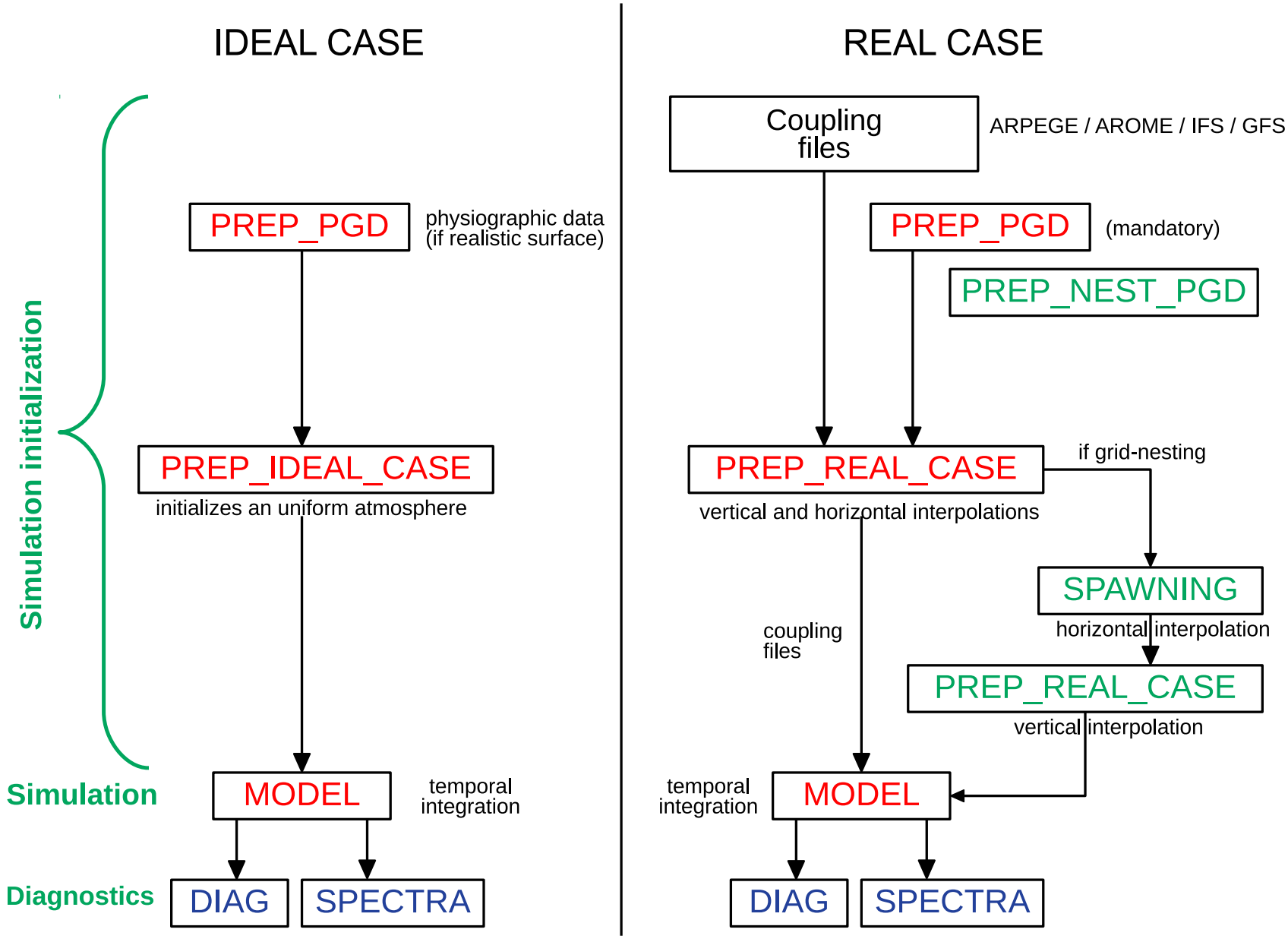
Real case

MesoNH Tutorial Class 1-4 December 2025


IDEAL CASE
REAL CASE
Simulation initialization
PREP_PGD
physiographic data
(if realistic surface)
PREP_IDEAL_CASE
initializes an uniform atmosphere
Simulation
MODEL
temporal
integration
Diagnostics
DIAG
SPECTRA
Coupling
files
ARPEGE / AROME / IFS / GFS
PREP_PGD
(mandatory)
PREP_NEST_PGD
PREP_REAL_CASE
vertical and horizontal interpolations
if grid-nesting
SPAWNING
horizontal interpolation
coupling
files
PREP_REAL_CASE
vertical interpolation
temporal
integration
MODEL
DIAG
SPECTRA

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. /ΔX and ΔY

&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 $2^n\ 3^m\ 5^p$

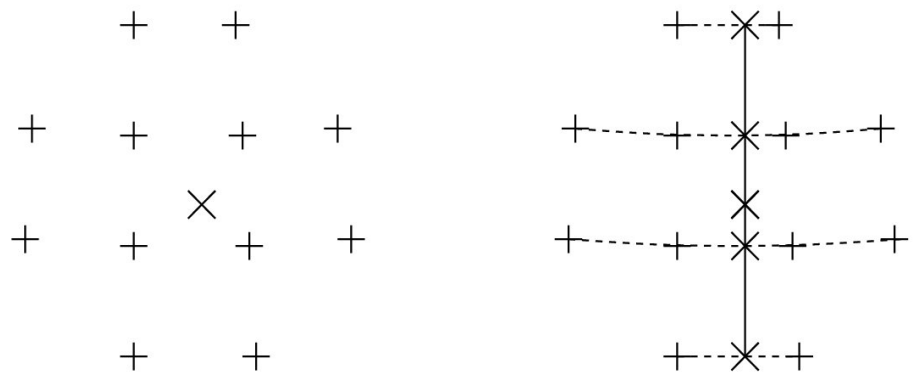
Atmospherical fields

Atmospherical data are issued from :

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

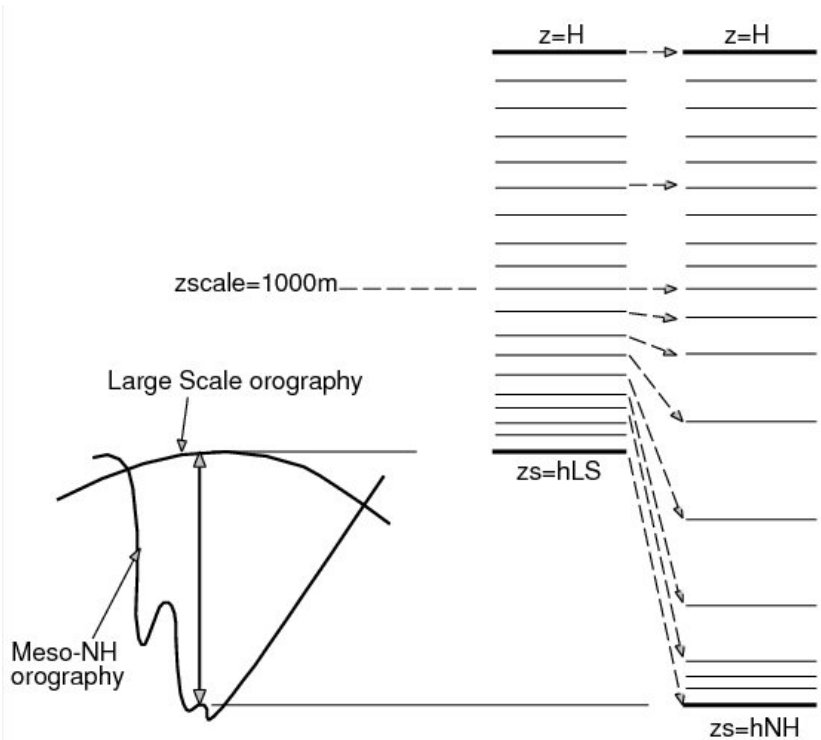
PREP_REAL_CASE

- 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.



PREP_REAL_CASE

- Vertical interpolation



déplacement vertical selon la fonction 'shift'

entre hLS et zscale

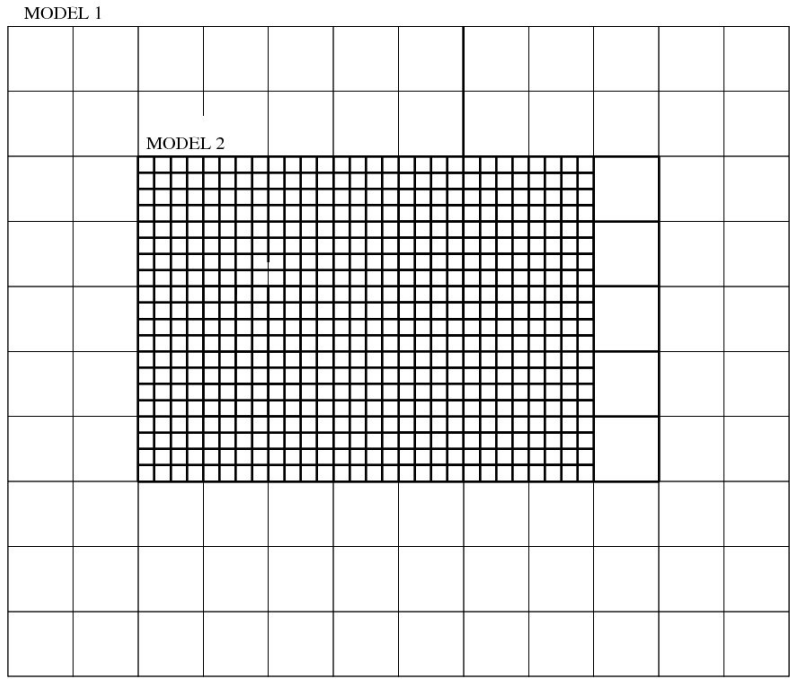
Namelist PRE_REAL1.nam

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.,ΔZ at ground/at top
              ZZMAX_STRGRD=2500., Height for streching change
              ZSTRGRD=5.,ZSTRTOP=7. /streching at ground/at top
```

two-domain simulation



2 domains simulation : Grid-nesting

We need :

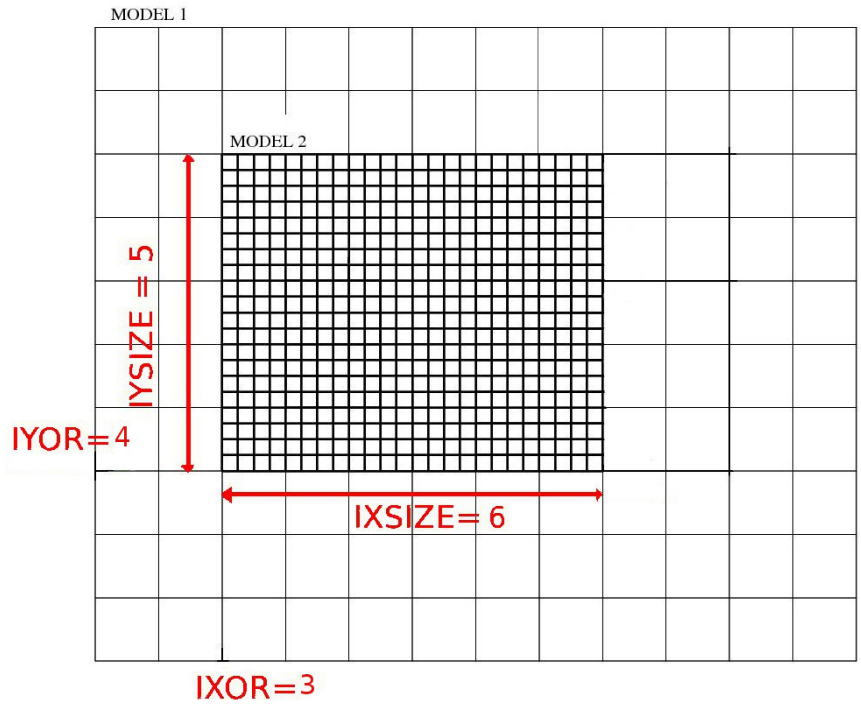
- a PGD file for every model
- All the PGDs must have the same averaged orography over their common area :
  PREP_NEST_PGD (the mean of orography for a SON file in the overlapping domain of its DAD file must be equal to the orography of the dad file at its resolution).

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_PGD1.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 EXSEG**n**.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',
           CDIFSFCOND = '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" /
```