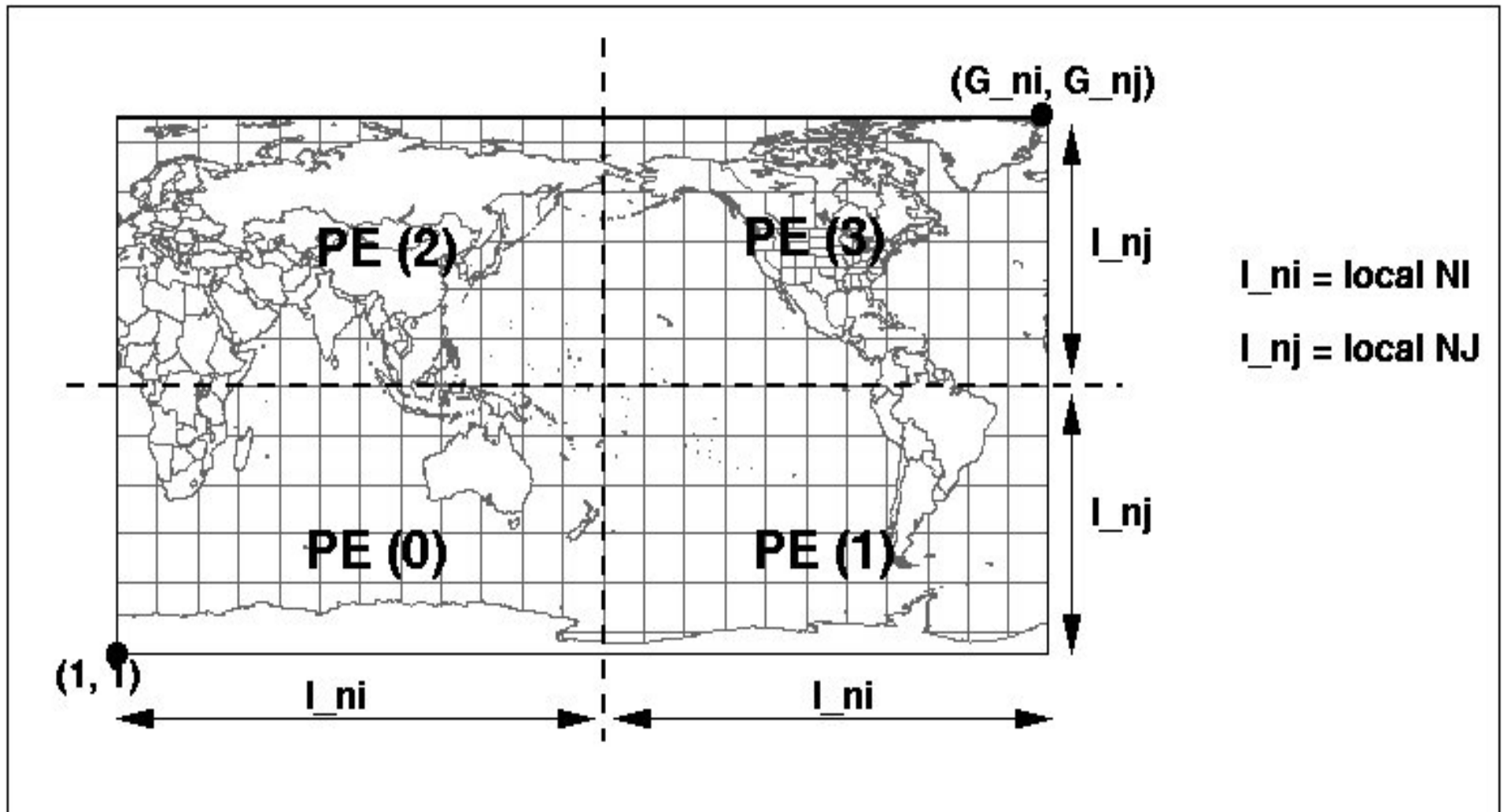


**Tout ce que vous avez
toujours voulu savoir sur
GEMDM sans jamais oser le
demander...**

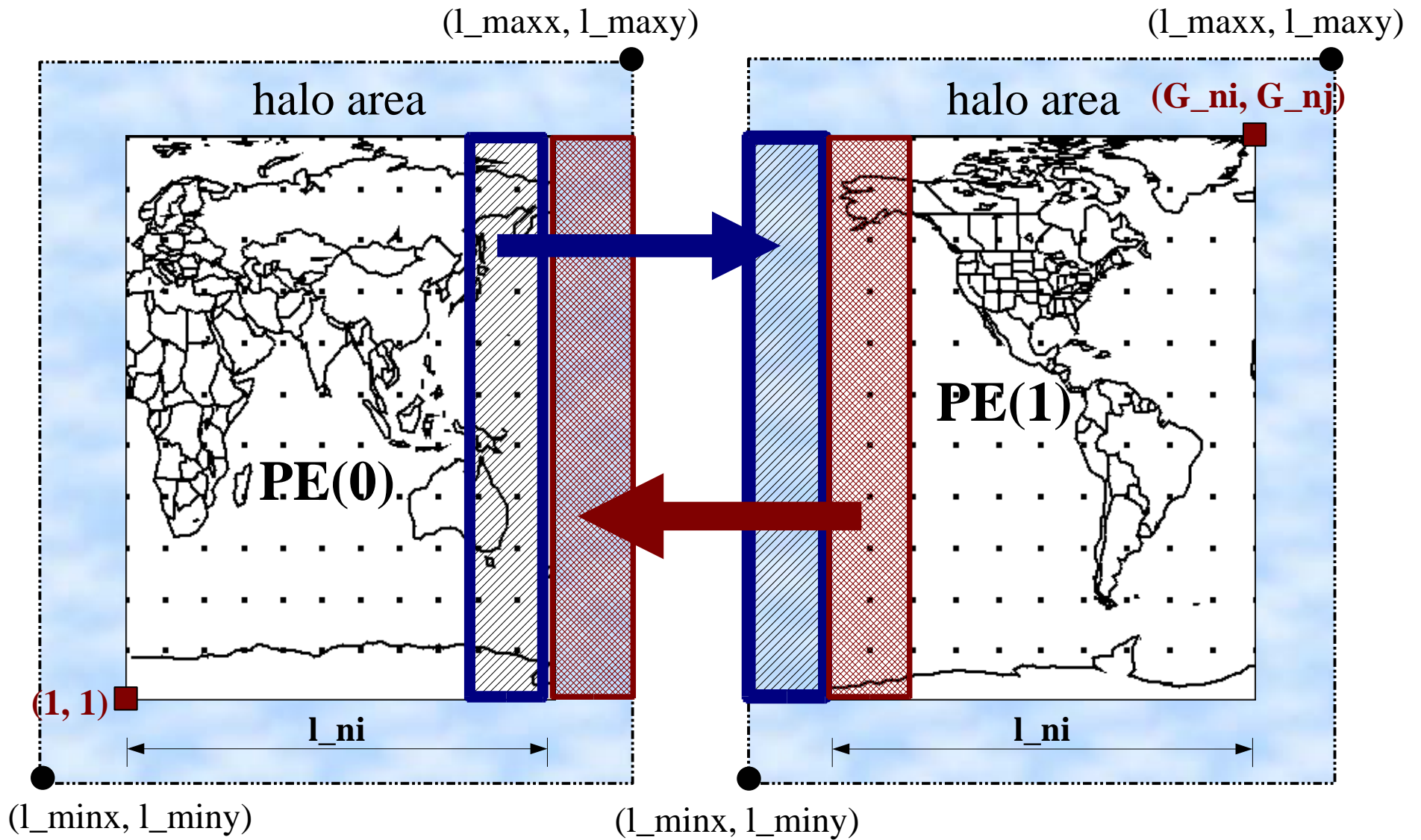
V.Lee, M. Desgagné

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



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

GEMNTR

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

ie:

maingemntr_AIX_3.2.0.Abs

maingemntr_IRIX64_3.2.0.Abs

maingemntr_Linux_3.2.0.Abs

GEMDM

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 12% **make gem**

lorentz 13% ls

Makefile

RCS/

arbre_de_dependance

maingemdm_Linux_3.2.1.Abs*

maingemntr_Linux_3.2.1.Abs*

make_cdk

malibLinux/

output/

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

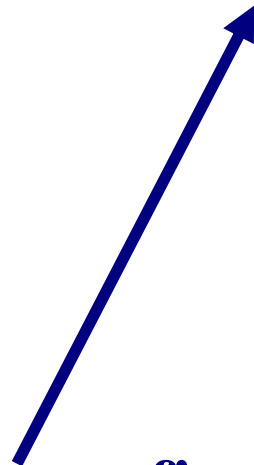
process@

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/
Makefile_IRIX64  bin/
Makefile_Linux   dfiles/
RCS/              doc/
RCS_4DVAR/       lib/
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/
```

&grid

Grd_typ_S='GU', Grd_ni=23, Grd_nj=12,

/

&ptopo

Ptopo_npex=2, Ptopo_npey=2,
Ptopo_nblocx=1, Ptopo_nbloey=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

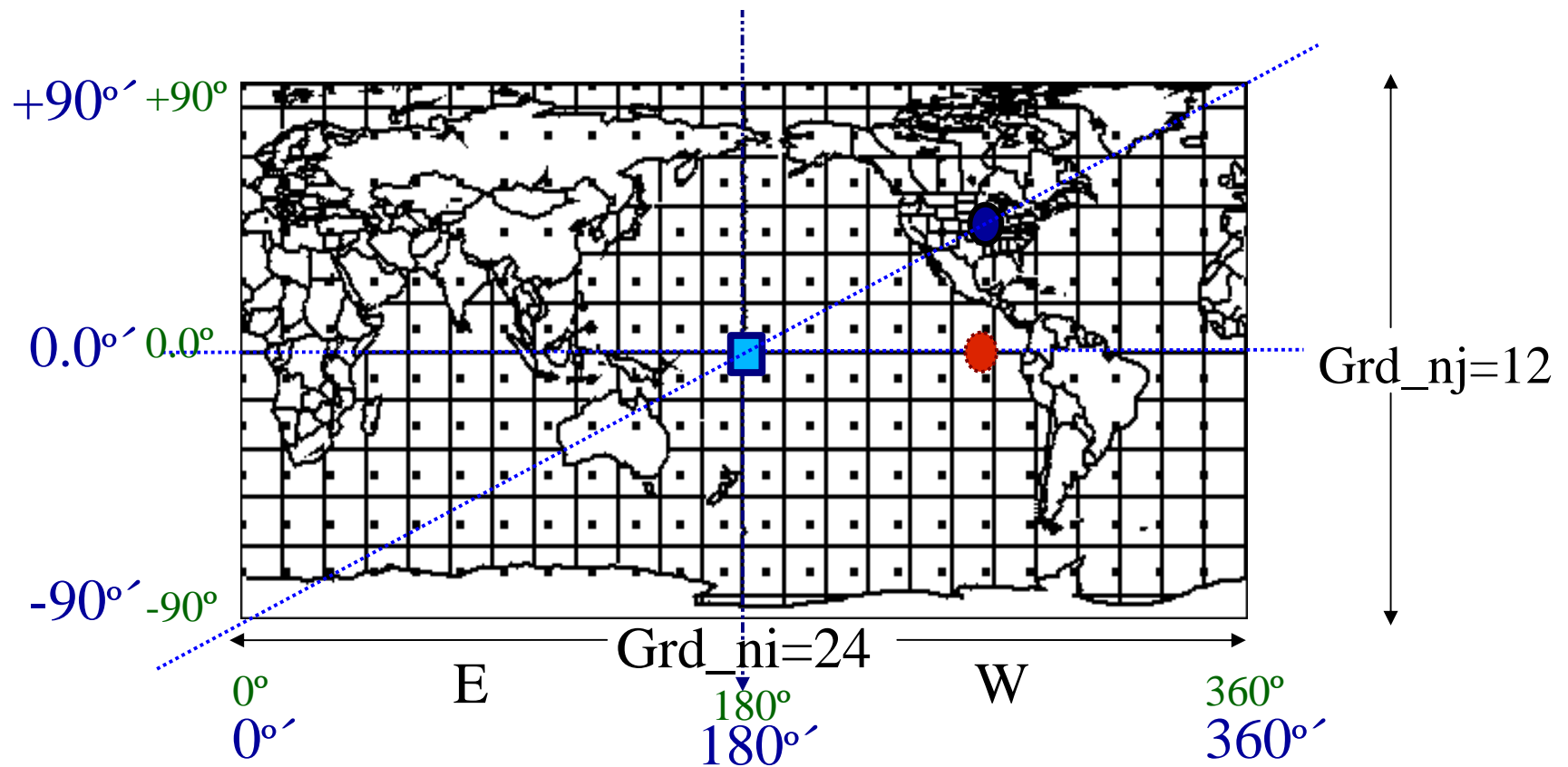
gem_settings.nml ('grid' namelist)

Grd_typ_S

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

Global Uniform grid – not rotated

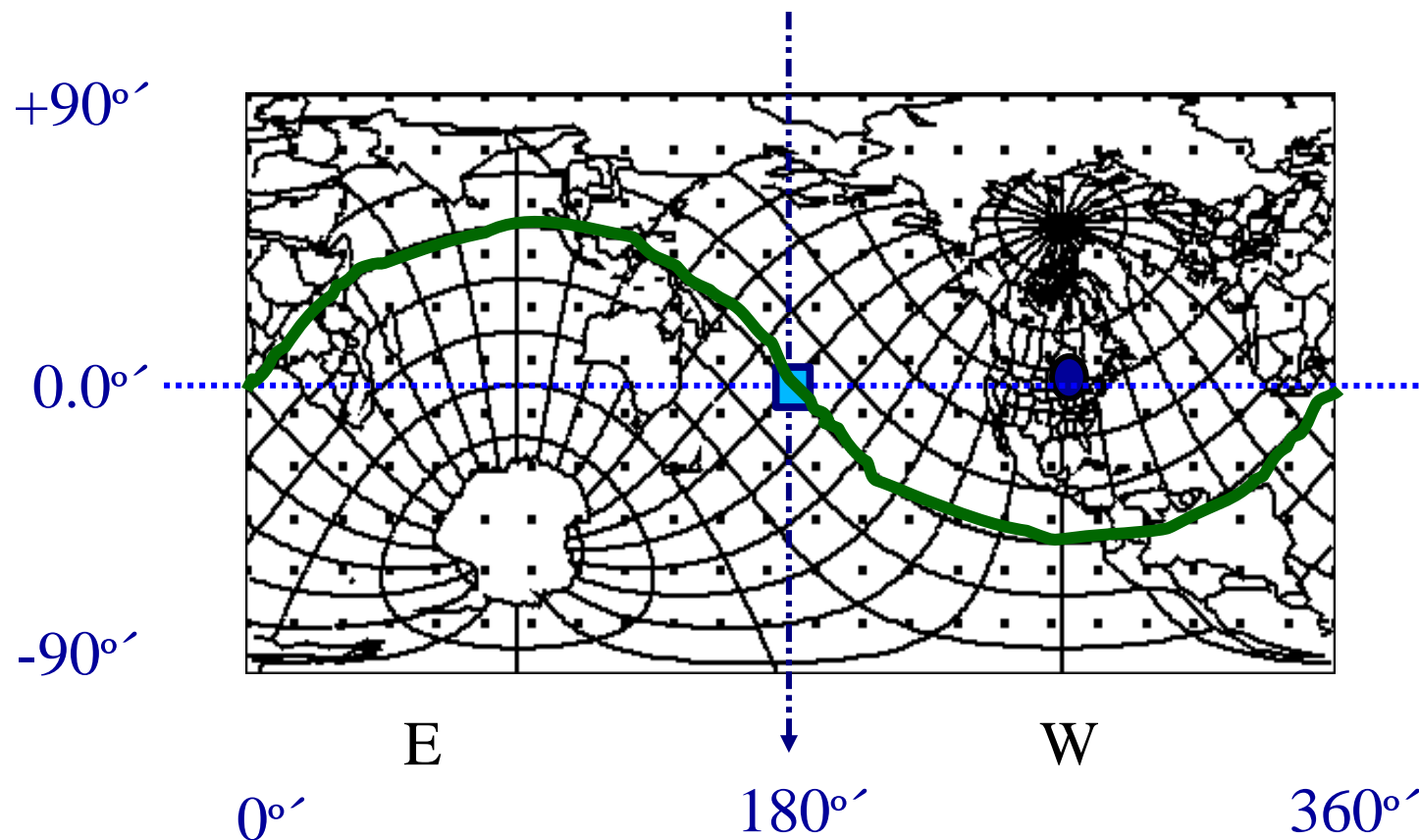
- Grd_xlon1=180., Grd_xlat1=0., (geographical coordinates)
- Grd_xlon2=270., Grd_xlat2=0., (coordinates)
- Grd_xlon2=270., Grd_xlat2=45.,



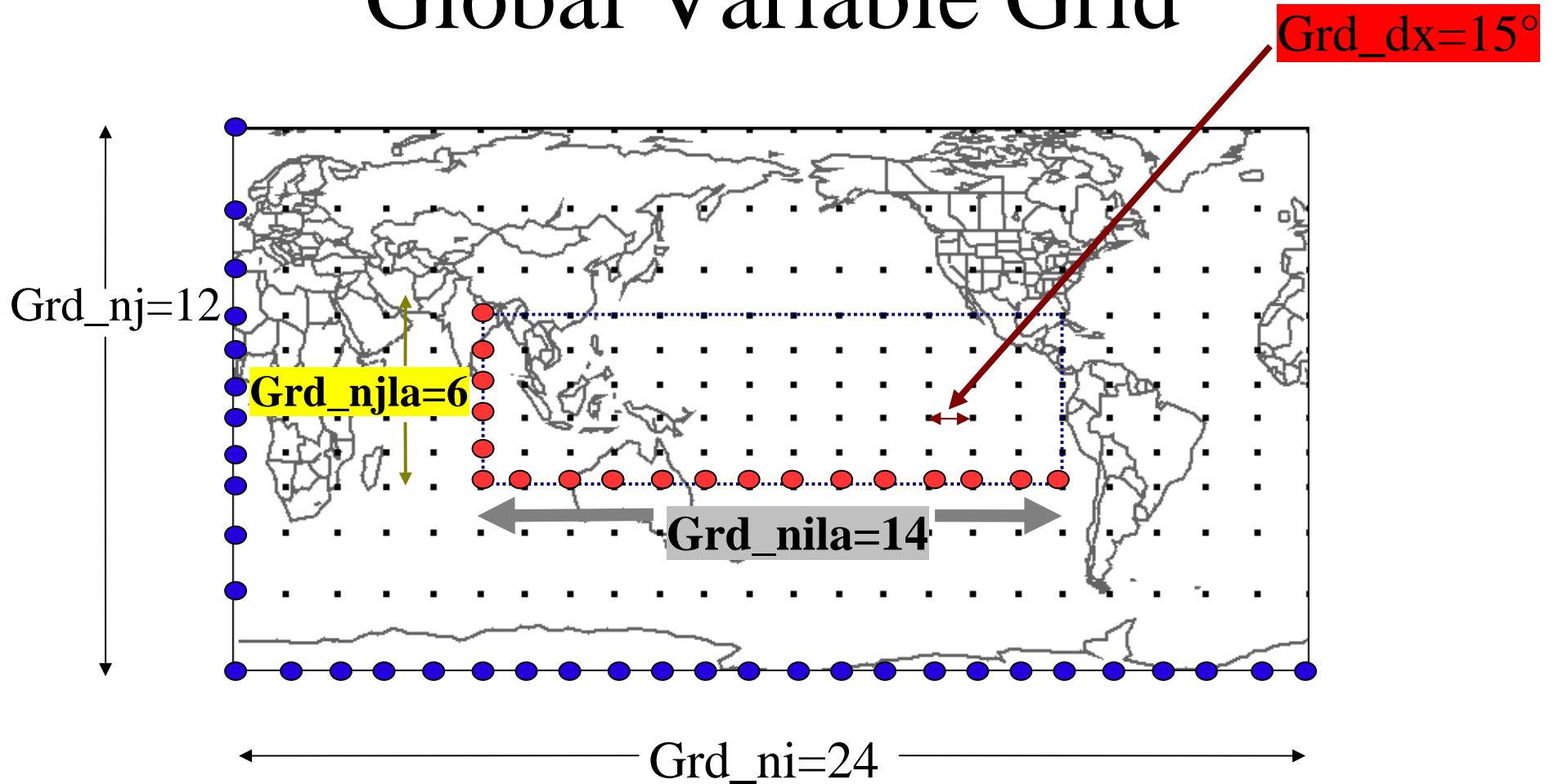
Global Uniform grid – rotated

Grd_roule=.true.,

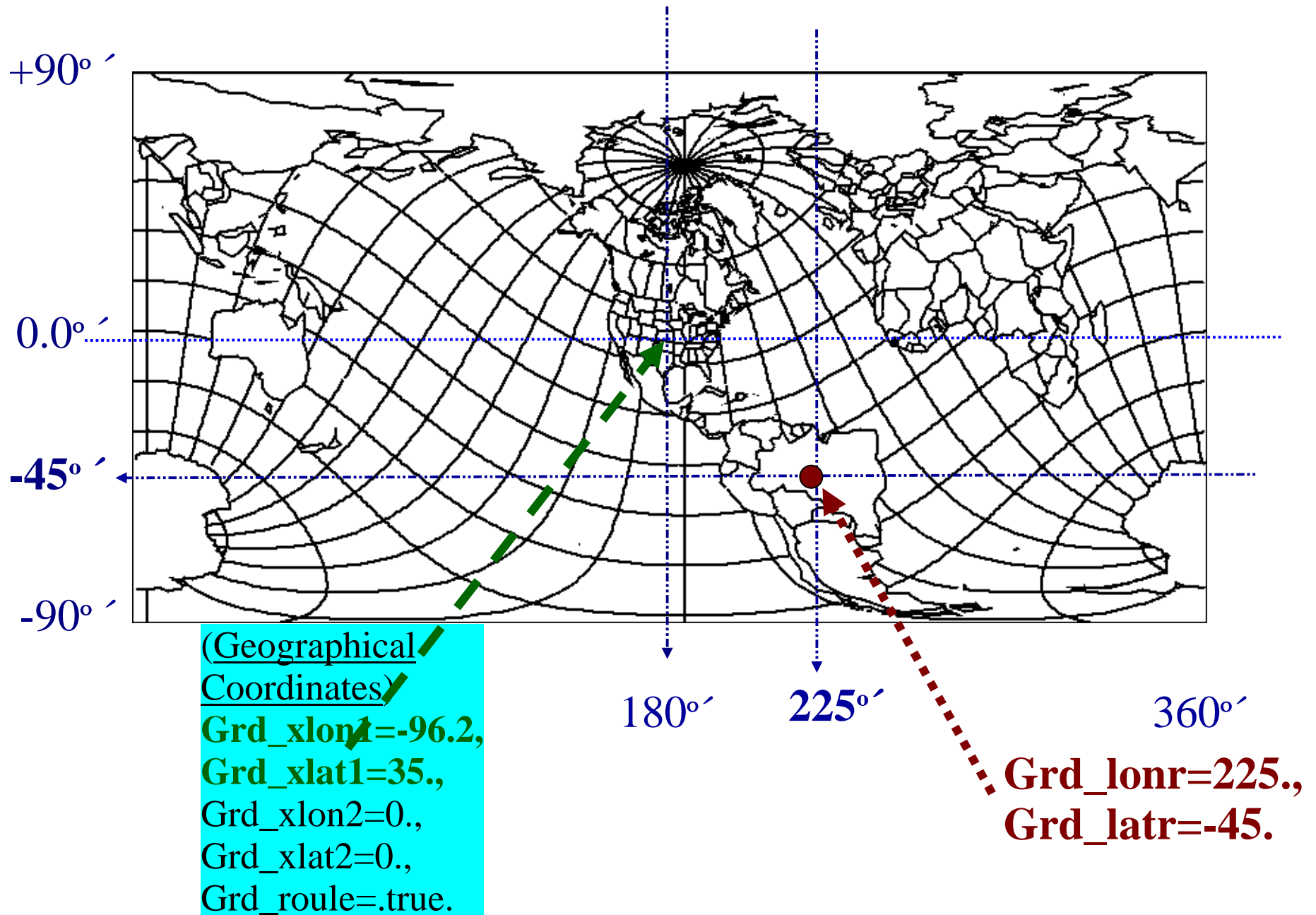
- Grd_xlon1=180., Grd_xlat1=0., (geographical
- Grd_xlon2=270., Grd_xlat2=45., coordinates)



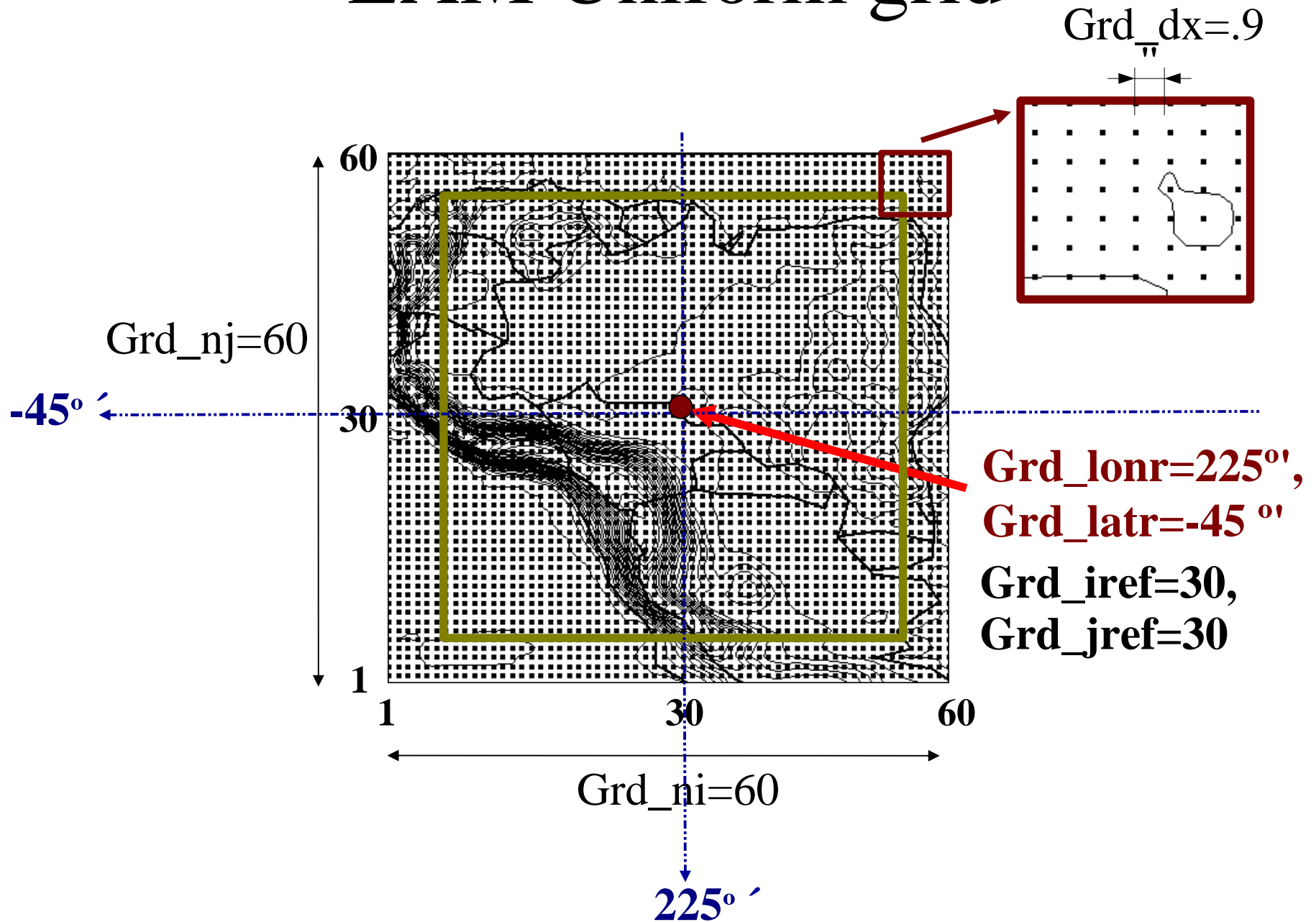
Global Variable Grid



LAM Uniform grid



LAM Uniform grid



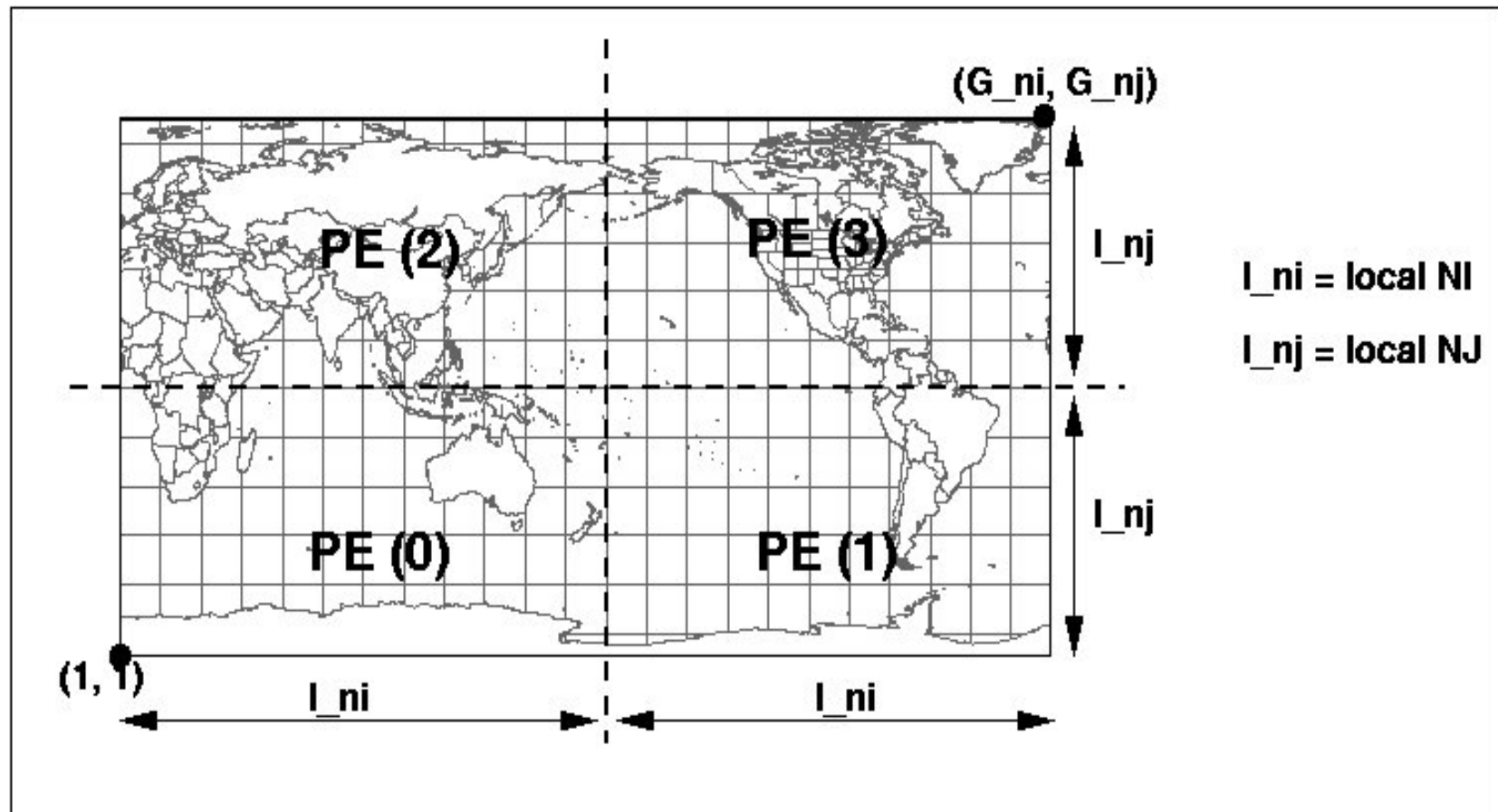
gem_settings.nml ('ptopo' namelist)

Basic topology definition

&ptopo

Ptopo_npex=2, Ptopo_npey=2,

/



gem_settings.nml ('ptopo' namelist)

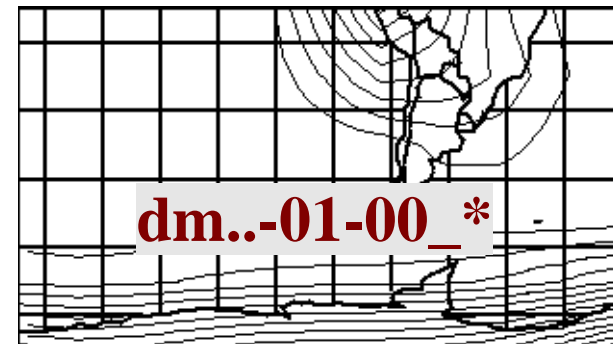
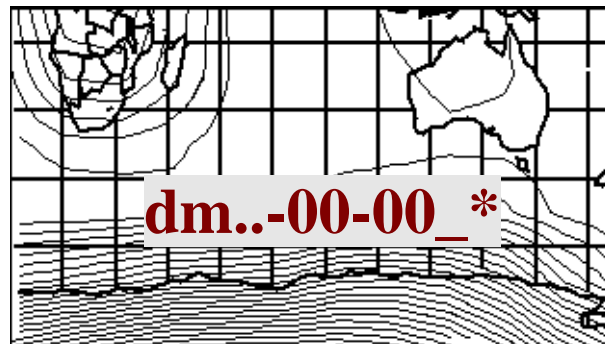
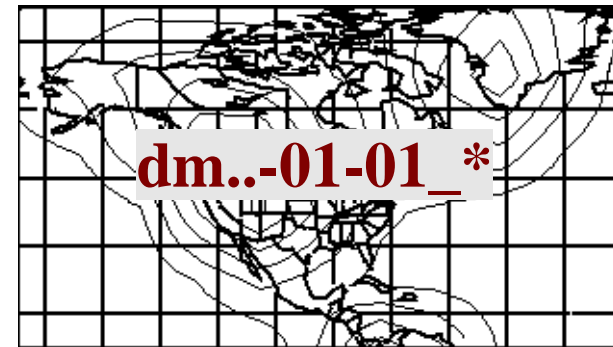
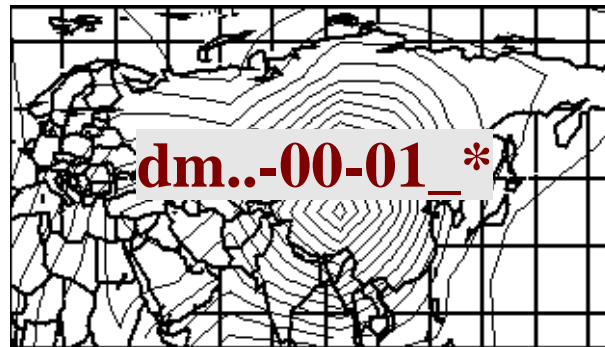
Block topology definition for output files

&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.

/

grid=1,model; outcfg.out

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_p

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

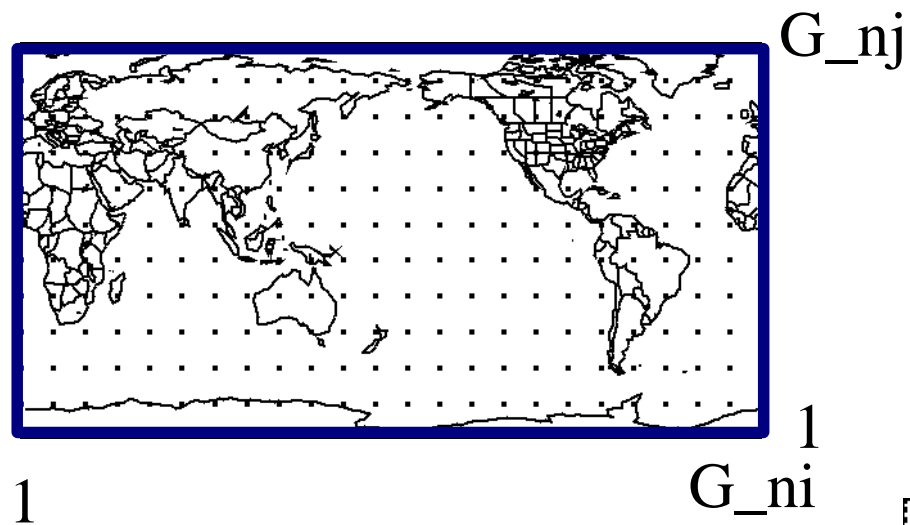
sortie_p([ALC,ACOEEF],grid,2,levels,1,steps,2)

						+-----+ **PERBUS** +-----+	
+-----+						+-----+	
Name			Output			Description	
Start	Length	Ini	Stag	name			
				lger			
+-----+						+-----+	
ACOEEF		"1I "			A COEF. IN WGEQ		
1	12	0	0				
AIP		"PE "			ACCUM. OF REFROZEN PRECIP.		
13	12	0	0				
ALC		"A1 "			ACCUM. OF LIQUID CONVECT. PRECIP.		
25	12	0	0				
ALCS		"A8 "			ACCUM. OF LIQUID SHAL L. CONVECT. PRECIP		
.	37	0	0				
						2168,54	75%

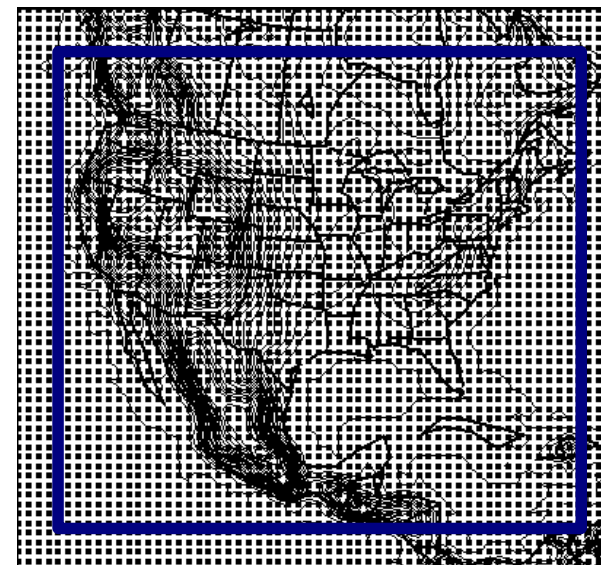
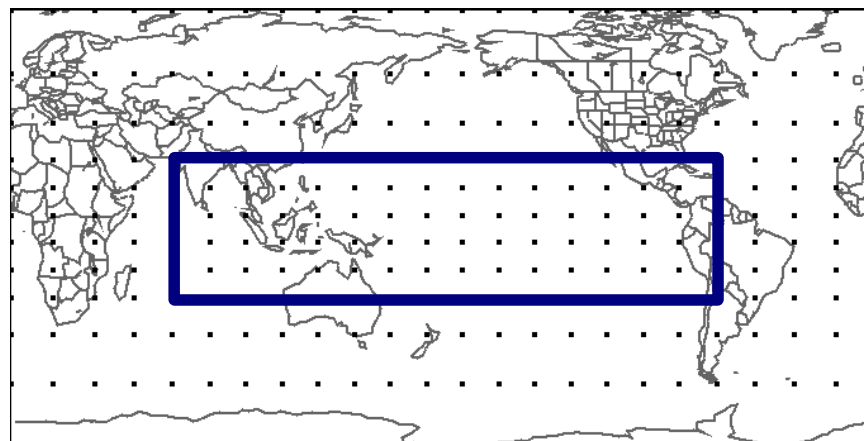
Fields available for output may not mean that they have values!

grid =

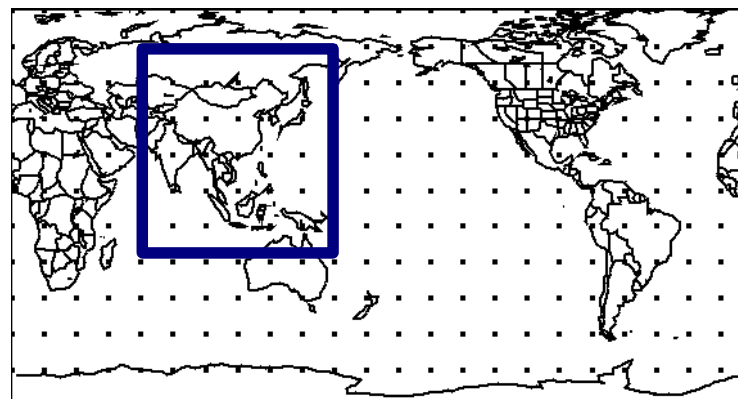
grid=1,model;



grid=1,core;



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



Running GEMDM

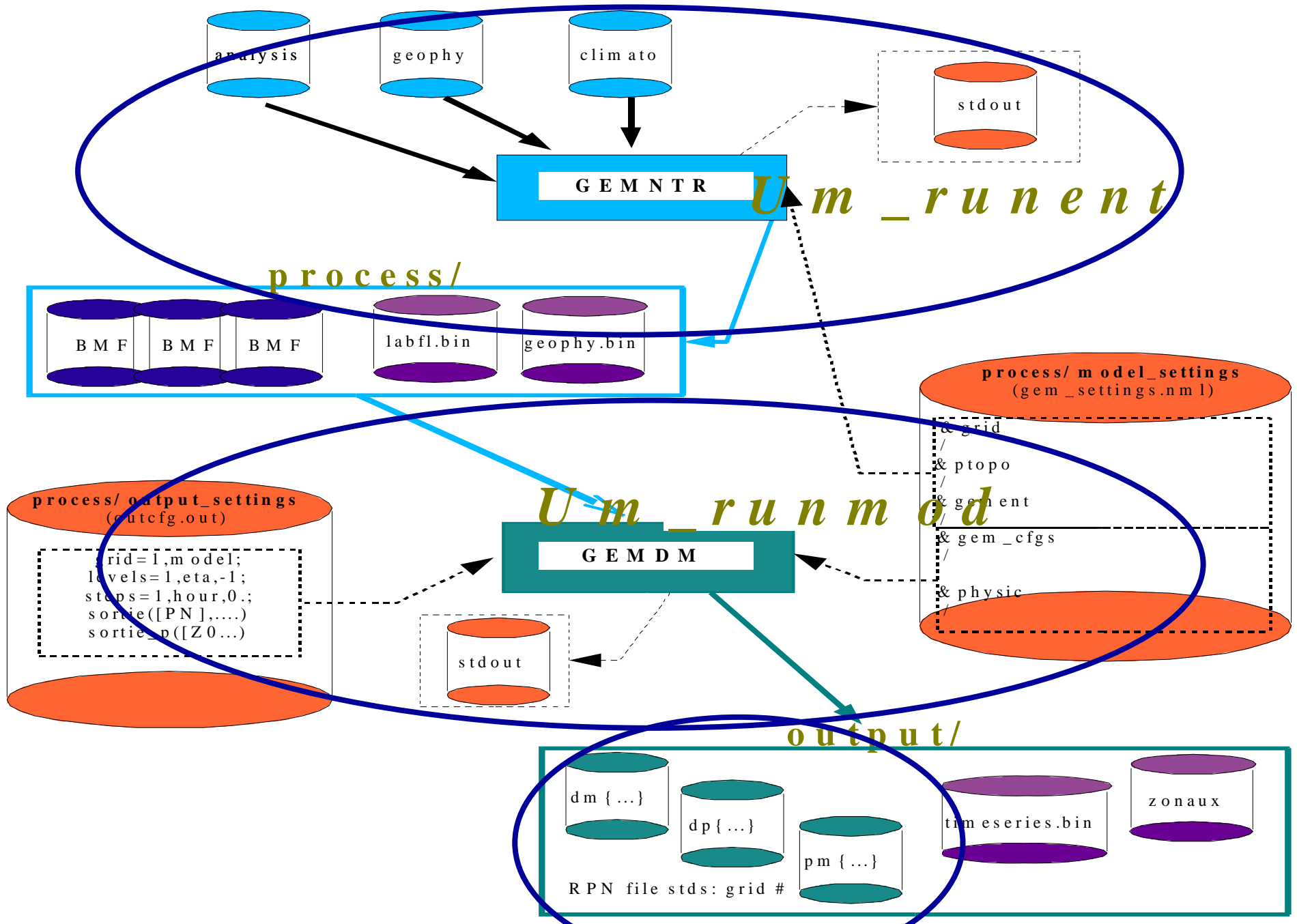
(interactive- pollux, Linux only)

```
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



Um_runent

process/

Um_runmod

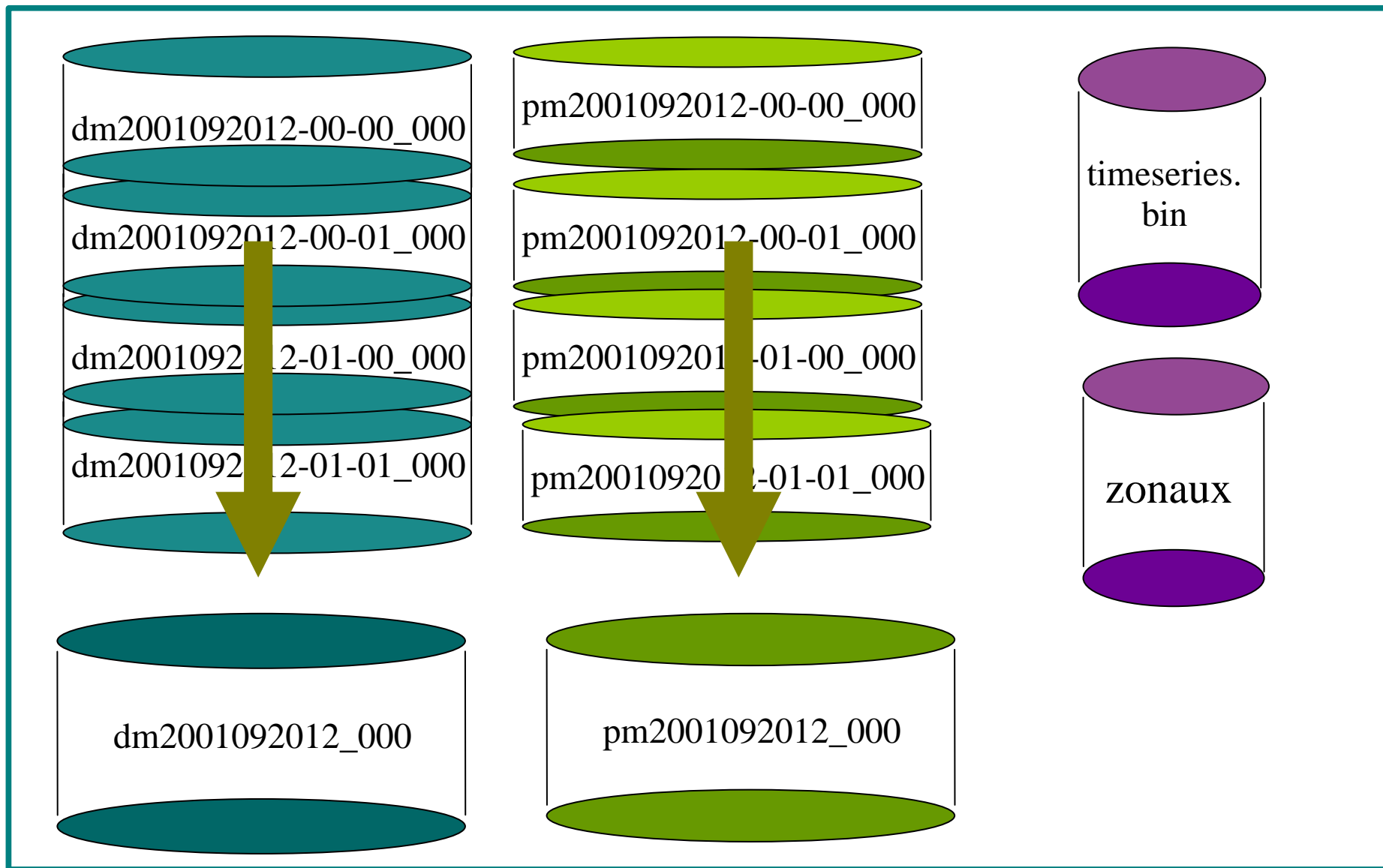
output/

d2z

(post-processing)

(Ptopo_nblocx=2,Ptopo_nblocy=2)

output/



Diese to Z grid (*d2z*)

lorenz 28% ls -a output/
casc/

dm2001092012-00-01_000
dm2001092012-01-01_000
pm2001092012-00-01_000
pm2001092012-01-01_000

dm2001092012-00-00_000
dm2001092012-01-00_000
pm2001092012-00-00_000
pm2001092012-01-00_000

lorenz 29% **d2z**

lorenz 30% ls -a output/
casc/
pm2001092012_000

dm2001092012_000

d m

d p

p m

d – dynamics
p – physics
variables

m – model
p – pressure
levels

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_3.2.1.Abs*

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;  
absaddress=  
anal=; GEM_v321c_E_1491182.1 (gemntr)  
d2z=1; GEM_v321c_M_1491182.1 (gemdm)  
GEM_v321c_M_1491182.2 (gemdm)  
inrep=; GEM_v321c_M_1491182.3 (gemdm)  
climato$HOME/listings/  
geophys$HOME/listings/  
GEM_v321c_1523732_PREPFT_32_1482792.1 (d2z)  
GEM_v321c_1523732_FT_32_1122414.1 (xfer)
```

\$HOME/gem/azur/v321c

\$HOME/listings/[azur]

\$HOME/listings/

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

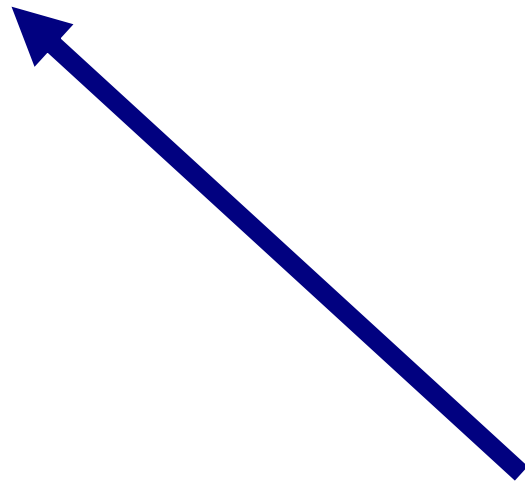
Useful Azur commands

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
- Etagerie: 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

The screenshot shows a Netscape browser window displaying the RPN website. The browser's address bar shows the URL <http://web-mrb.cmc>. The website header includes the RPN logo (Research en prévision numérique) and navigation links for Home, Help, Contact us, Search, and Français. A search box is located on the left side. The main content area features the text "research and development at Recherche en Prévision Numérique: Future and present" and a copyright notice for October 1999. The footer provides contact information for the Meteorological Research Branch, Environment Canada, located at 2121 Trans-Canada Highway, Dorval, Québec, Canada H9P 1J3. A left sidebar contains a list of links under the categories "Workgroups" and "Links".

File Edit View Go Bookmarks Tools Window Help

Back Forward Reload Stop <http://web-mrb.cmc> Search Print

Home Bookmarks Internet Lookup New&Cool

RPN
(Recherche en
prévision numérique)

Environnement Canada Environment Canada **Canada**

Home Help Contact us Search Français

Search

Submit

HOME
[Personnel](#)
[Comité social](#)
[Publications](#)
[Library](#)
[Seminars](#)
[Mardis de l'info](#)

Workgroups

[Administration](#)
[Informatics](#)
GEMDM
[Model Coupling](#)
[Community model](#)
[Large Scale](#)
[Mesoscale](#)
[Physics](#)
[Numerics](#)
[Statistics](#)

Links

[ARMA](#)
[CMC](#)
[MSC](#)
[WGNE](#)

research and development
at
**Recherche en Prévision
Numérique:
Future and present**

copyright RPN, October 1999

Meteorological Research Branch
Environment Canada
2121 Trans-Canada Highway, Dorval, Québec, Canada H9P 1J3

Transferring data from web-mrb.cmc.ec.gc.c...

GEMDM website

Documentation for
configuration files
and release notes of
each version



Quick references



(available soon ...
“GEMDM workshop handout”)

The screenshot shows a web browser window with the URL <http://web-mrb.cmc>. The page has a menu bar (File, Edit, View, Go, Bookmarks, Tools, Window, Help) and a toolbar with navigation buttons (Back, Forward, Reload, Stop) and utility buttons (Search, Print). Below the browser window, there is a green box indicating the last update: "Last Update Sept. 20, 2005".

The main content area is divided into two columns. The left column contains a "RESEARCH Work:" section with links for "15km:Lam vs Reg" and "10km:Lam vs Reg". Below this is a "VERSION Rel. Date" table with a blue oval highlighting the entries from v 3.2.1 down to v 2.0.0. The right column features the title "Introduction to GEMDM" and a paragraph stating "GEMDM is a Distributed Memory version of GEM". It then describes the Distributed Memory (DM) implementation, explaining how the domain of dimension $G_{ni} \times G_{nj}$ is split into subdomains of dimension $l_{ni} \times l_{nj}$ using a regular block partitioning technique. It mentions that this is based on a user-defined 'Ptopo_npex' number of processors to split G_{ni} and 'Ptopo_npey' number of processors to split G_{nj} . An example of a processor topology of (2x2) is shown as $Ptopo_npex=2, Ptopo_npey=2$.

At the bottom of the right column, there is a diagram of a world map with a grid. The map is divided into four quadrants labeled PE (0), PE (1), PE (2), and PE (3). The horizontal axis is labeled G_{ni} and the vertical axis is labeled G_{nj} . The subdomain dimensions are labeled l_{ni} and l_{nj} .

At the bottom left of the page, there is a "Quick References to:" section with links for "GEMDM Environment", "GEMDM Flowchart", "Batch Mode Setup", and "GEMDM structure".

RPN Website:

<http://notos.cmc.ec.gc.ca/mrb/rpn>

or

<http://web-mrb.cmc.ec.gc.ca/mrb/rpn>

Questions?