /

&NAM\_NEST\_PGD YNEST= 'e1' / *string of 2 characters to be added to the PGD file names*  
*to define the corresponding output PGD file names*

# SPAWNING

```
&NAM_GRID2_SPA /  
&NAM_LUNIT2_SPA CINIFILE = '28JANVIER_21H' ,  
                    name of the initial file  
                    CINIFILEPGD = 'PGD_DAD.neste1',  
                    PGD file associated to CINIFILE  
                    YDOMAIN = 'PGD_SON.neste1',  
                    PGD file name (output domain)  
                    YSPANBR = '04' /  
                    number to generate output file name : .spa04
```

The SPAWNING stage must be followed by **PREP\_REAL\_CASE** if the domain is not flat

# PREP\_REAL\_CASE

PRE\_REAL1.nam :

&NAM\_FILE\_NAMES

HATMFILE ='28JANVIER\_21H.spa04', *input file (spawned file)*  
HATMFILETYPE='MESONH',  
HPGDFILE ='PGD\_SON.neste1',  
CINIFILE ='28JAN21H\_MODEL\_2' / *output name of prep\_real\_case*

&NAM\_REAL\_CONF NVERB=5 /

&NAM\_VER\_GRID YZGRID\_TYPE='SAMEGR' /

&NAM\_PREP\_SURF\_ATM *namelist from SURFEX*

CFILE = '28JANVIER\_21H',  
CFILETYPE = 'MESONH' ,  
CFILEPGD="PGD\_DAD.neste1",  
CFILEPGDTYPE = 'MESONH' /

# Namelist

## Principe

One namelist **EXSEGn.nam** for each model

Model 1 (dad) : EXSEG1.nam

Namelist ended by **n** are relative to model 1

Other namelists are common for all models

Modele 2 (son) : EXSEG2.nam

There is only an initial file (no coupling file)

Only namelists ended by **n** are taken into account



# MODEL with grid-nesting

## file EXSEG1.nam

```
&NAM_LUNITn CINIFILE = "28JANVIER_21H",  
              CINIFILEPGD = "PGD_DAD.neste1"/  
              CCPLFILE(1) = "29JANVIER_00H"/  
  
&NAM_DYNn XTSTEP = 60., CPRESOPT = "CRESI",  
           NITR=8,LHORELAX_UVWTH = T,  
           LHORELAX_RV = T, LVE_RELAX = T,  
           NRIMX = 5, NRIMY = 5, XRIMKMAX = 0.0083 /  
  
&NAM_ADVn CUVW_ADV_SCHEME = "WENO_K",  
           NWENO_ORDER=5 CTEMP_SCHEME='RK53',  
           CMET_ADV_SCHEME = "PPM_01" /  
  
&NAM_PARAMn CTURB = "TKEL", CRAD = "ECMW",  
             CSCONV = "KAFR", CDCONV = "KAFR",  
             CCLOUD = "KESS"/
```

```

&NAM_PARAM_RADn XDTRAD = 3600.,
                    XDTRAD_CLONLY = 3600.,
                    NRAD_COLNBR = 400 /

&NAM_PARAM_KAFRn XDTCONV = 300., NICE = 1,
                    LREFRESH_ALL = T, LDOWN = T /

&NAM_LBCn CLBCX = 2*"OPEN", CLBCY = 2*"OPEN" /

&NAM_TURBn CTURBLEN = "BL89",
            CTURBDIM = "1DIM",
            LSUBG_COND = F /

&NAM_CONF CCONF = "START", start/restart simulation
            NMODEL = 2, number of [father + son(s)] models
            CEXP = "CTRL0", CSEG = "SEG01" /
            name of the outputs = CEXP.Nmodel.CSEG.00(n)

&NAM_DYN XSEGLEN = 400., LCORIO = T,
            XALKTOP = 0.001, XALZBOT = 14500. /

```

```

&NAM_NESTING NDAD(2) = 1, 1 is the father of the son number 2
      NDTRATIO(2) = 4, ratio of the timestep for the son number 2
      XWAY(2) = 2. 1 = one-way; 2 = two-way interactions /

&NAM_BACKUP XBAK_TIME(1,1)=100/

&NAM_CONFIO LCDF4=T LLFIOUT=T LLFIREAD=F /
&NAM_ISBAn CSCOND = "NP89", CALBEDO = "DRY",
      CC1DRY = 'DEF', CSOILFRZ = 'DEF',
      CDIFSFCND = 'DEF', CSNOWRES= 'DEF' /

&NAM_SGH_ISBAn CRUNOFF = "WSAT"/

&NAM_SEAFLUXn CSEA_ALB="UNIF" /

```

## file EXSEG2.nam

```
&NAM_LUNITn CINIFILE = "28JAN21H_MODEL_2"/  
                CINIFILEPGD = "PGD_SON.neste1"/  
  
&NAM_DYNn CPRESOPT = "CRESI",  
            LHORELAX_UVWTH = F, LHORELAX_RV = F,  
            LHORELAX_RC= F, LHORELAX_RR= F,  
            LHORELAX_RS= F, LHORELAX_RI= F,  
            LHORELAX_RG= F, LHORELAX_TKE= F,  
            LVE_RELAX = T,NITR=8,  
            NRIMX = 0, NRIMY = 0 /  
  
&NAM_ADVn CUVW_ADV_SCHEME = "WENO_K",  
            CMET_ADV_SCHEME = "PPM_01" /  
  
&NAM_PARAMn CTURB = "TKEL", CRAD = "ECMW",  
            CSCONV = "KAFR", CDCONV = "KAFR",  
            CCLOUD = "KESS"/
```

```

&NAM_PARAM_RADn XDTRAD = 1800.,
                  XDTRAD_CLONLY = 1800.,
                  LCLEAR_SKY = F, NRAD_COLNBR = 400 /

&NAM_PARAM_KAFRn XDTCONV = 300., NICE = 1,
                  LREFRESH_ALL = T, LDOWN = T /

&NAM_LBCn CLBCX = 2*"OPEN", CLBCY = 2*"OPEN",
           XCPHASE = 20. /

&NAM_TURBn XIMPL = 1., CTURBLEN = "BL89",
           CTURBDIM = "1DIM",
           LSUBG_COND = F /

&NAM_ISBAn CSCOND = "NP89", CALBEDO = "DRY",
           CC1DRY = 'DEF', CSOILFRZ = 'DEF',
           CDIFSFCOND = 'DEF', CSNOWRES= 'DEF'/

&NAM_SGH_ISBAn CRUNOFF = "WSAT"/

&NAM_SEAFLUXn CSEA_ALB="UNIF" /

```