Post-processing Tools: RIP4
(WRF-ARW & WRF-NMM)

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RIP4

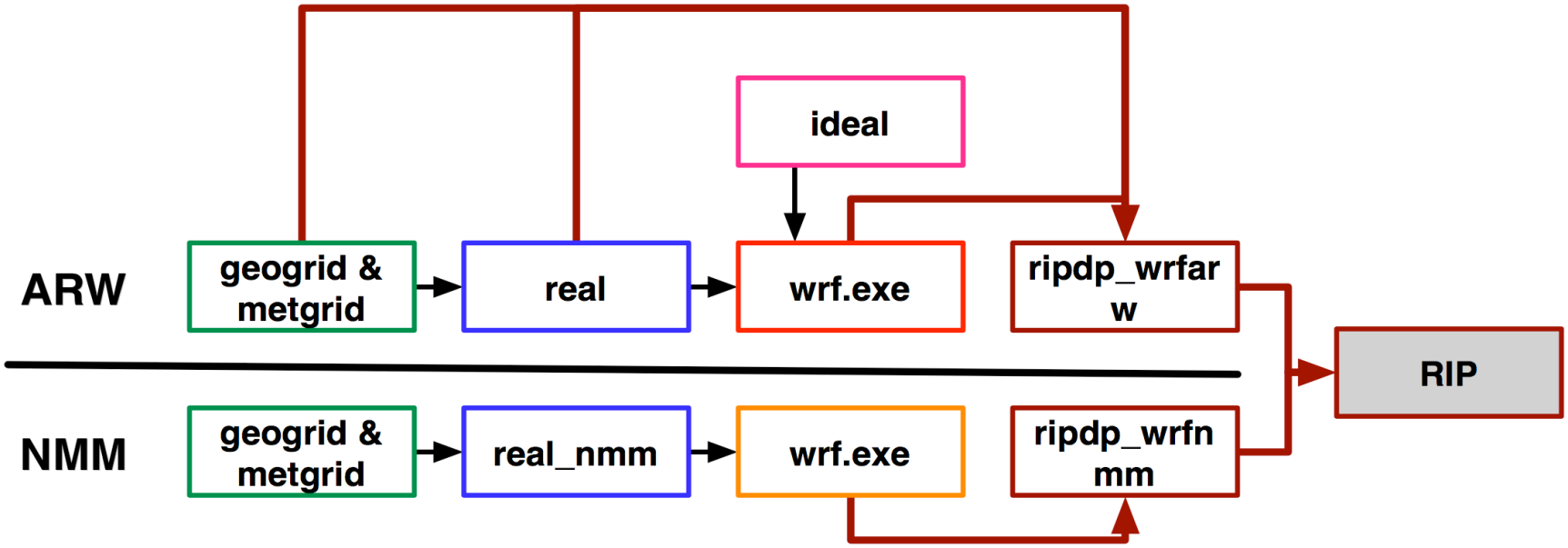
- **Read Interpolate Plot version 4**
- **Develop by Mark Stoelinga (UW/NCAR) & MMM/NCAR Staff**
- **Originally developed for the MM5 model**
- **Generate a number of graphical plots**
  - *Horizontal, cross-section, skewT*

RIP4

Important versions

ARW WRF output:	**version 4.0**
ARW idealized data:	**version 4.1**
WPS (ARW WRF):	**version 4.2**
NMM WRF output:	**version 4.3**
Current version:	**version 4.4**

RIP4 Input Data



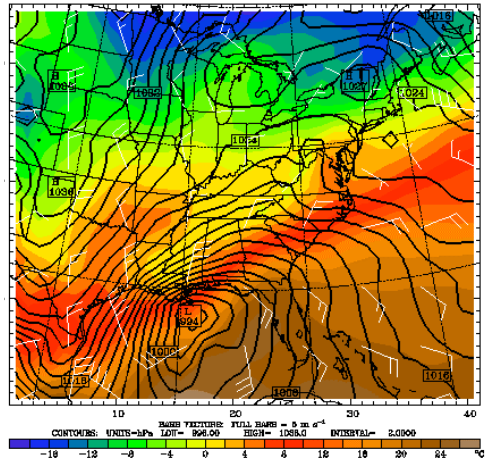
RIP4

INPUT DATA

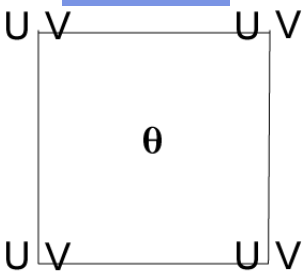
RIPDP

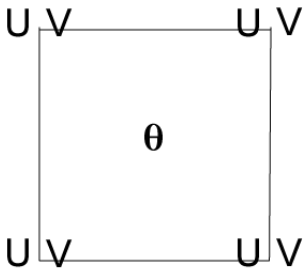
RIPDP format one file per TIME & VAR

RIP



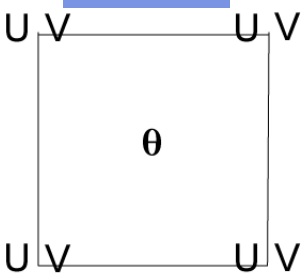
MM5



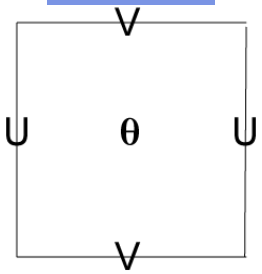


RIP4 - Grids

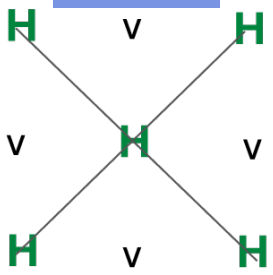
MM5



ARW



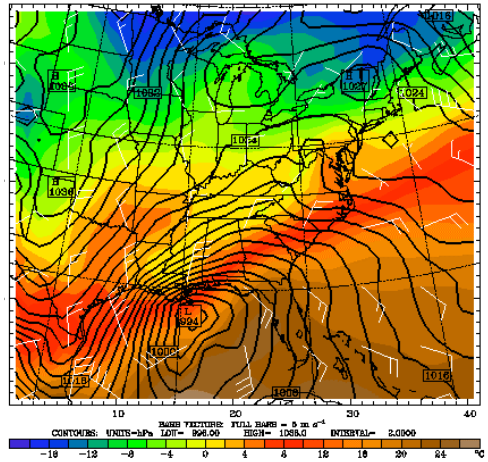
NMM



R I P D P

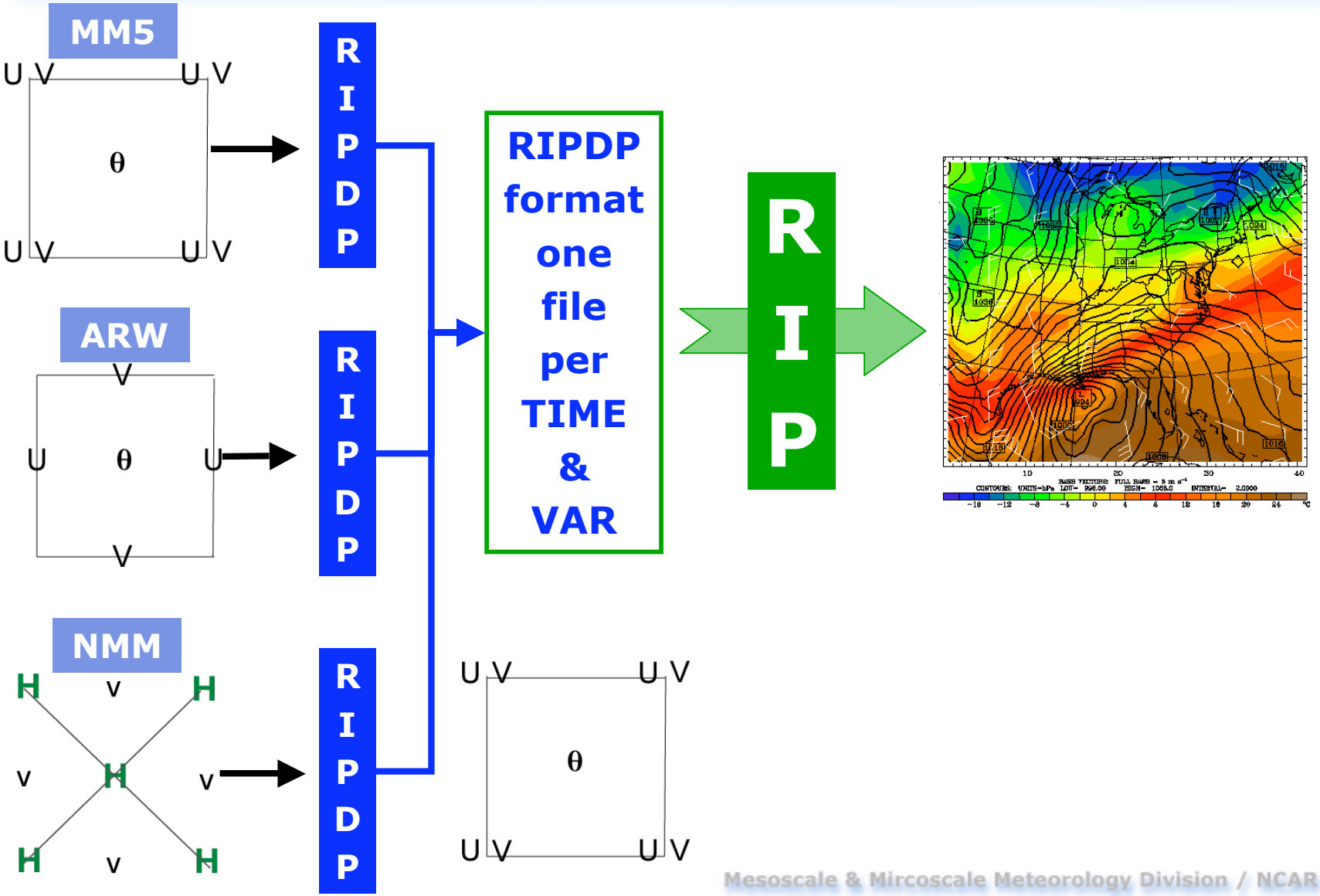
RIPDP format one file per TIME & VAR

R I P



?

RIP4 - Grids


MM5
U V
U V
θ
U V
U V
ARW
V
U
θ
U
V
NMM
H
v
H
v
H
v
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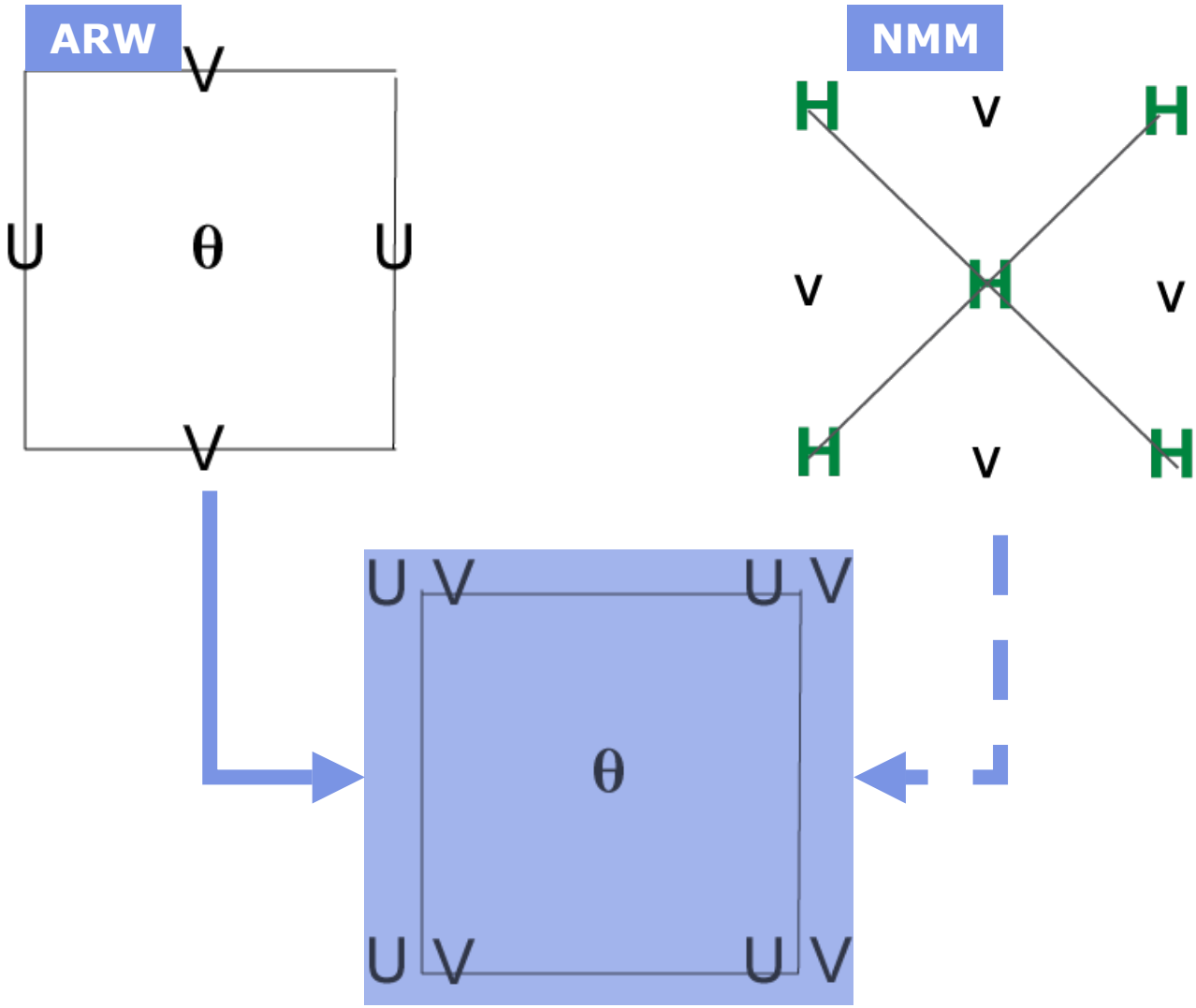
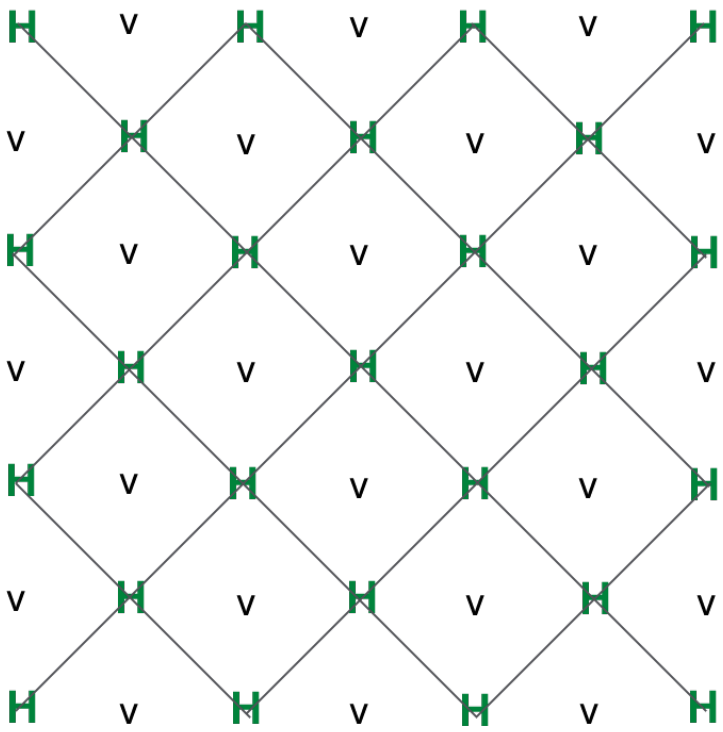
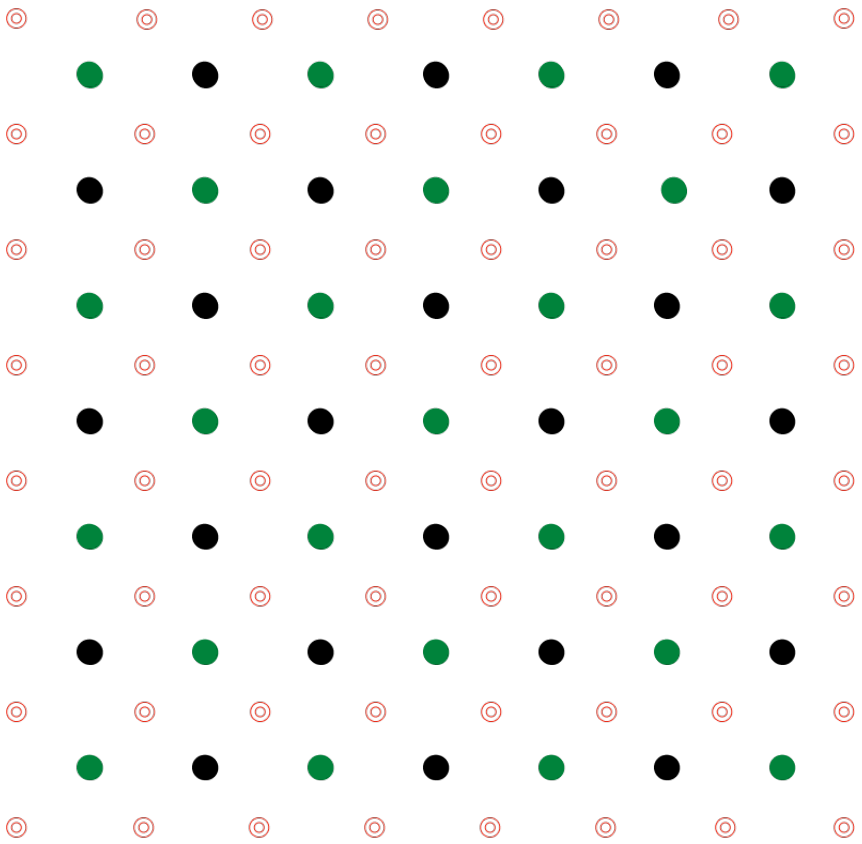
v
H
RIPDP
RIPDP
RIPDP
RIPDP format one file per TIME & VAR
RIP
U V
U V
θ
U V
U V

RIP4 - WRF Grids

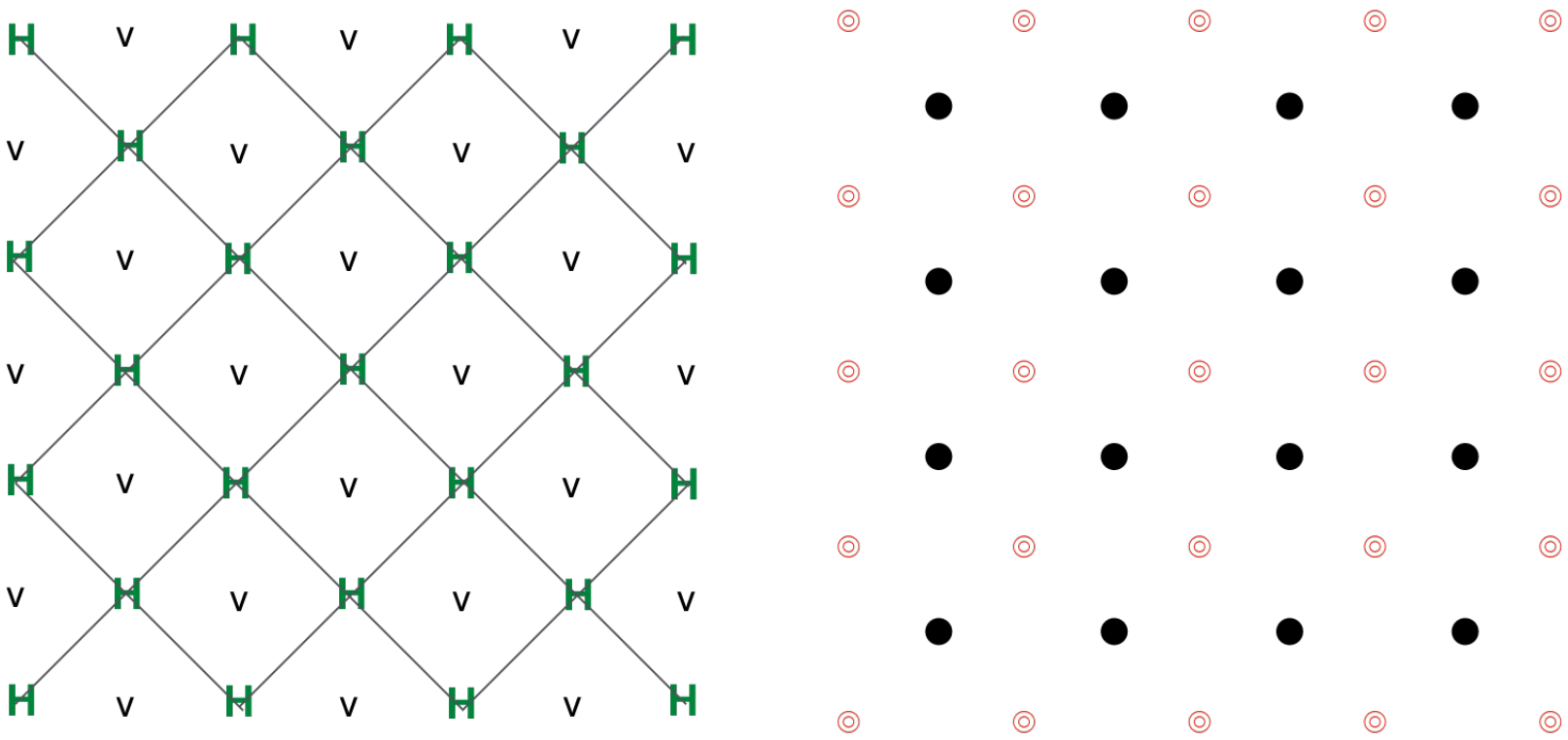


RIP4 - NMM Grid *(iinterp 0)*





RIP4 - NMM Grid *(iinterp 1)*



new projection ; no direct relationship

General

- **Requires NCAR Graphics low-level routines**
  - ***http://ngwww.ucar.edu***

- **NCL Version 5:**
  - ***http://www.ncl.ucar.edu***
  - Released November 2007
  - Combine NCL and NCAR Graphics
  - Open Source
  - *Recommended*

General

- **Documentation**
  - In program tar file under the **Doc/** directory
  - ***http://www.mmm.ucar.edu/wrf/users/docs/ripug.htm***
  - ***http://www.dtcenter.org/wrf-nmm/users/docs/user_guide/RIP/ripug.htm***

General

- **Download Code:**
  - *http://www.mmm.ucar.edu/wrf/users/download/get_source.html*
  - *http://www.dtcenter.org/wrf-nmm/users/downloads/index.php*
- **OnLine Tutorial:**
  - *http://www.mmm.ucar.edu/wrf/users/graphics/RIP4/RIP4.htm*
  - *http://www.dtcenter.org/wrf-nmm/users/OnLineTutorial/NMM/RIP/index.php*

RIP4 on your computer

- **set environment variables**

  setenv RIP_ROOT /usr/$USER/RIP4 *(rip_root)*
  setenv NCARG_ROOT /usr/local/ncarg *(/usr/local/ncl)*

- **Edit *Makefile* to define paths to netCDF library and include file on your computer:**

  NETCDFLIB and *NETCDFINC*

- **make <machine type>** (*it'll make suggestions*)

  make linux (*example*)

- **RIP4 has 2 parts (RIPDP and RIP)**

ripdp

- **ripdp_wrf*xxx***
  RIP Data Preparation for WRF (ARW / NMM)

- **RIPDP** converts different input file formats *(WRF - netCDF)* into RIP input format *(B - grid)*

- **RIPDP** puts each **Variable** at each **Time** into a separate file – **LOTS** of files

mkdir RIPDP

Running ripdp

Optional

```
ripdp_wrfxxx  [-n namelist-file]          \
  <model_data_name>    [basic/all]   \
  <input_file1 input_file2>
```

Example

```
ripdp_wrfarw   RIPDP/arw   all   wrfout*
ripdp_wrfnmm   RIPDP/nmm   all   wrfout*
```

use directory as part of the model_data_name

ripdp namelist

- **Use namelist to add control**
  - **ptimes** *(times for ripdp to process)*

    0,1,2,3,4,5,6 *(0,1,2,3,4,5,6)*

    0,-6,1 *(0,1,2,3,4,5,6)*

    0, 2,-4,1, 6 *(0, 2,3,4, 6)*

  - ***tacc:*** *input files not on exact times*

    history_interval=10 ; time_step=180 (*3 min*)
    Output times **uneven** (29_00:00, 29_00:09,
    29_00:21, 29_00:30)

    history_ interval=12 ;time_step=180 *(3 min)*
    Output times **even** (29_00:00, 29_00:12,
    29_00:24, 29_00:36:00)

  - **discard:** fields if '*all*' is selected on the command line
  - **retain:** fields if 'basic' is selected on the command line

NMM only

ripdp namelist

- **iinterp = 1:** interpolate to a new B-grid
- **dskmcib:** grid spacing, in km, of the coarse domain on which the new B-grid will be based
- **miycorsib, mjxcorsib:** number of grid points in the y and x directions of new B-grid
- **nprojib:** map projection number (0: none/ideal, 1: LC, 2: PS, 3: ME, 4: SRCE) of new B-grid
- **xlatcib, xloncib:** central latitude and longitude of new B-grid
- **truelat1ib, truelat2ib:** two true latitudes of new B-grid

- **miyib, mjxib:** number of grid points in the y and x directions, of the fine domain
- **yicornib, xjcornib:** coarse domain y and x locations of the lower left corner point of the fine domain
- **dskmib:** grid spacing, in km, of the fine domain

rip

- **read the output generated by *ripdp***
- **read User Input File (UIF) *(rip_sample.in)***
  - **First** section is a list of general parameters *(namelist format)*
  - **Second** section is a series of plots in the Plot Specification Table (PST)
- **generate meta file**

Running rip

- **Edit the User Input File (UIF)**
- **setenv NCARG_ROOT /usr/local/ncarg**
  setenv NCARG_ROOT /usr/local/ncl
  (if you installed NCL version 5)
- **setenv RIP_ROOT *your-rip-directory***
  - *Can overwrite this with rip_root in input namelist*

Running rip

created by ripdp

- **rip [-f] model-data-set-name **
  rip-execution-name

User Input File (UIF)

Example

rip [-f] RIPDP/*xxx* rip_sample.in

use directory as part of the model_data_set_name

output

[rip_sample.out]
rip_sample.TYPE

rip UIF

```
&userin
    .......
&end
```

Namelist controlling general parameters

```
&trajcalc
    .......
&end
```

Namelist for trajectory calculations
Only used if itrajcalc=1, in userin namelist

```
==================================
---------    Plot Specification Table   ----------
==================================
feld= .........
feld= .........
==================================
feld= .........
feld= .........
==================================
```

Frame specification group (FSG)

Plot specification line (PSL)

Plot Specification Table (PST)

rip namelist - *&userin*

- **Use namelist to control**
  - processing times, intervals
  - title information
  - text quality on a plot
  - whether to do time series, trajectory, or to write output for Vis5D

- **Full explanation for namelist variables is available in the user document**

rip namelist - *&userin*

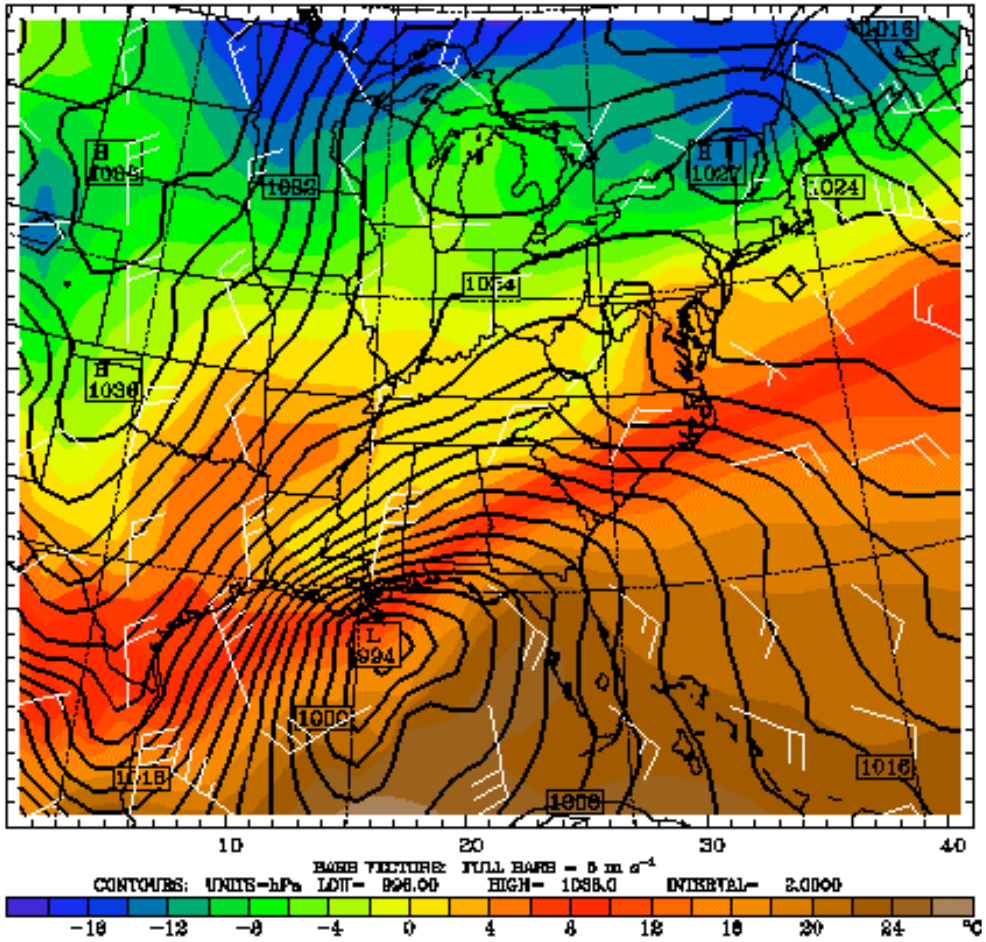
- idotitle – first part of first title line
- titlecolor – color of title lines
- ptimes, ptimeunits – times to process
- tacc – tolerance for processing data
- timezone –display of local time
- iusedaylightrule – 1 applied, 0 not applied
- iinittime – plotting of initial time
- ivalidtime – plotting of valid time
- inearsth – plot times as 2 / 4 digits
- flmin, frmax, fbmin, ftmax – frame size
- ntextq – text quality

rip namelist - *&userin*

- ntextcd – text font
- fcoffset – 12 means hour 12 of the MM5 forecast is considered hour 0 by you
- idotser – generate time series output
- idescriptive – more descriptive titles
- icgmsplit – split metacode into several files
- maxfld – reserve memory for RIP (10-15)
- itrajcalc – 0, 1 ONLY when doing trajectory calculations *(use also namelist trajcalc)*
- imakev5d – 0, 1 generate Vis5D data
- rip_root - override RIP_ROOT
- ncarg_root - output type: X11, cgm, pdf, ps

Creating a Plot

Temperature @ lowest sigma level
Sea Level Pressure
Winds @ lowest sigma level



Creating a Plot

```
&userin
   ……
&end
&trajcalc
   …….
&end
=============================================
----      Plot Specification Table       ----
=============================================
feld=tmc; ptyp=hc; vcor=s; levs=1fb; >
   cint=2; cmth=fill; >
   cosq=32,light.violet,-16,blue, >
   0,yellow,16,orange,32,light.gray
feld=slp; ptyp=hc; cint=2; linw=2
feld=uuu,vvv; ptyp=hv; vcmx=1; >
   colr=white;intv=5
feld=map; ptyp=hb
feld=tic; ptyp=hb
=============================================
```

levs=2fb
levs=1,2,3
levs=800,500
levs=800,-300,100

Summary: How to run RIP4?

- **Compile the code**
  make <*machine type*>
- **Run ripdp_wrf*xxx***
  Create a new directory for the output
- **Set environment variables**
  setenv NCARG_ROOT /usr/local/ncarg *(/usr/local/ncl)*
  setenv RIP_ROOT *your-rip-directory* *(or in namelist)*
- **Edit the User Input File (UIF)**
- **Run rip**