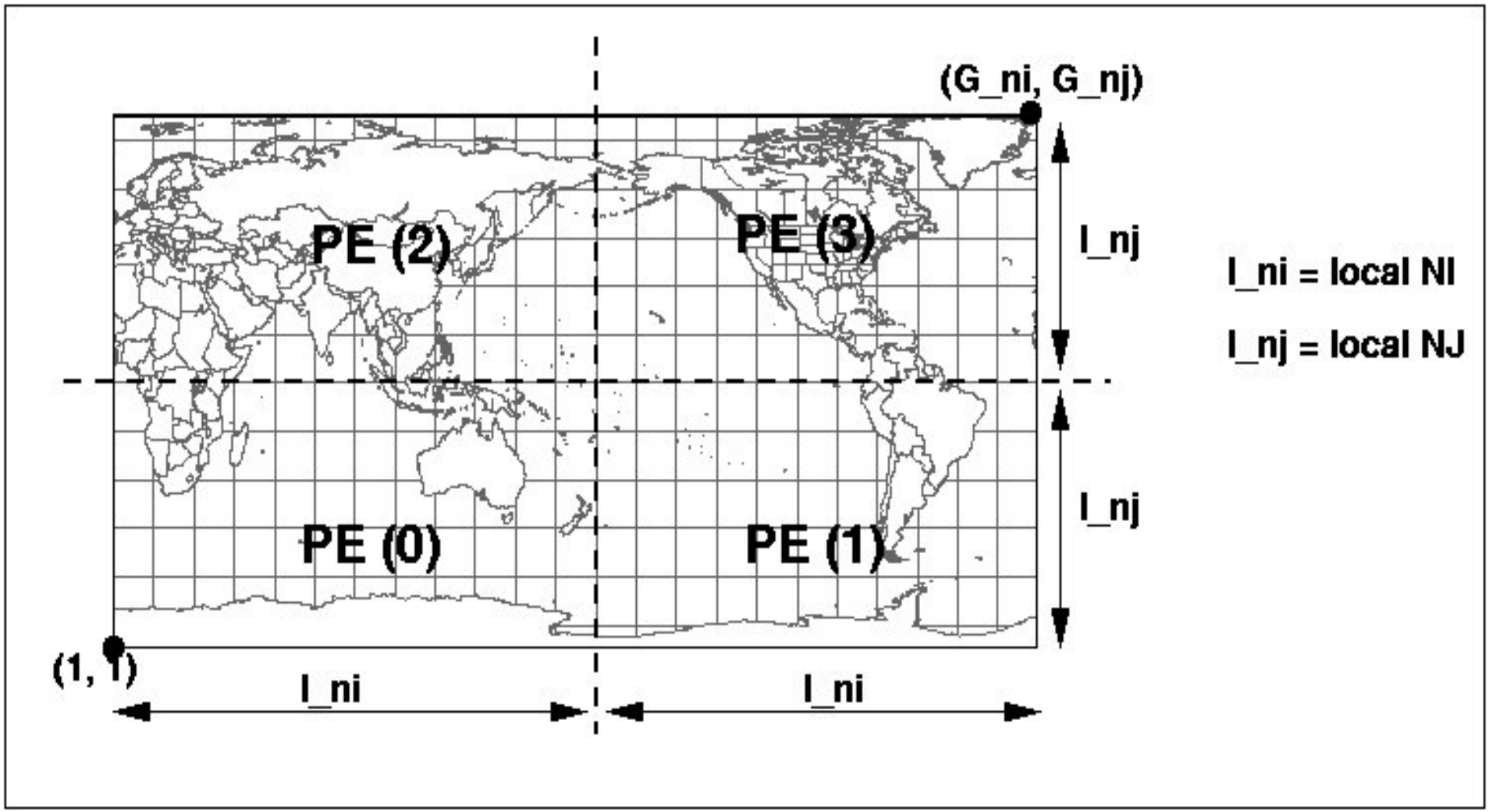
Tout ce que vous avez toujours voulu savoir sur GEMDM sans jamais oser le demander…

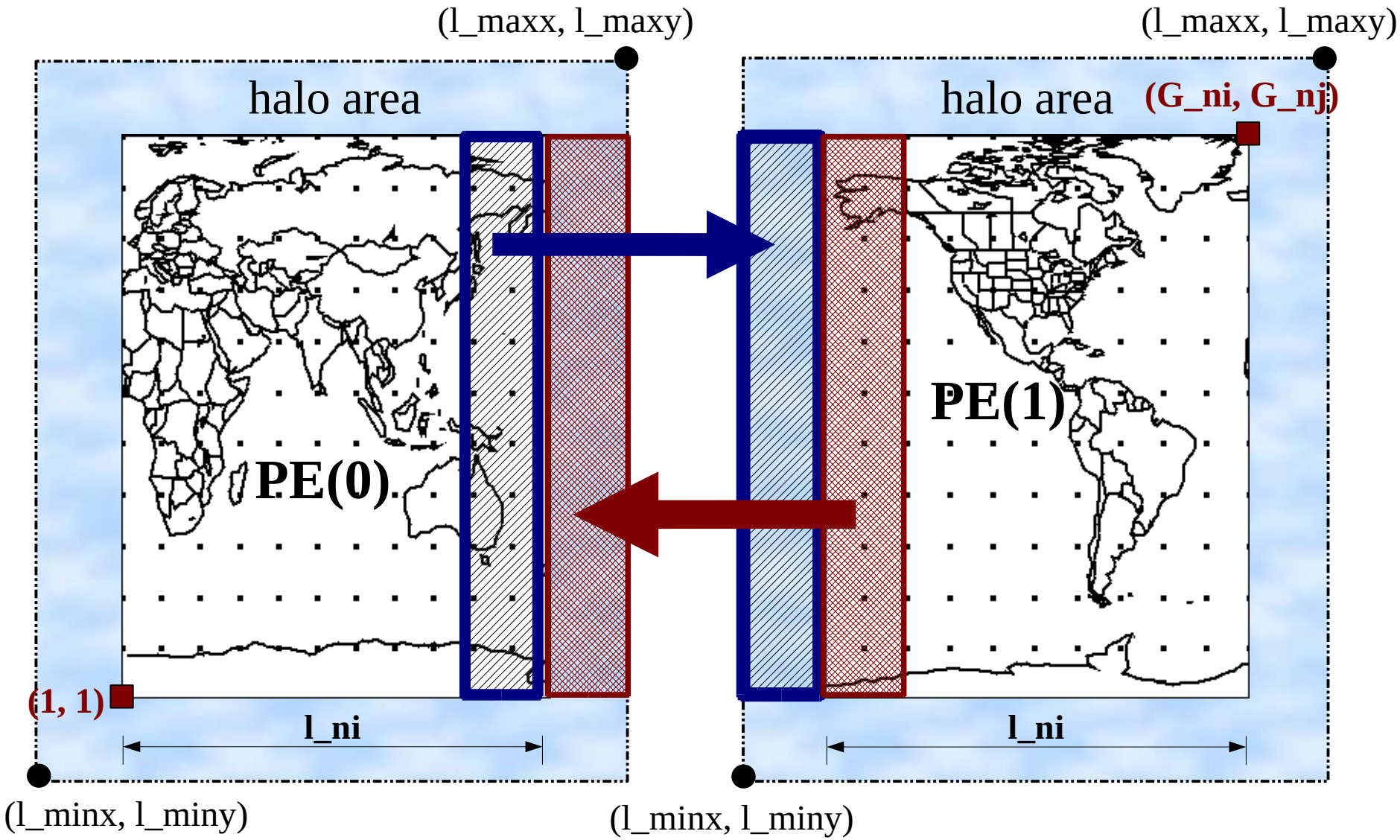
V.Lee, M. Desgagné

GEM DISTRIBUTED MEMORY

Ptopo_npex=2, Ptopo_npey=2



Message Passing Interface (MPI)



GEMDM History

v_2.0.0 ---> July 13, 2000 (first release, now obsolete)
v_3.1.2 ---> April 27, 2004 (operational global run)
v_3.2.0 ---> October 22, 2004 (operational regional run)
v_3.2.1 ---> July 31, 2005 (unreleased)
v_3.2.2 ---> December ?, 2005 (meso-global test runs)

Important Note before beginning...

Remove
.cshrc
in
$HOME

GEMDM ENVIRONMENT

. r.sm.dot gem [version]

example:

. r.sm.dot gem 3.2.1

$gem **$PATH**

echo **$PATH**
/usr/local/ssh/bin:/opt/pgi/linux86/bin:/data/dormrb04/tmpdirs/armnviv/90788106/bin:/users/dor/armn/viv/ovbin**.../usr/local/env/armnlib/modeles/GEMDM/v_3.2.1/scripts:/usr/local/env/armnlib/modeles/GEMDM/v_3.2.1/bin/IRIX64**

echo **$gem**
/usr/local/env/armnlib/modeles/GEMDM_shared/v_3.2.1

```
pollux 26% cd $gem
pollux 27% pwd
/usr/local/env/armnlib/modeles/GEMDM_shared/v_3.2.1
pollux 28% ls
Makefile_AIX       RCS_DYN/           patches/
Makefile_IRIX64    bin/               run_configs/
Makefile_Linux     dfiles/            scripts/
RCS/               doc/               src/
RCS_4DVAR/         lib/               src_4d/
pollux 29%
```

doc – documentation
src – source code
RCS – archived source (same as “src” but with “,v”)
scripts – control commands
patches – patch code
run_configs – sample run configs
lib – libraries
bin – binaries (Not model binaries!)

NO DEFAULT MODEL EXECUTABLES

maingemntr_${ARCH}_${version}.Abs

ie:

maingemntr_AIX_3.2.0.Abs
maingemntr_IRIX64_3.2.0.Abs
maingemntr_Linux_3.2.0.Abs

maingemdm_${ARCH}_${version}.Abs

ie:

maingemdm_AIX_3.2.0.Abs
maingemdm_IRIX64_3.2.0.Abs
maingemdm_Linux_3.2.0.Abs

Setup for your Working Directory **cont'd**

```
lorentz 5% . r.sm.dot gem 3.2.1
lorentz 6% cd $HOME
lorentz 7% mkdir exp321
lorentz 8% cd exp321
lorentz 9% ouv_exp (etagere utility)
lorentz 10% r.make_exp
lorentz 11% mkdir process output malibLinux
lorentz l2%  make gem
lorentz 13% ls
Makefile                    maingemdm_Linux_3.2.1.Abs*   malibLinux/
RCS/                        maingemntr_Linux_3.2.1.Abs*  output/
arbre_de_dependance         make_cdk                     process/
```

Disk quota exceeded?

lorentz 21% ls

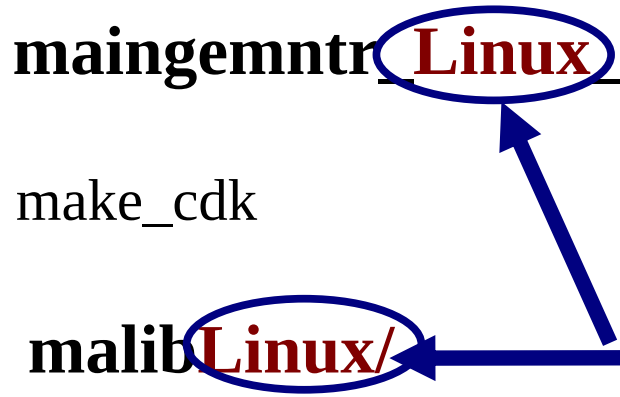
Makefile
outcfg.out
RCS/
output/
arbre_de_dependance
process/
gem_settings.nml

maingemdm_Linux_3.2.1.Abs*

maingemntr_Linux_3.2.1.Abs*

make_cdk

malib/Linux/



$ARCH (machine)
Linux (PC)
AIX (Azur)
IRIX64 (Pollux)

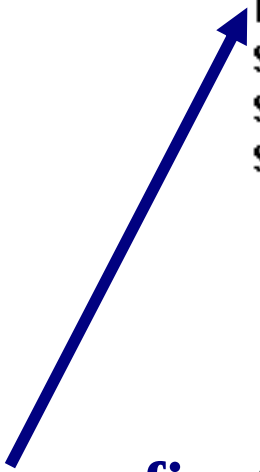
Use “linkit” or make soft links!

Use of **linkit** highly recommended for each machine **arch**itecture

```
lorentz 22%  echo $ARCH
Linux
lorentz 23%  export storage_model=/data/local/armnviv
lorentz 24%  linkit
lorentz 25%  ls
Makefile                    maingemdm_Linux_3.2.1.Abs@
  outcfg.out
RCS/                        maingemntr_Linux_3.2.1.Abs@
  output@
arbre_de_dependance         make_cdk
  process@
gem_settings.nml            malibLinux@
```

Configuration Files

```
pollux 26% cd $gem
pollux 27% pwd
/usr/local/env/armnlib/modeles/GEMDM_shared/v_3.2.1
pollux 28% ls
Makefile_AIX       RCS_DYN/           patches/
Makefile_IRIX64    bin/               run_configs/
Makefile_Linux     dfiles/            scripts/
RCS/               doc/               src/
RCS_4DVAR/         lib/               src_4d/
pollux 29%
```



lorentz 23% cp $gem/**run_configs**/dbg1/* .

lorentz 24% ls

Makefile
RCS/
arbre_de_dependance
configexp.dot.cfg
gem_settings.nml
maingemdm_Linux_3.2.1.Abs*
maingemntr_Linux_3.2.1.Abs*
make_cdk
malibLinux/
outcfg.out
output/
process/

gem_settings.nml

&grid
Grd_typ_S='GU', Grd_ni=23, Grd_nj=12,
/

&ptopo
Ptopo_npex=2, Ptopo_npey=2,
Ptopo_nblocx=1, Ptopo_nblocy=1
/

&gement
Out1_etik_s = 'MYRUN',
Topo_filmx_L = .true., Topo_init_L = .true.,
P_pbl_schsl_s = 'FCREST',
/

&gem_cfgs
hyb = 0.000, 0.011, 0.027, 0.051, 0.075,
0.101, 0.127, 0.155, 0.185, 0.219,
0.258, 0.302, 0.351, 0.405, 0.460,
0.516, 0.574, 0.631, 0.688, 0.744,
0.796, 0.842, 0.884, 0.922, 0.955,
0.980, 0.993, 1.000,
Grd_rcoef = 1.6, Pres_ptop = 10.,
Step_total = 6, Step_rsti = 999,
Step_gstat = 1, Lctl_debug=.true.,
Schm_phyms_L = .true.,
Out3_nbitg = 32,
/

&physics
P_pbl_bndlr_s = 'clef',
P_cond_conv_s = 'oldkuo', P_cond_stcon_s='newsund',
P_cond_schlct_s = 'conres','nil',
P_serg_srsus_L=.false., P_zong_znsus_L=.false.,
/

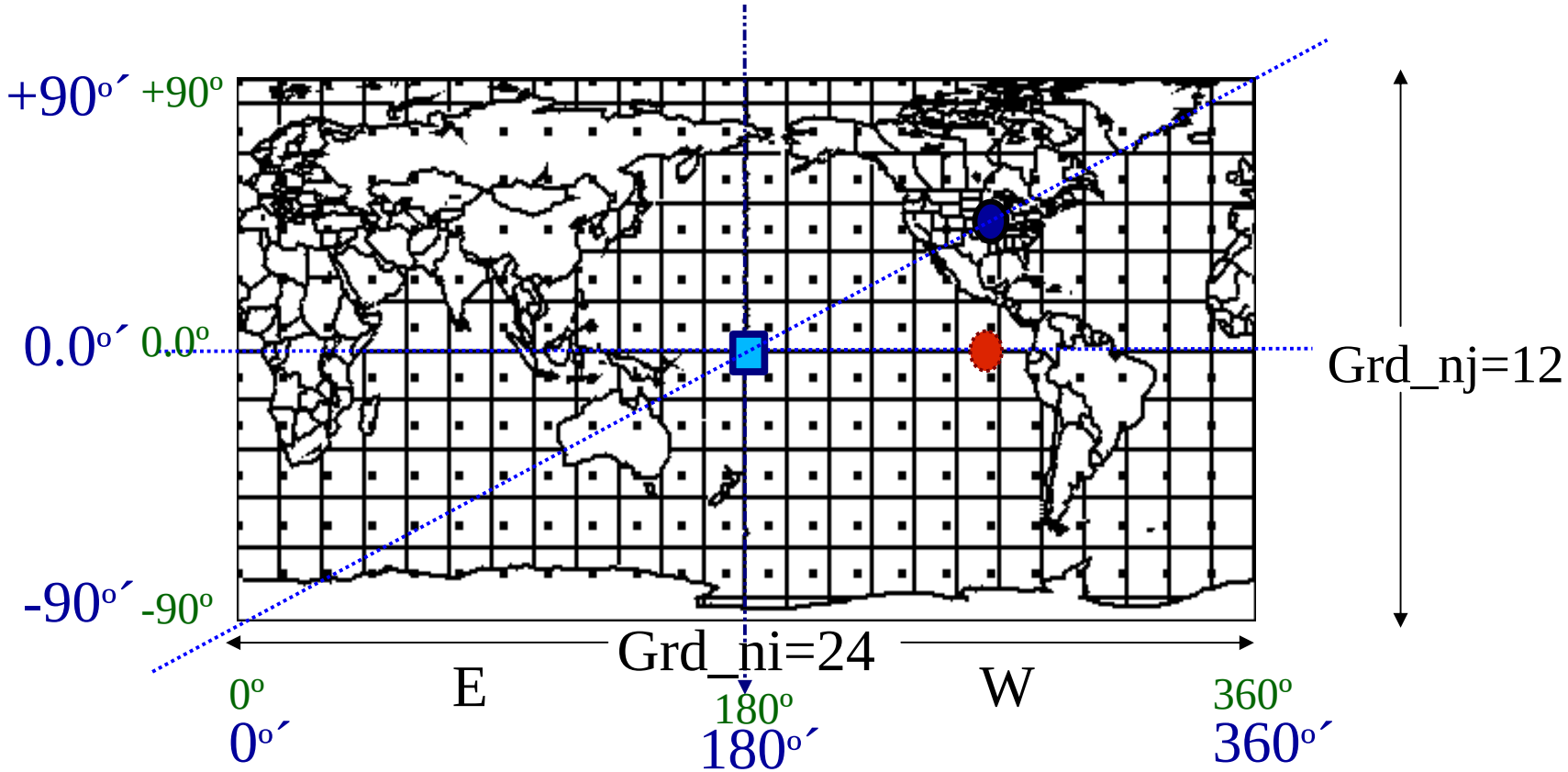
gem_settings.nml ('grid' namelist)

Grd_typ_S

- GU – Global Uniform
- GV – Global Variable
- LU – LAM Uniform

Global Uniform grid – not rotated

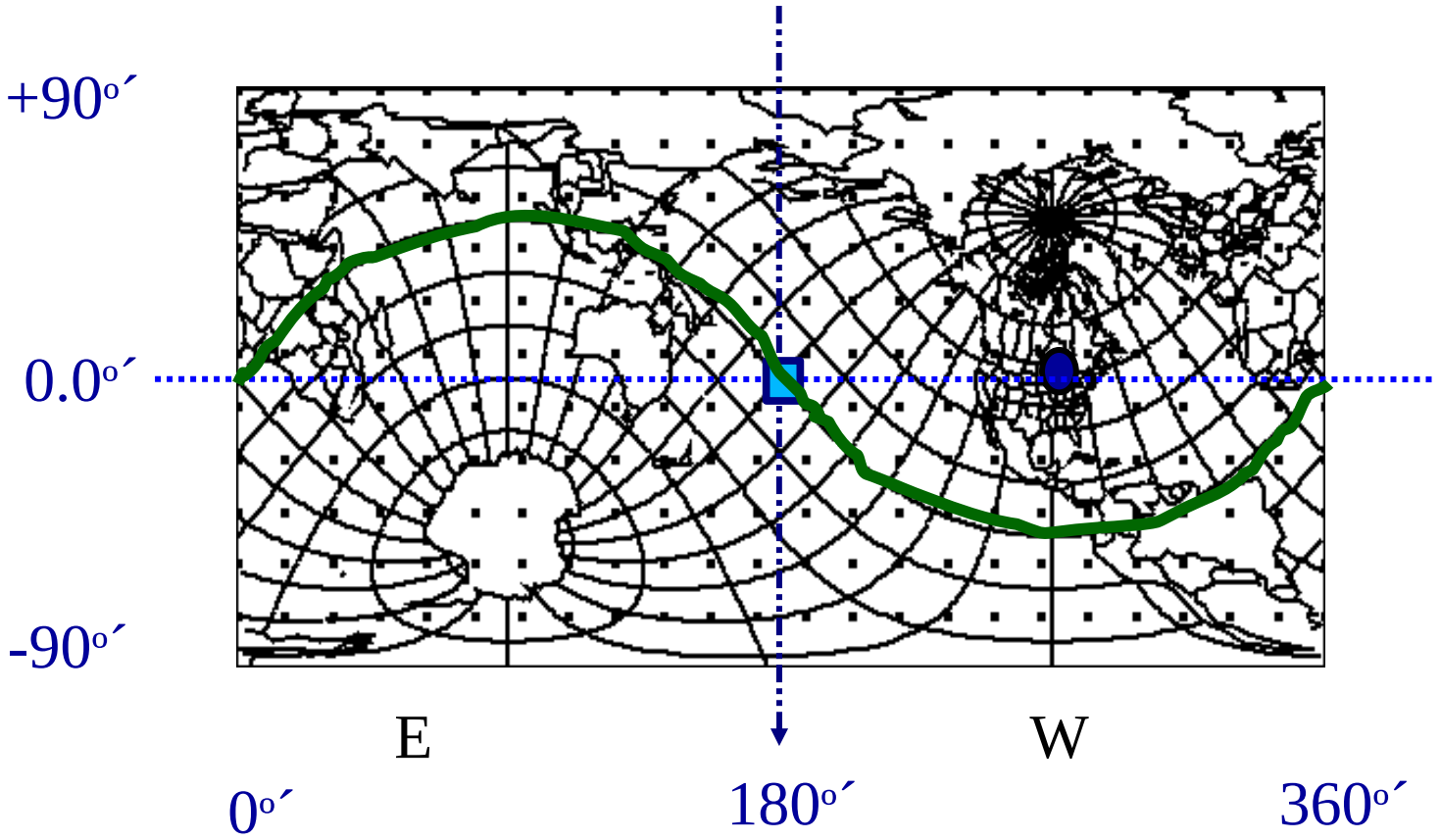
- Grd_xlon1=180., Grd_xlat1=0., (geographical
- Grd_xlon2=270., Grd_xlat2=0., coordinates)
- Grd_xlon2=270., Grd_xlat2=45.,



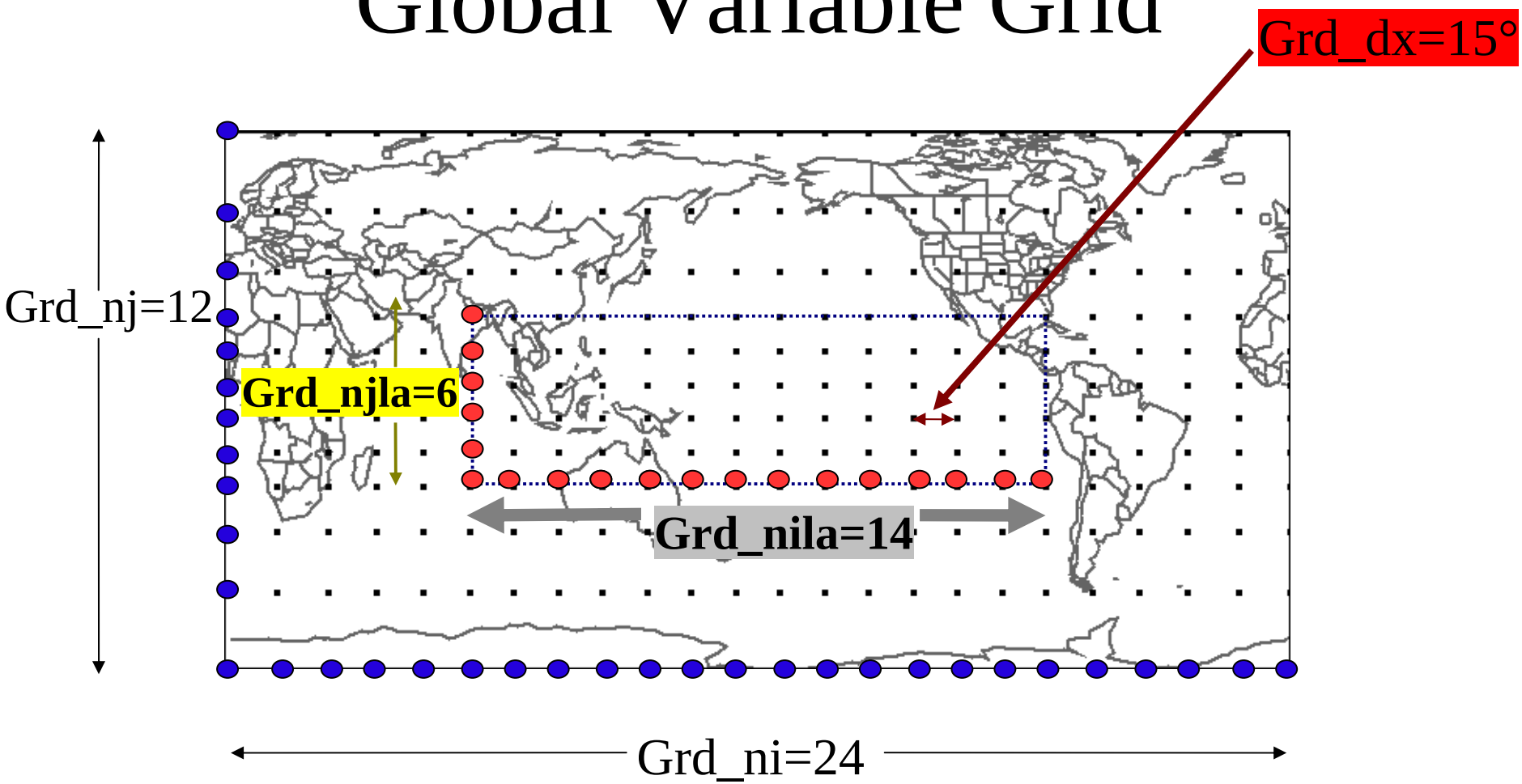
Global Uniform grid – rotated

Grd_roule=.true.,

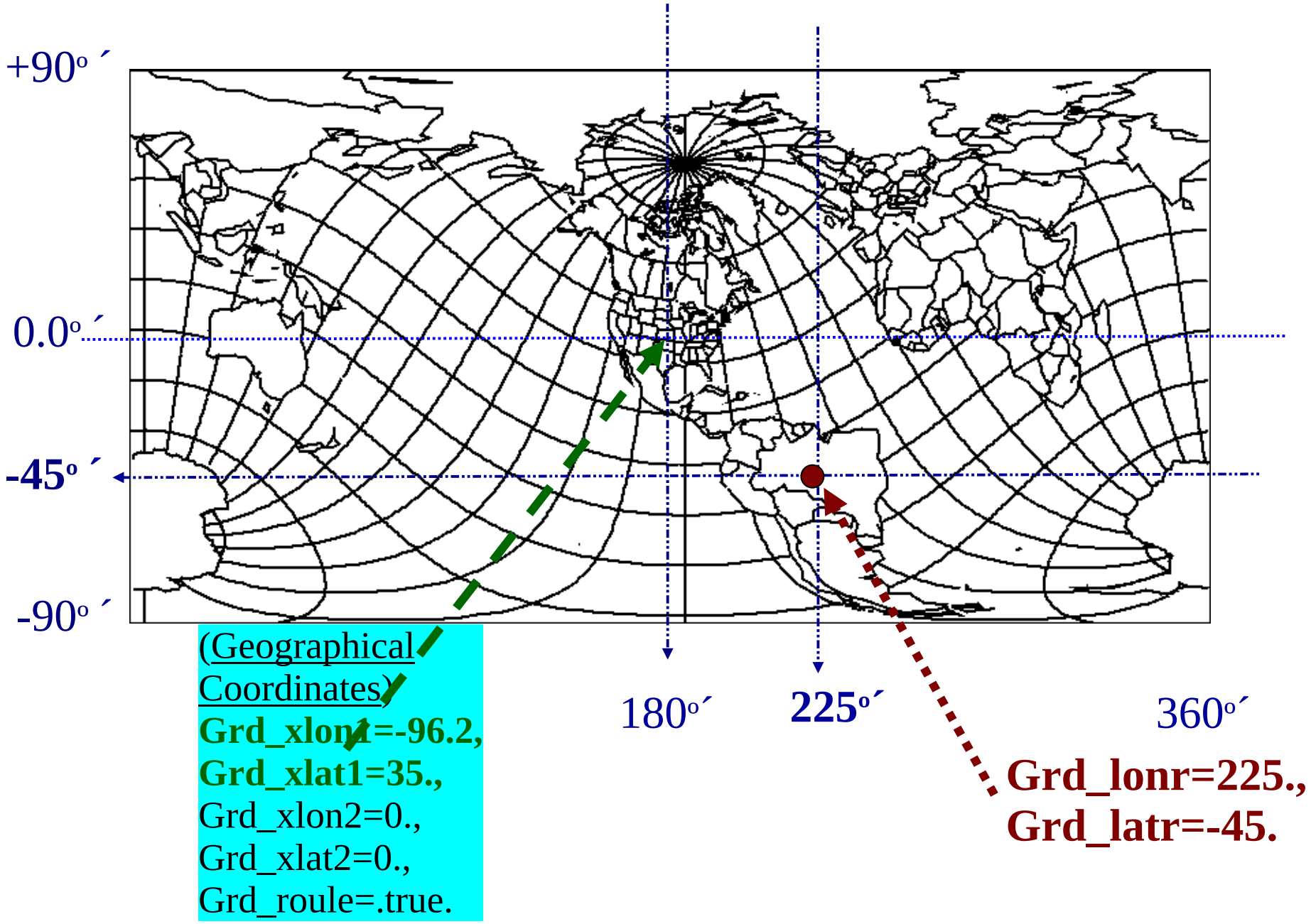
- Grd_xlon1=180., Grd_xlat1=0., (geographical
- Grd_xlon2=270., Grd_xlat2=45., coordinates)



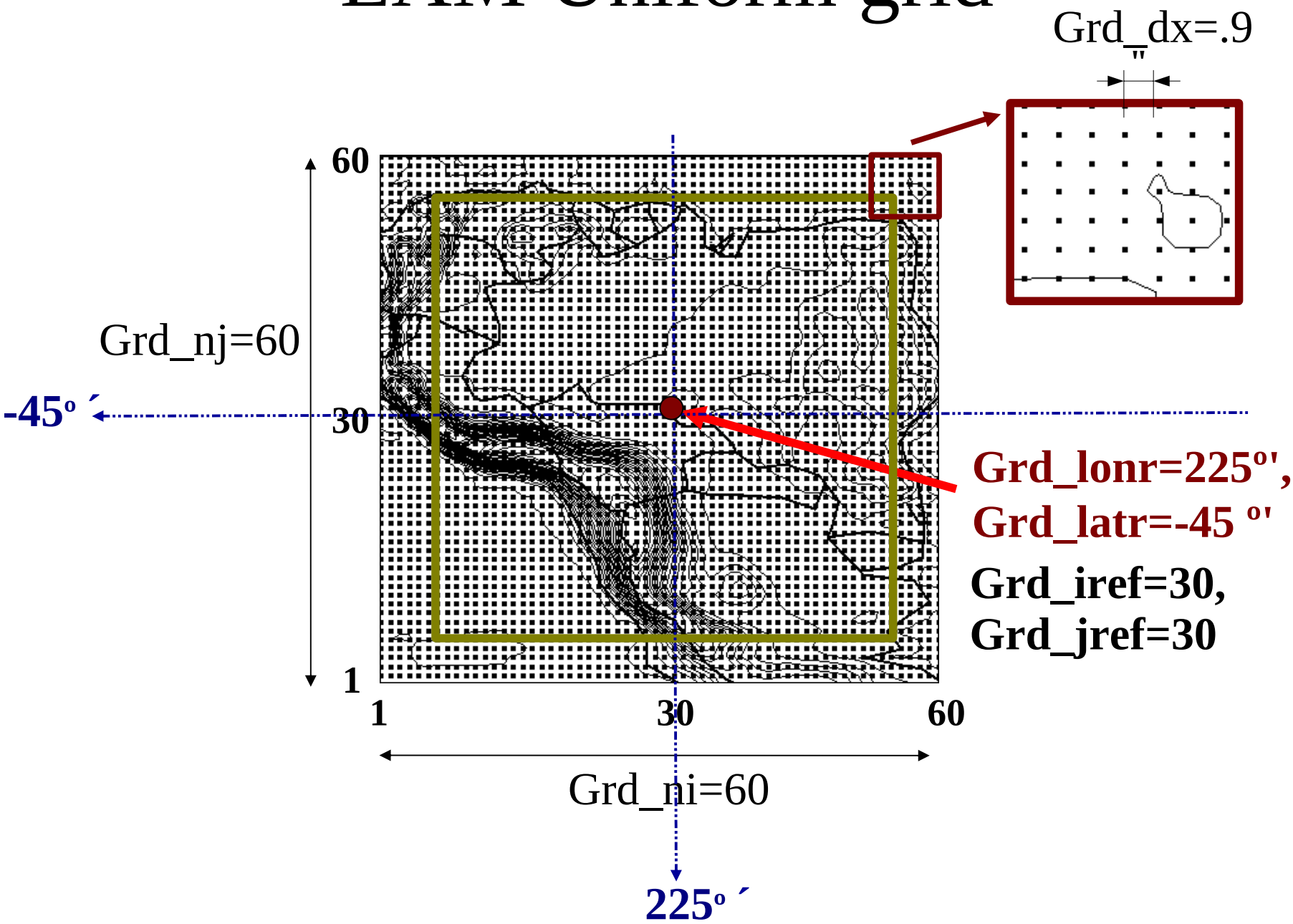
Global Variable Grid



LAM Uniform grid



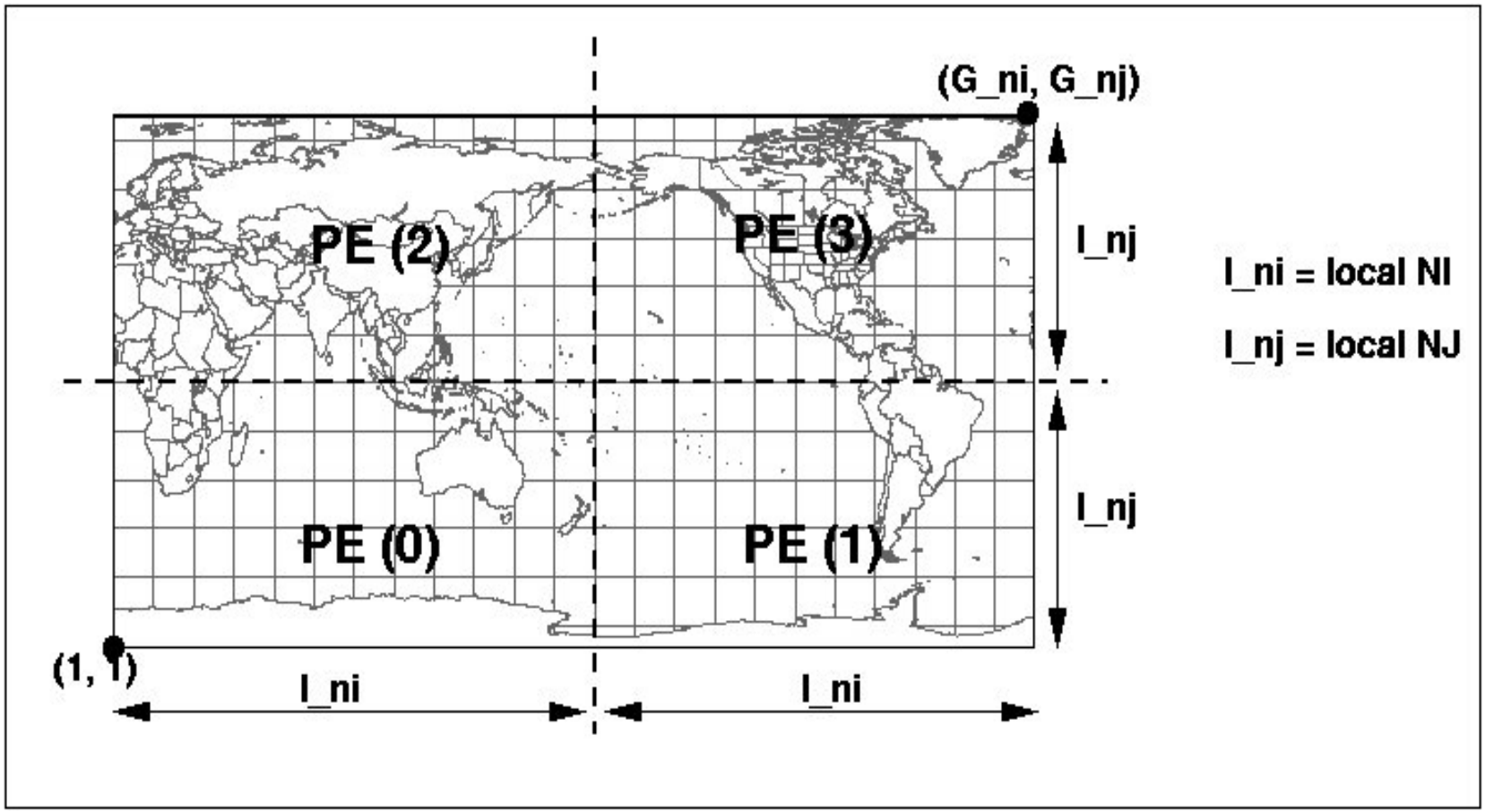
LAM Uniform grid



gem_settings.nml ('ptopo' namelist)

Basic topology definition

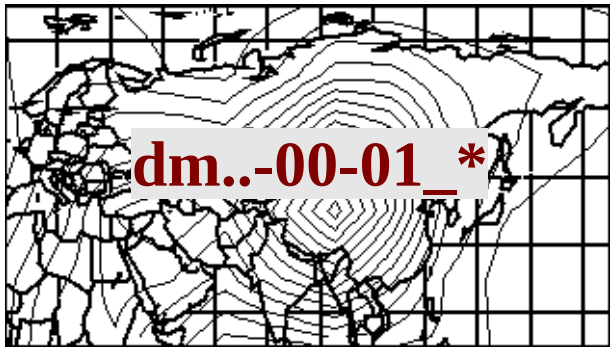
```
&ptopo
Ptopo_npex=2, Ptopo_npey=2,
/
```

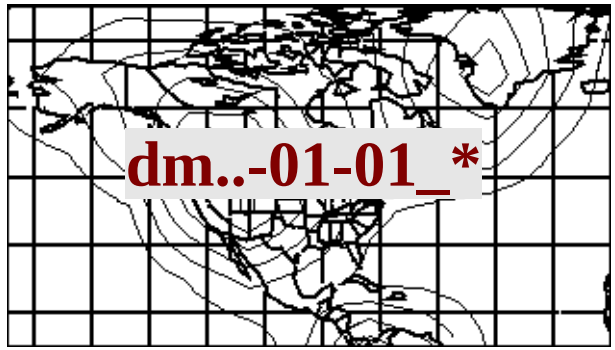


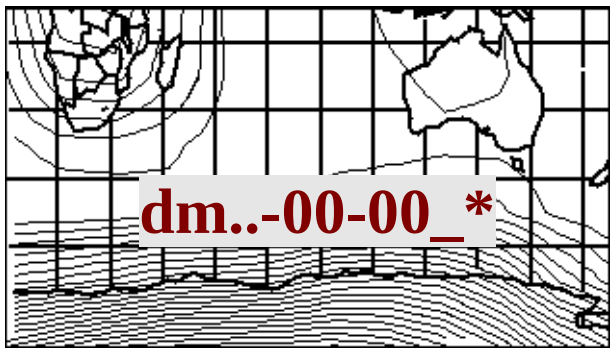
gem_settings.nml ('ptopo' namelist)

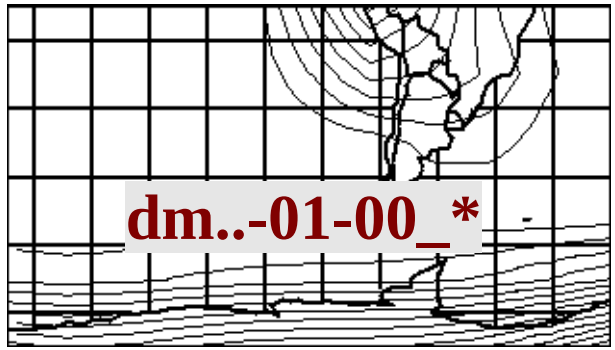
Block topology definition for output files

```
&ptopo
Ptopo_npex=2, Ptopo_npey=2,
Ptopo_nblocx=2, Ptopo_nblocy=2,
/
```









gem_settings.nml ('gem_cfgs' namelist)

Controls for main program GEMDM

&gem_cfgs

hyb = 0.000, 0.011, 0.027, 0.051, 0.075,
0.101, 0.127, 0.155, 0.185, 0.219,
0.258, 0.302, 0.351, 0.405, 0.460,
0.516, 0.574, 0.631, 0.688, 0.744,
0.796, 0.842, 0.884, 0.922, 0.955,
0.980, 0.993, 1.000,

Grd_rcoef = 1.6, **Pres_ptop** = 10.,
Step_total = 6, **Step_rsti** = 999,
Step_gstat = 1, **Lctl_debug**=.true.,
Schm_phyms_L = .true.,
Out3_nbitg = 32,

/

outcfg.out

```
grid=1,model;
grid=2,core;
grid=3,reduc,4,10,5,11

levels=1,eta, -1;
levels=3,eta, 0;
levels=4,eta,<18,20,1>;
levels=2,pres,[1000.,950., 800.,700.,500.,250.,20.]

steps=1,step,[0,2],<5,10,2>;
steps=2,hour,<0.,6.,1.>;

sortie([ME,PN,P0,TT], grid,1, levels,2, steps,2)
sortie_p([Z0, MT, MG, PR], grid,1, levels,1,
 steps,1)

filtre([GZ,TT], coef, 0.5, pass,2)
xnbit([Z0],bits, 32)
```

sortie

sortie([ME,PN,P0,TT], grid,1, levels,2, steps,2)

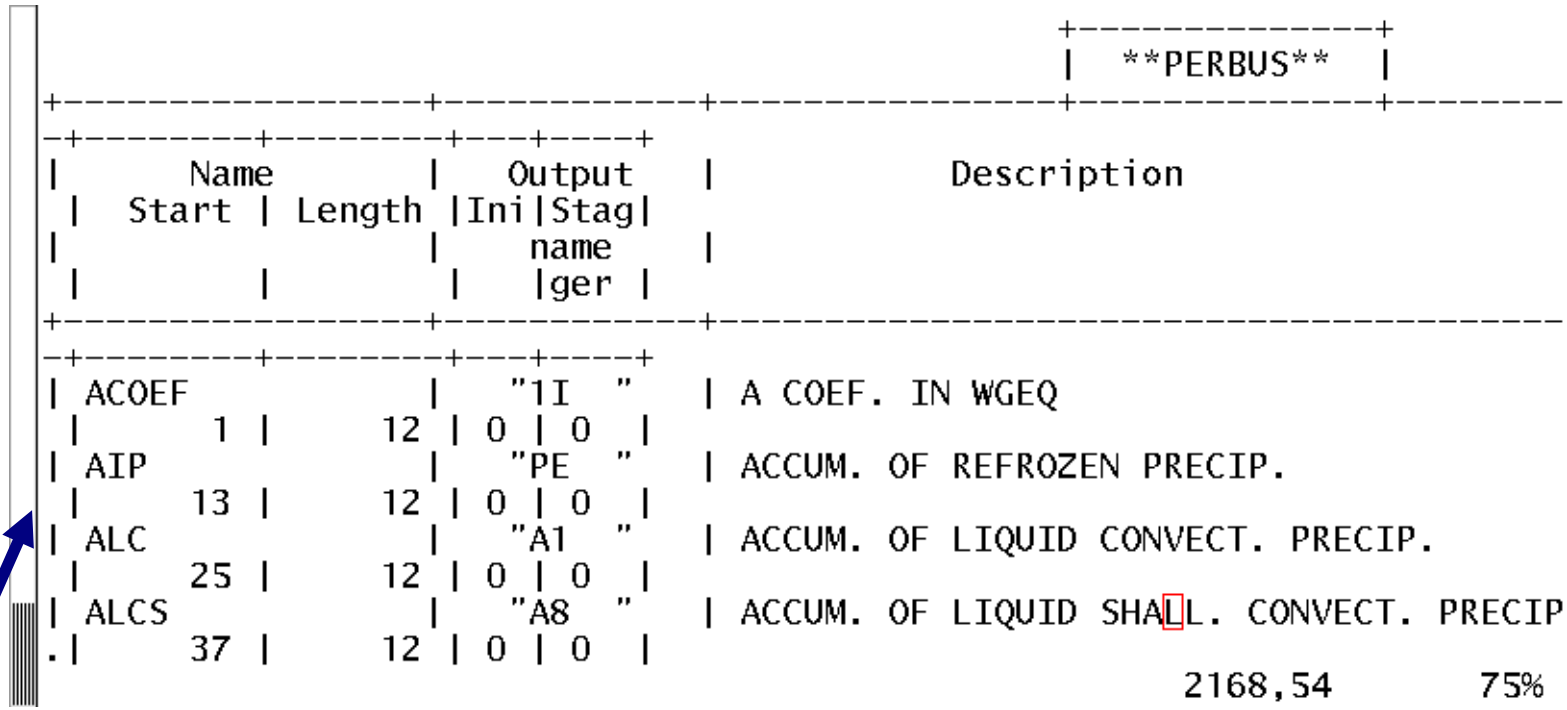
```
THERE ARE     1 VARIABLES IN COMDECK TR3DT0
THERE ARE     1 VARIABLES IN COMDECK TR3DT1

+----------------------------------------+
|   97 DYNAMIC VARIABLES AVAILABLE FOR OUTPUT|
+----------------------------------------+
 UT0       VT0       WT0       TT0       TDT0      FIT0      QT0       TPT0
 FIP0      QPT0      PIP0      TPL0      MUT0      PSD0      ST0       TRT0
 UTH       VTH       PSDH      XTH       YTH       ZTH       XCTH      YCTH
 ZCTH      UT1       VT1       WT1       TT1       TDT1      FIT1      QT1
 ZZ1       TPT1      FIP1      QPT1      PIP1      TPL1      MUT1      PSD1
 ST1       TRT1      XCT1      YCT1      ZCT1      MRU       MRV       MRW
 RVV       RCN       RTH       MRRD      MR3       RHLL      RUW1      RVW1
 MR1       MR3P      RHLN      RUW2      RVW2      UU        VV        UV
 WW        WE        GZ        P0        PS        PT        PN        DD
 QQ        QR        QS        Q3        DS        VT        TT        TD
 ES        HR        TW        PX        ZZ        HU        ME        MX
 LA        LO        QC        TH        GPTX      GXTX      MULX      HUT0
                                                             1321,43        78%
```

sortie_p

sortie_p([Z0, MT, MG, PR], grid,1, levels,1, steps,1)

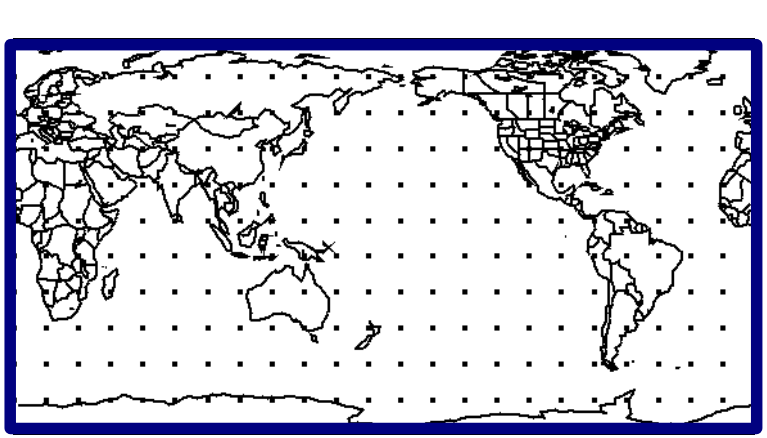
sortie_p([ALC,ACOEF],grid,2,levels,1,steps,2)



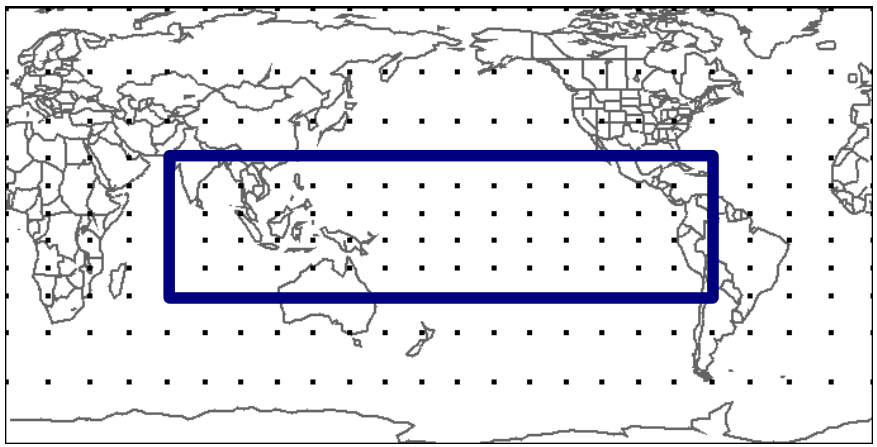
Fields available for output may not mean that they have values!

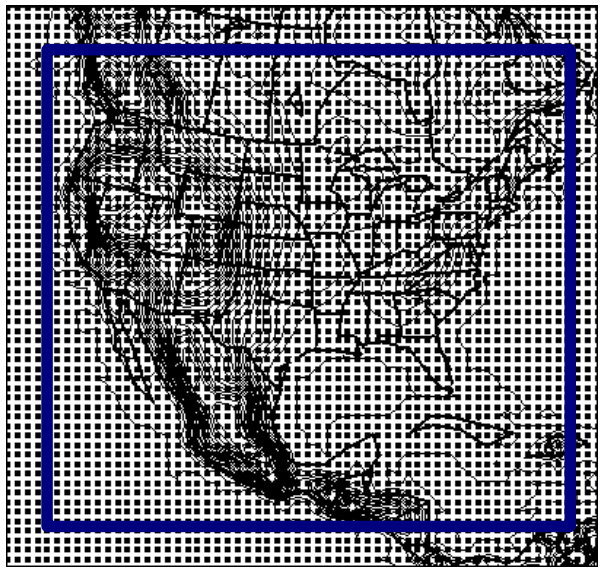
grid =

grid=1,model;

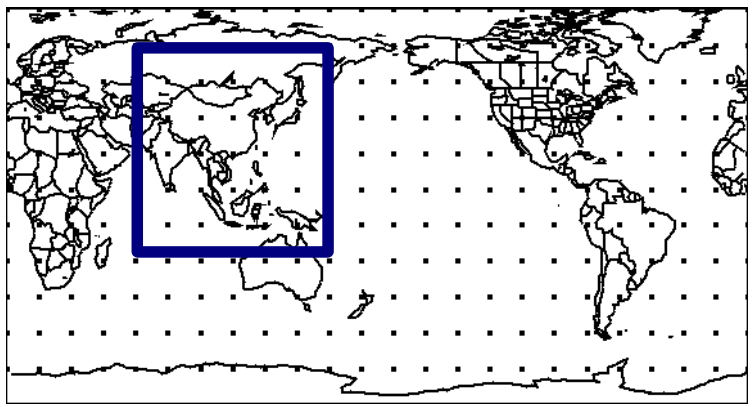


grid=1,core;





grid=1,reduc,4,10,5,11;
(x1,x2,y1,y2)

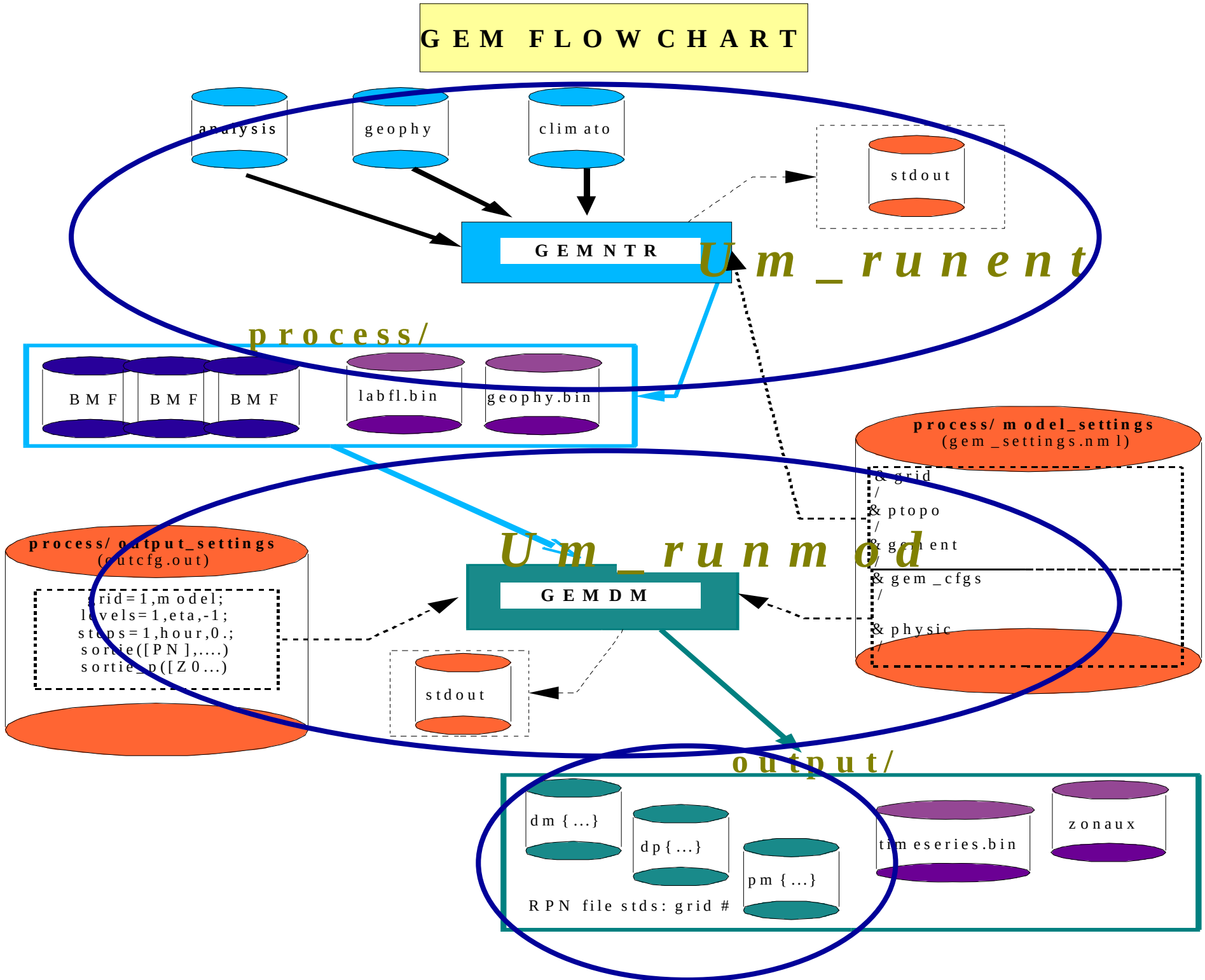


Running GEMDM
(interactive- pollux,Linux only)

lorentz 25% ls

Makefile	maingemdm_Linux_3.2.1.Abs@	
outcfg.out	**gem_settings.nml**	
RCS/	maingemntr_Linux_3.2.1.Abs@	**output@**
arbre_de_dependance	make_cdk	**process@**
malibLinux@		

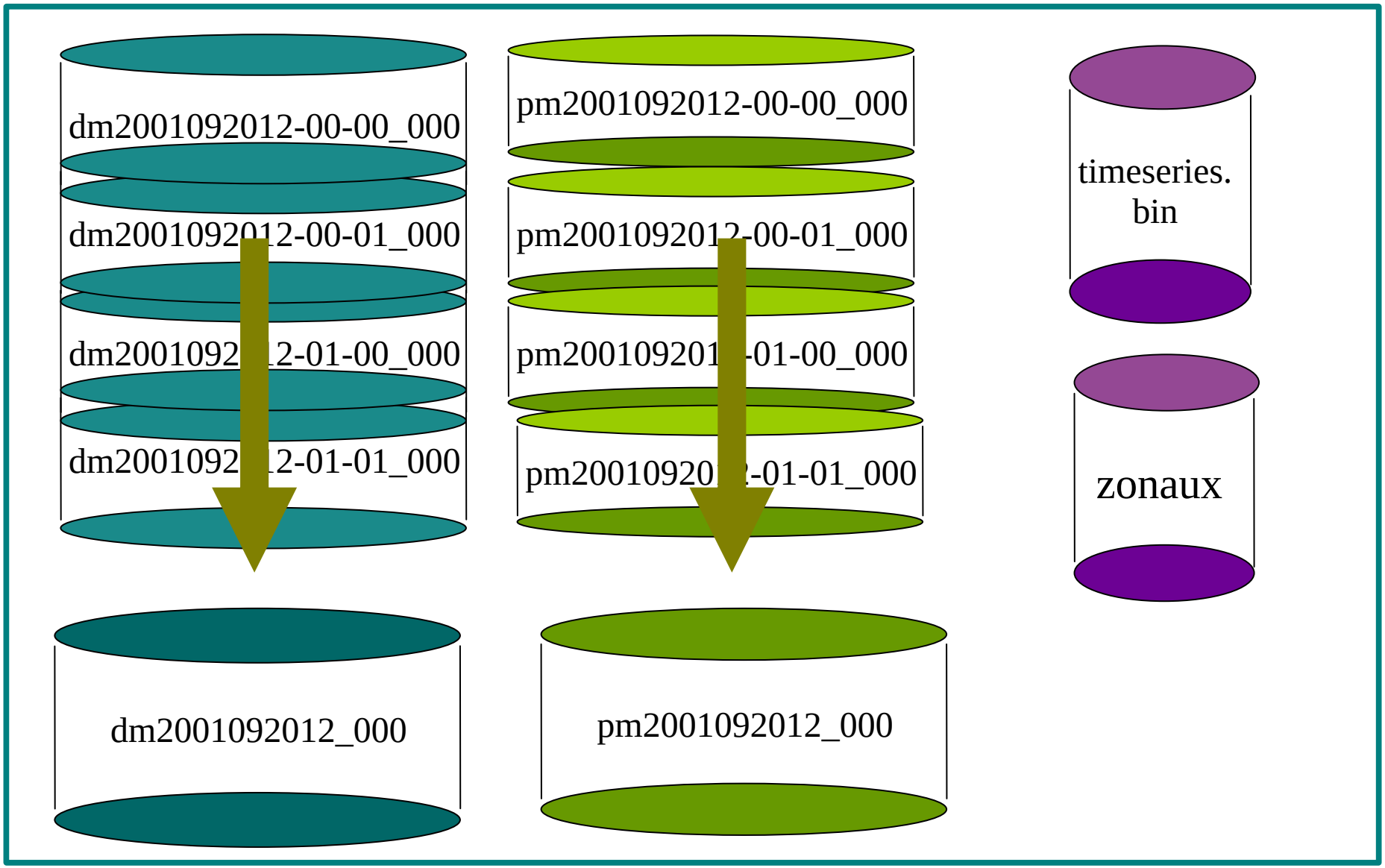
lorentz 26% Um_runent.sh > out_gemntr (horizontal int,split)
(Um_runent.sh -h for help)
lorentz 27% Um_runmod.sh > out_gempp (vertical int, integ)
(Um_runmod.sh -h for help)


GEM FLOW CHART
analysis
geophy
climato
stdout
GEMNTR
Um_runent
process/
BMF
BMF
BMF
labfl.bin
geophy.bin
process/ model_settings
(gem_settings.nml)
&grid
/
&ptopo
/
&gem_cfgs
/
&physic
/
process/ output_settings
(outcfg.out)
grid=1,model;
levels=1,eta,-1;
steps=1,hour,0.;
sortie([PN],....)
sortie_p([Z0...)
Um_runmod
GEMDM
stdout
output/
dm{...}
dp{...}
pm{...}
RPN file stds: grid #
timeseries.bin
zonaux

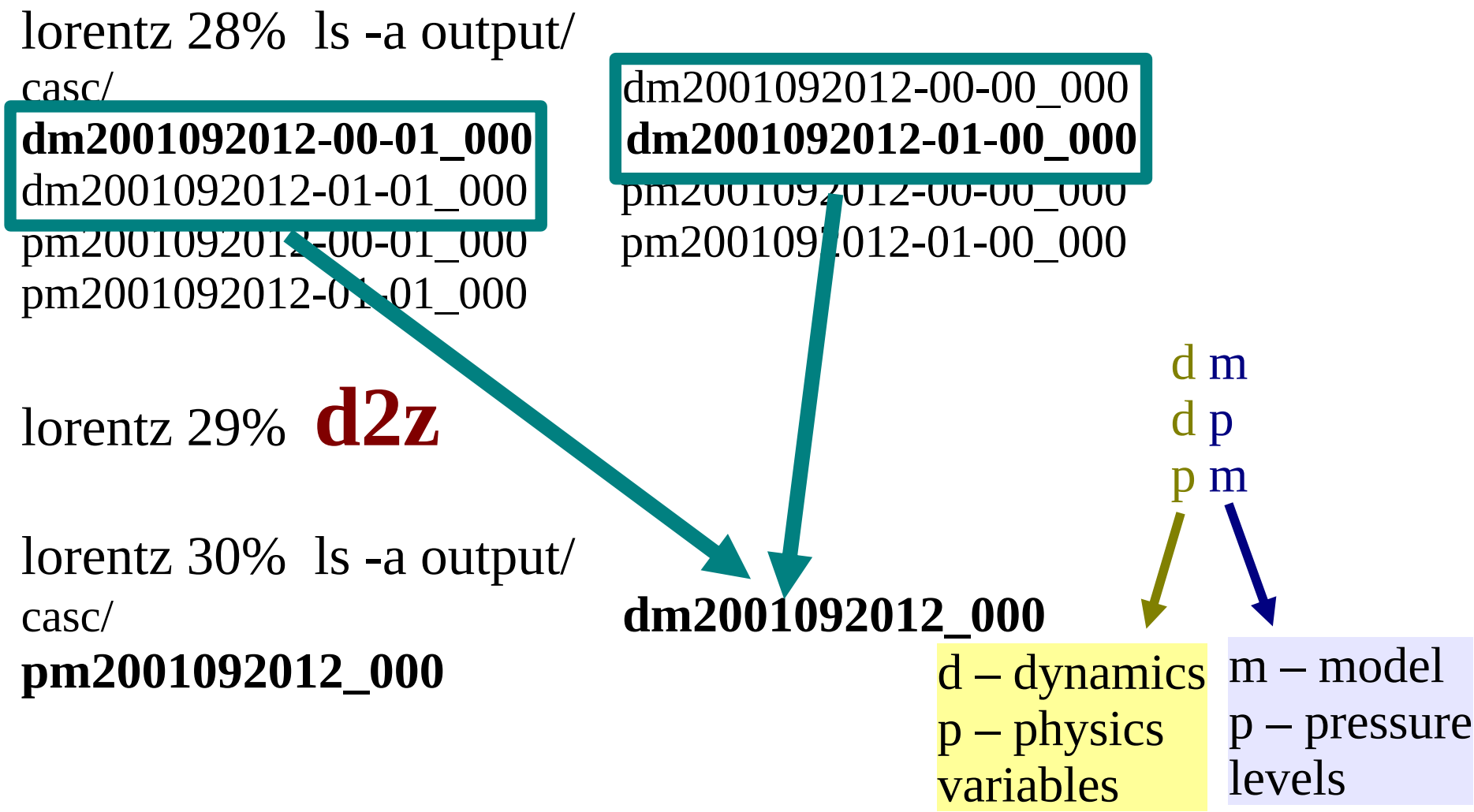
d2z *(post-processing)*

*(Ptopo_**nblocx**=2,Ptopo_**nblocy**=2)*

output/



Diese to Z grid
(d2z)



Running Batch

Example given for **AZUR**

but first....

Account Setup for Batch Runs: (where do batch experiments run?)

```
lorentz 56%  cd $HOME
lorentz 57%  mkdir gem
lorentz 58%   cd gem

lorentz 59%  ln -s /fs/mrb/02/armn/armnviv azur
lorentz 60%   ln -s /data/dormrb04/armn/armnviv pollux
lorentz 61%   ln -s /data/local/armn/armnviv lorentz

lorentz 62%   ls
azur@  lorentz@ pollux@
```

`hostname`

Account Setup for Batch Runs
Where do batch run listings go?

lorentz 63% cd $HOME
lorentz 64% **mkdir listings**
lorentz 65% **cd listings**
lorentz 66% ln -s /fs/mrb/02/armn/armnviv/listings **azur**
lorentz 67% ln -s /data/dormrb04/armn/armnviv/listings **pollux**
lorentz 68% ln -s /data/local/armn/armnviv/listings **lorentz**

lorentz 69% ls
azur@ lorentz@ pollux@

Batch Run Setup

c1f01p8m 1% **. r.sm.dot gem 3.2.1**
c1f01p8m 2% cd $HOME/exp321
c1f01p8m 3% linkit
c1f01p8m 4% **make gem**
c1f01p8m 5% mkdir **abc**

c1f01p8m 7% ls
Makefile
RCS/
arbre_de_dependance
abc/
maingemdm_Linux_3.2.1.Abs@
maingemntr_Linux_3.2.1.Abs@
maingemdm_AIX_3.2.1.Abs@
maingemntr_AIX_3.2.1.Abs@
make_cdk
malibAIX@
malibLinux@

c1f01p8m 6% cp **$gem**/run_configs/dbg1/* **abc**/

c1f01p8m 8% ls **abc**/
configexp.dot.cfg gem_settings.nml outcfg.out

configexp.dot.cfg

exp=**v321c**;
mach=azur;
model=gem;
t=400;
cm=12G;
npeOMP=1;
xfer=lorentz:/data/local2/armn/armnviv/stuff;
absaddres=;
anal=;
d2z=1;
inrep=;
climato=;
geophy=;

Submitting the Batch Run

c1f01p8m 9% ls

Makefile
RCS/
arbre_de_dependance
abc/
maingemdm_AIX_3.2.1.Abs@
maingemntr_AIX_3.2.1.Abs@
make_cdk
malibAIX@

c1f01p8m 10% Um_launch abc

c1f01p8m 11% ls $HOME/gem/azur/**v321c**

gem_settings.nml
outcfg.out
maingemntr_AIX_3.2.1Abs*
maingemdm_AIX_3.2.1.Abs*
output/
process/
xfer_job_811232*

configexp.dot.cfg

exp=v321c;
mach=azur;
model=gem;
t=400;
cm=12G;
npeOMP=1;
xfer=lorentz:/data/local2/armn/armnviv/stuff;
absaddres=;
anal=;
d2z=1;
inrep=;
climato=;
geophy=;

$HOME/gem/azur/v321c

$HOME/listings/[azur]
GEM_**v321c**_E_1491182.1 *(gemntr)*
GEM_**v321c**_M_1491182.1 *(gemdm)*
GEM_**v321c**_M_1491182.2 *(gemdm)*
GEM_**v321c**_M_1491182.3 *(gemdm)*
$HOME/listings/
GEM_**v321c**_1523732_PREPFT_32_1482792.1 *(d2z)*
GEM_**v321c**_1523732_FT_32_1122414.1 *(xfer)*

Helpful Scripts

findfft -gnimin 24 -gnimax 30

gni=24
gni=25
gni=27
gni=30

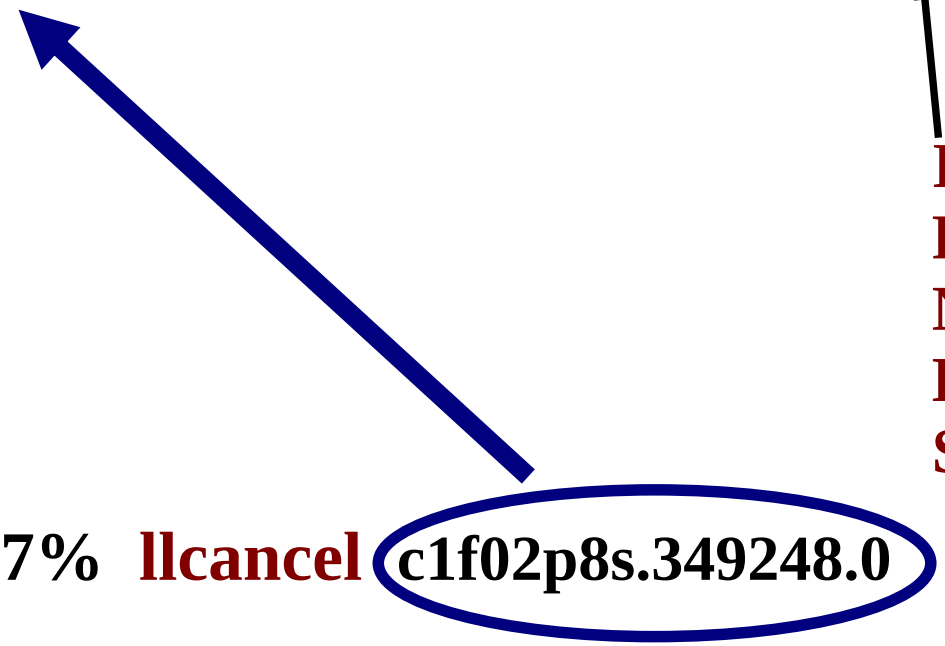
findtopo -gni 24 min 12 -max 14

checktopo -gni 240 -gnj 120 -gnk 58 -npx 1 -npy 16 -vspng

Useful Azur commands

c1f01p8m 6% **llq -u armnviv**

c1f02p8s.349248.0 armnviv 11/22 18:23 I 50 development



I – idle
R – running
NQ – not queued
E – pre-empted
ST – starting

c1f01p8m 7% llcancel c1f02p8s.349248.0

GEMDM changes constantly!

mail to **Majordomo @ec.gc.ca**

subscribe gem

subscribe phy

Useful knowledge when working with GEMDM

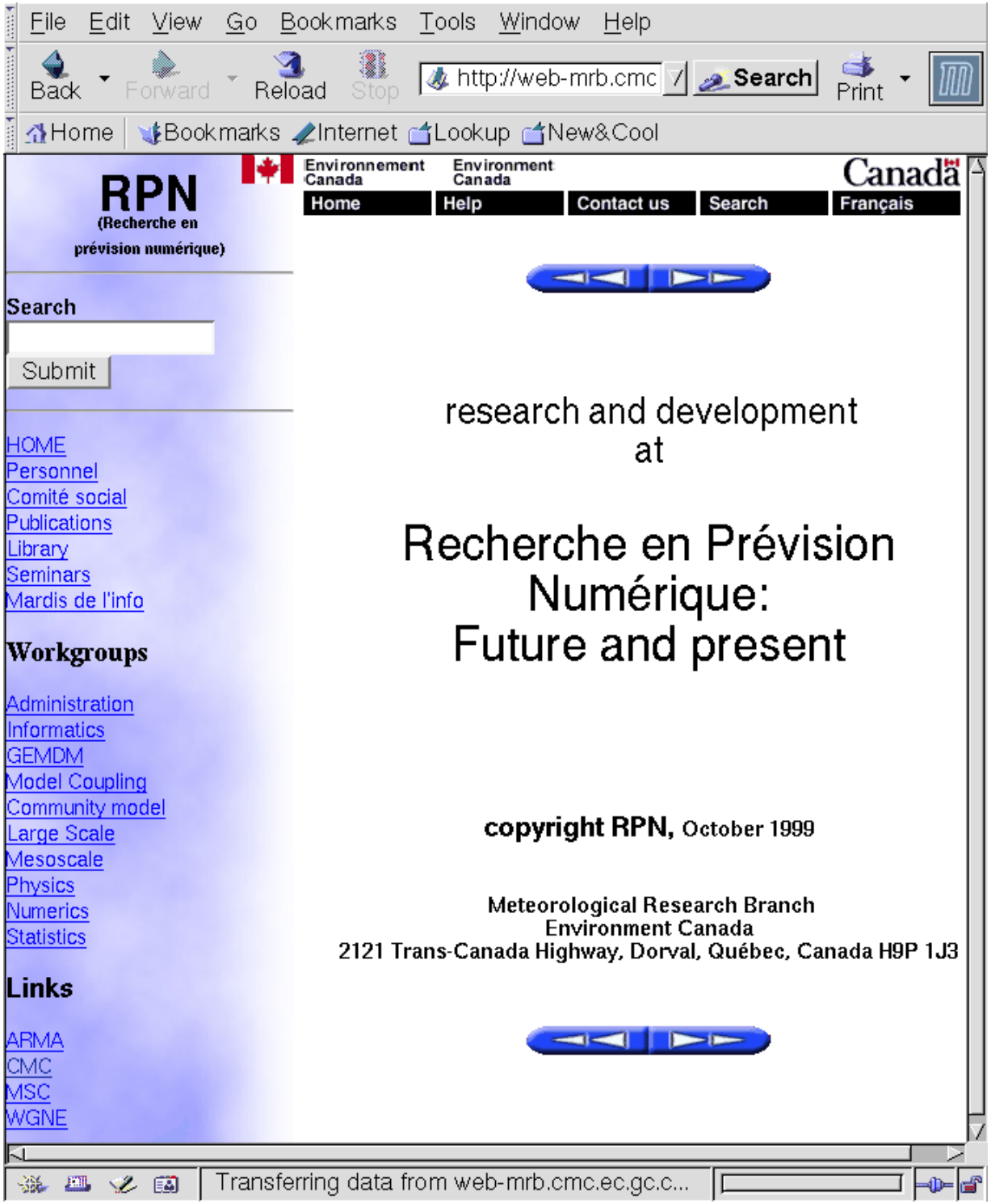
- RPN standard file utilities: editfst, xrec, pgsm, voir/xvoir
- Etagere: ouv_exp, omd_exp, r.make_exp
- Compiling, building executables: r.compile, r.build
- Submitting batch jobs: soumet, qsub
- Fortran, Unix shell (Make utilities)
- MPI (rpn_comm)

Hint: Documentation on these subjects can be found at the RPN website **Informatics**

RPN website

Informatics

GEMDM

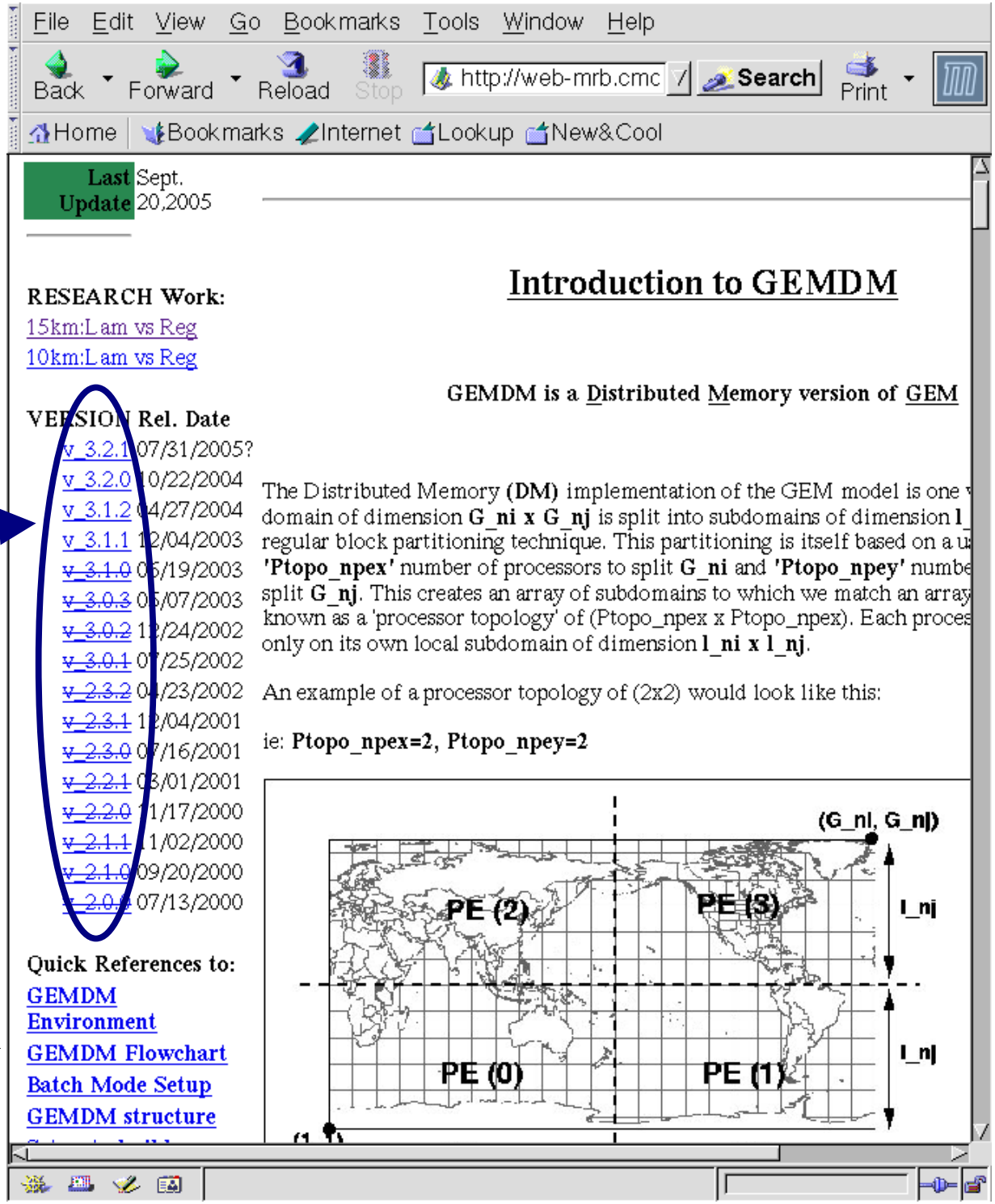


GEMDM website

Documentation for configuration files and release notes of each version

Quick references

(available soon …
"GEMDM workshop handout")



RPN Website:

http:notos.cmc.ec.gc.ca/mrb/rpn
or
http:web-mrb.cmc.ec.gc.ca/mrb/rpn

Questions?