Gen-Vx-Mask and Regridding

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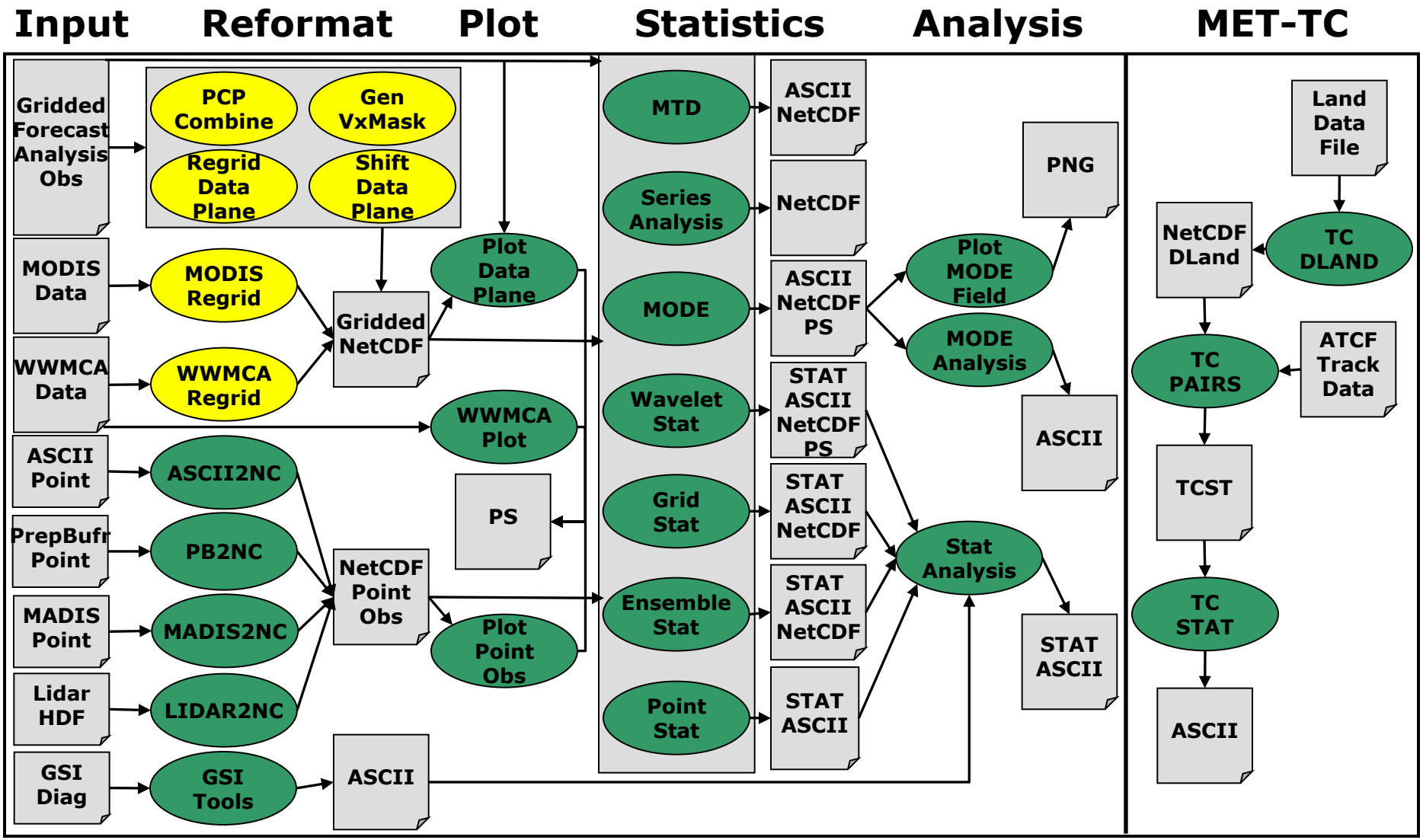
Gen-Vx-Mask Tool



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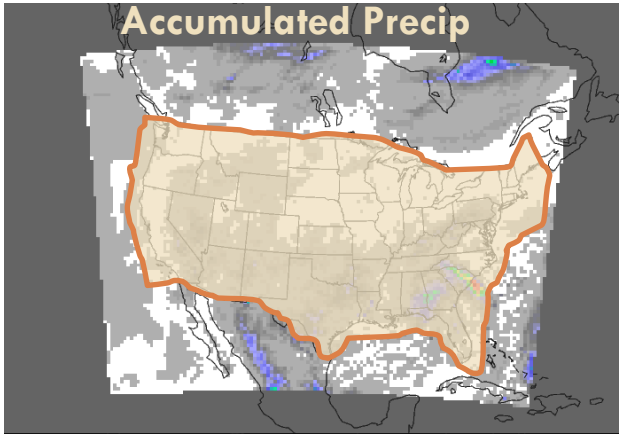
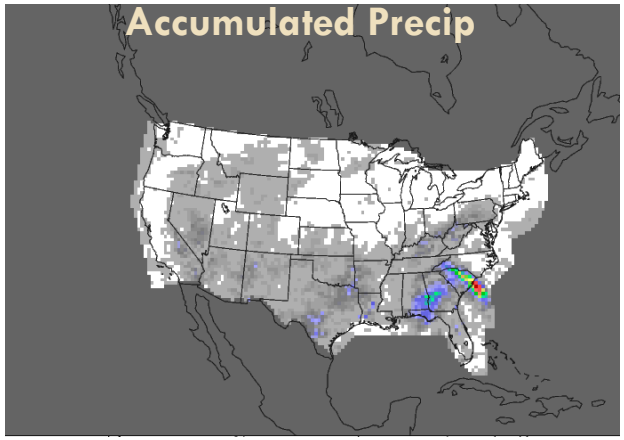
Gen-Vx-Mask: Overview

- **Generate Verification Mask**
  - Replaces earlier Gen-Poly-Mask and Gen-Circle-Mask tools
- **Purpose:**
  - Generate mask once for a domain and use the output many times.
- **Functionality:**
  - Generate a 0/1 bitmap mask field to define which grid points are included in statistics.
  - Support multiple masking methods.
  - Run iteratively to define complex masking region.
  - Define mask once prior to running the MET statistics tools.
  - No configuration file.
- **Data formats:**
  - Reads gridded data files.
  - Reads ASCII formatted lat/lon file.
  - Writes gridded output NetCDF mask file.



CONUS
31.1931 -120.4211
31.2291 -120.4976
31.2650 -120.5741
31.3009 -120.6123
31.3369 -120.6506
31.3728 -120.6888
31.4087 -120.6888
31.4447 -120.7270
992 more points…



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Gen-Vx-Mask: Usage

Usage: gen_vx_mask

input_file
mask_file
out_file
[-type string]
[-input_field string]
[-mask_field string]
[-complement][-union]
[-intersection][-symdiff]
[-thresh string]
[-height n][-width n]
[-value n]
[-name string]
[-log file]
[-v level]
[-compress level]

input_file	Defines grid for the mask
mask_file	Defines the spatial masking area
out_file	Output NetCDF file name
-type string	poly, box, circle, track, grid, data, solar_alt, or solar_azi
-input_field	Field for initial value at each grid point (instead of 0)
-mask_field	Field for data masking
-complement	Define complement of the mask
-union -intersection -symdiff	Control logic for combining -input_field and current mask
-thresh	Threshold for circle, track, data, solar_alt, and solar_azi types
-height, -width	Height and width for box type
-value, -name	Output mask value and variable name

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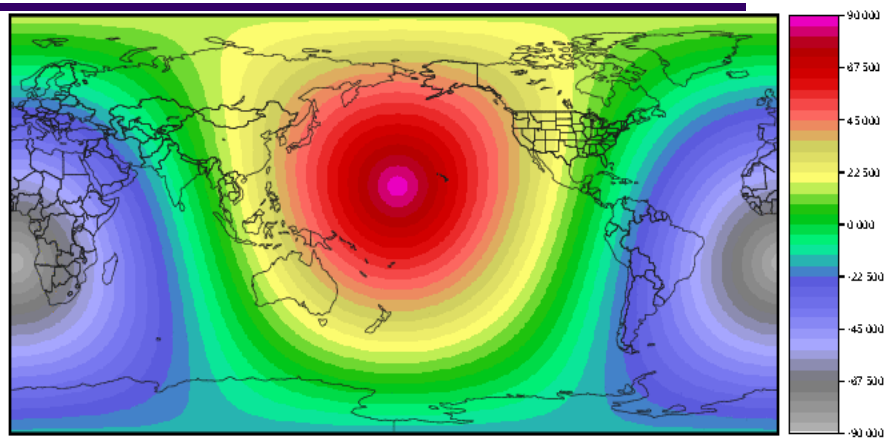
Gen-Vx-Mask: Types

- mask_file = Lat/Lon file
  - Polyline (poly)
  - Box
  - Circle
  - Track
- mask_file = gridded data file
  - Grid
  - Data
  - Lat or Lon
- mask_file = gridded data file or timestamp
  - Solar Altitude (solar_alt)
  - Solar Azimuth (solar_azi)
- mask_file = shapefile
  - Shape (.shp)



solar_alt_00.nc

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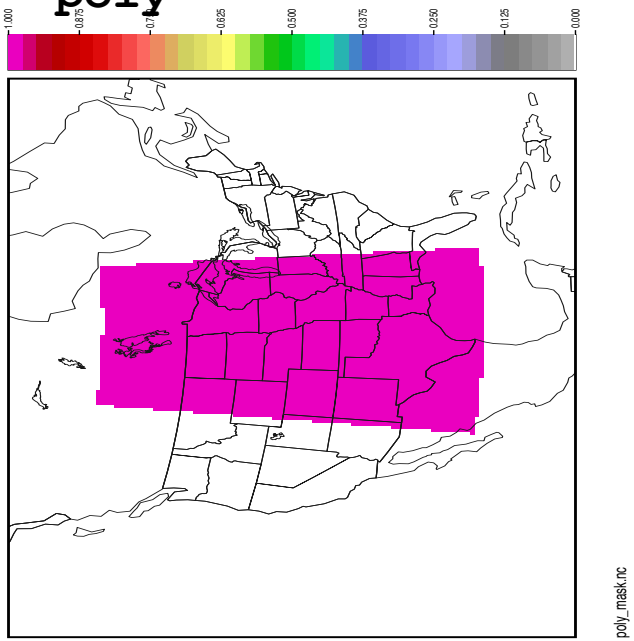
Gen-Vx-Mask: Lat/Lon Types

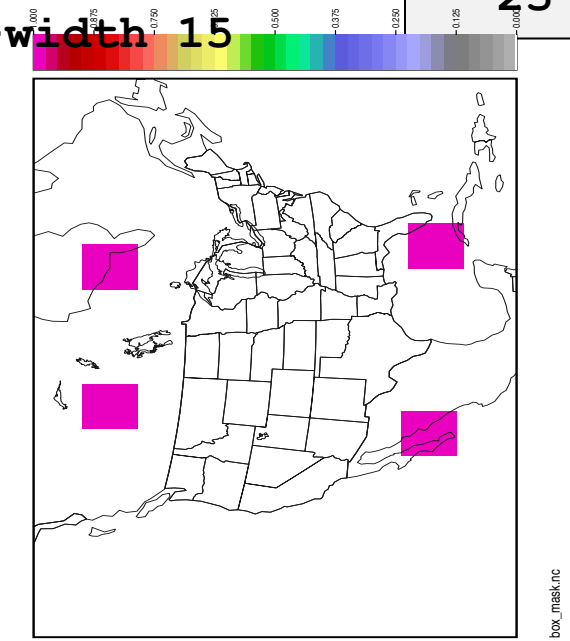
```
gen_vx_mask wrfprs_ruc13_12.tm00 MyLatLonPoints.txt \
            poly_mask.nc -type …
```

```
MyLatLonPoints
25 -110
55 -110
55  -85
25  -85
```

poly



box
-width 15



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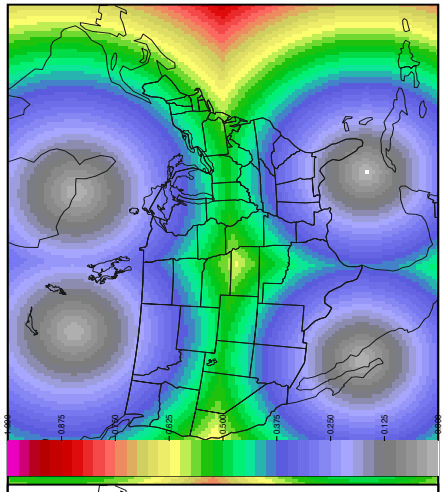
Gen-Vx-Mask

Gen-Vx-Mask: Lat/Lon Types

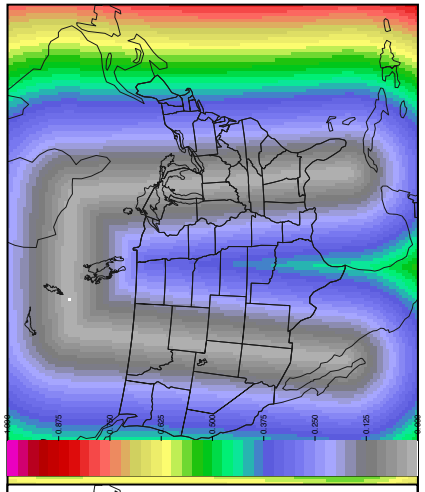
```
gen_vx_mask wrfprs_ruc13_12.tm00 MyLatLonPoints.txt \
            poly_mask.nc -type ...
```

```
MyLatLonPoints
25 -110
55 -110
55  -85
25  -85
```

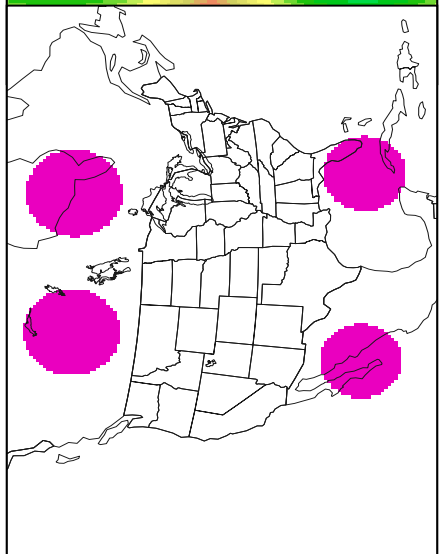
circle



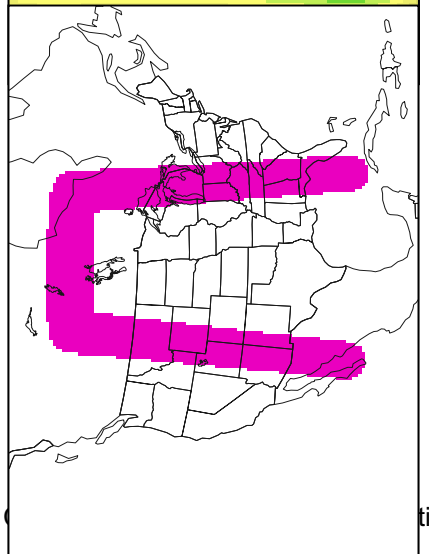
track



circle
-thresh
le500



track
-thresh le250



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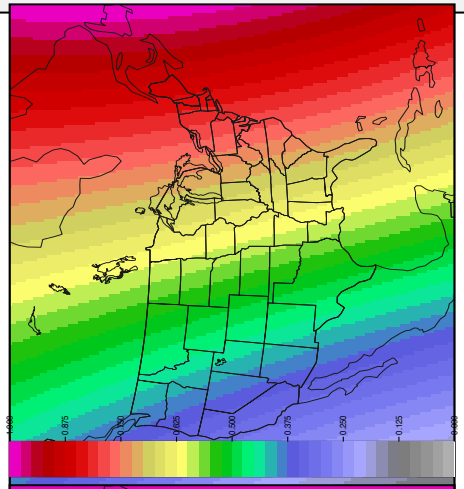
Gen-Vx-Mask

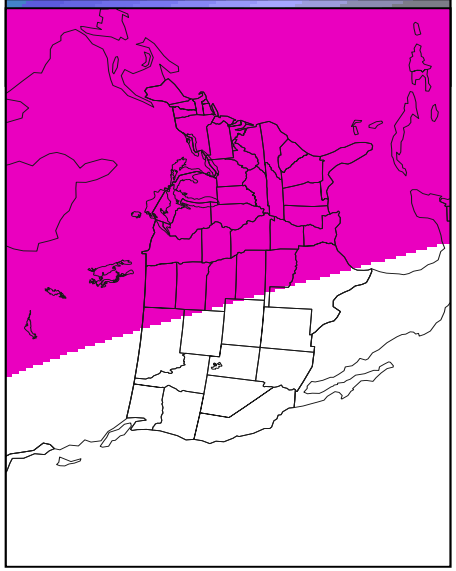
Gen-Vx-Mask: Timestamp Types

```
gen_vx_mask wrfprs_ruc13_12.tm00 20050807_12 \
                                  k.nc -type
```

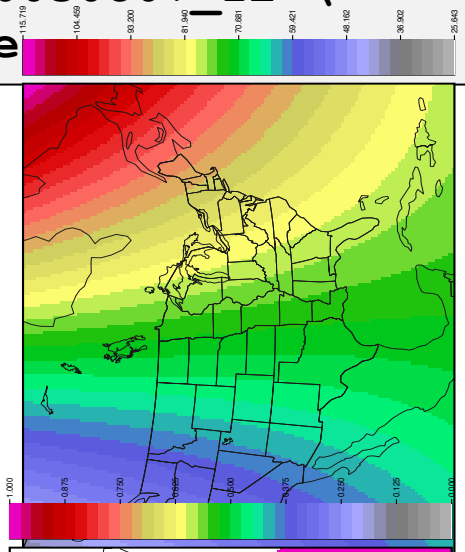
solar_alt



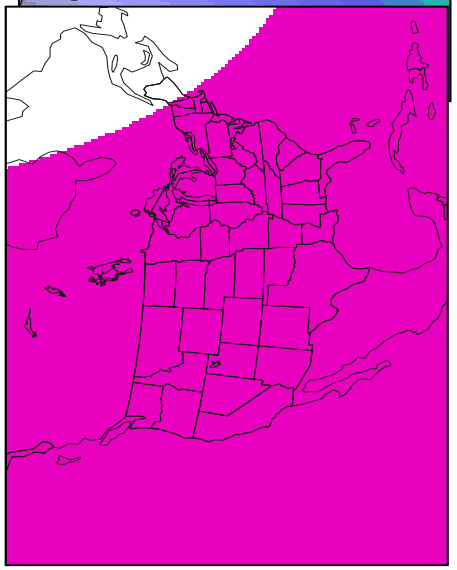
solar_alt
-thresh:
>0



solar_azi



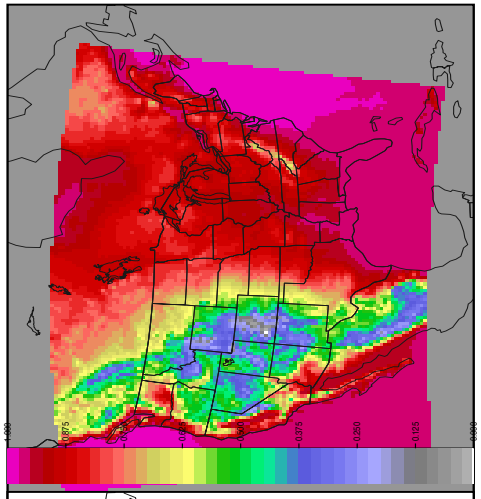
solar_azi
-thresh
<=90



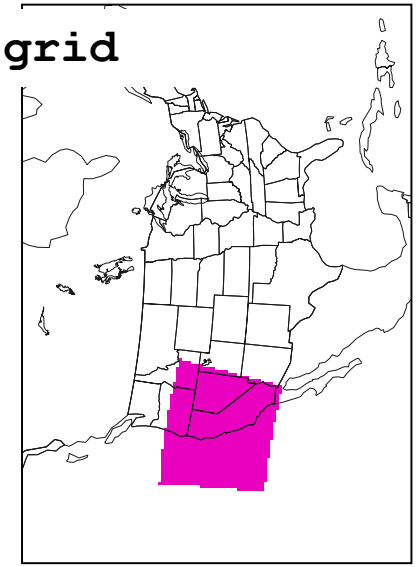
Gen-Vx-Mask

Gen-Vx-Mask: Grid/Data File Types

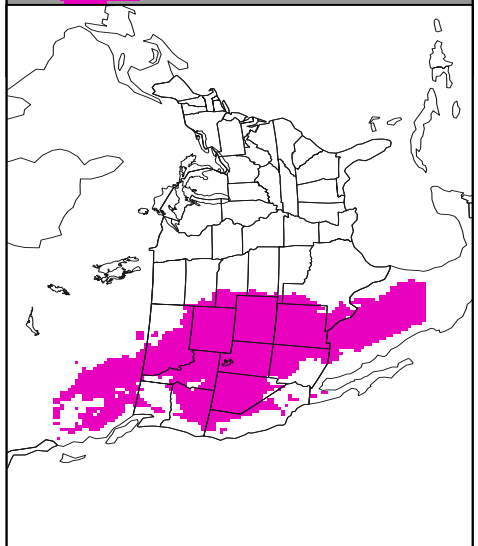
```
gen_vx_mask wrfprs_ruc13_12.tm00 d01_2009123112_02400.grib \
            grid_mask.nc -type …
```



data
-mask_field
'name="PRES";
level="L0";'

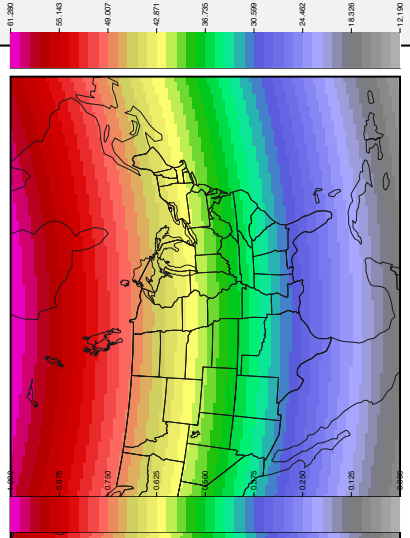


grid

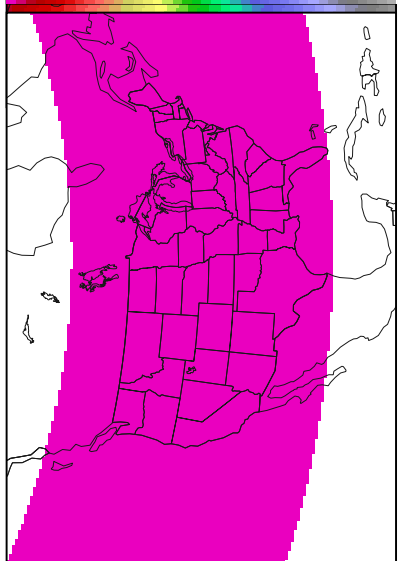


data
-thresh
'le 90000'

lat

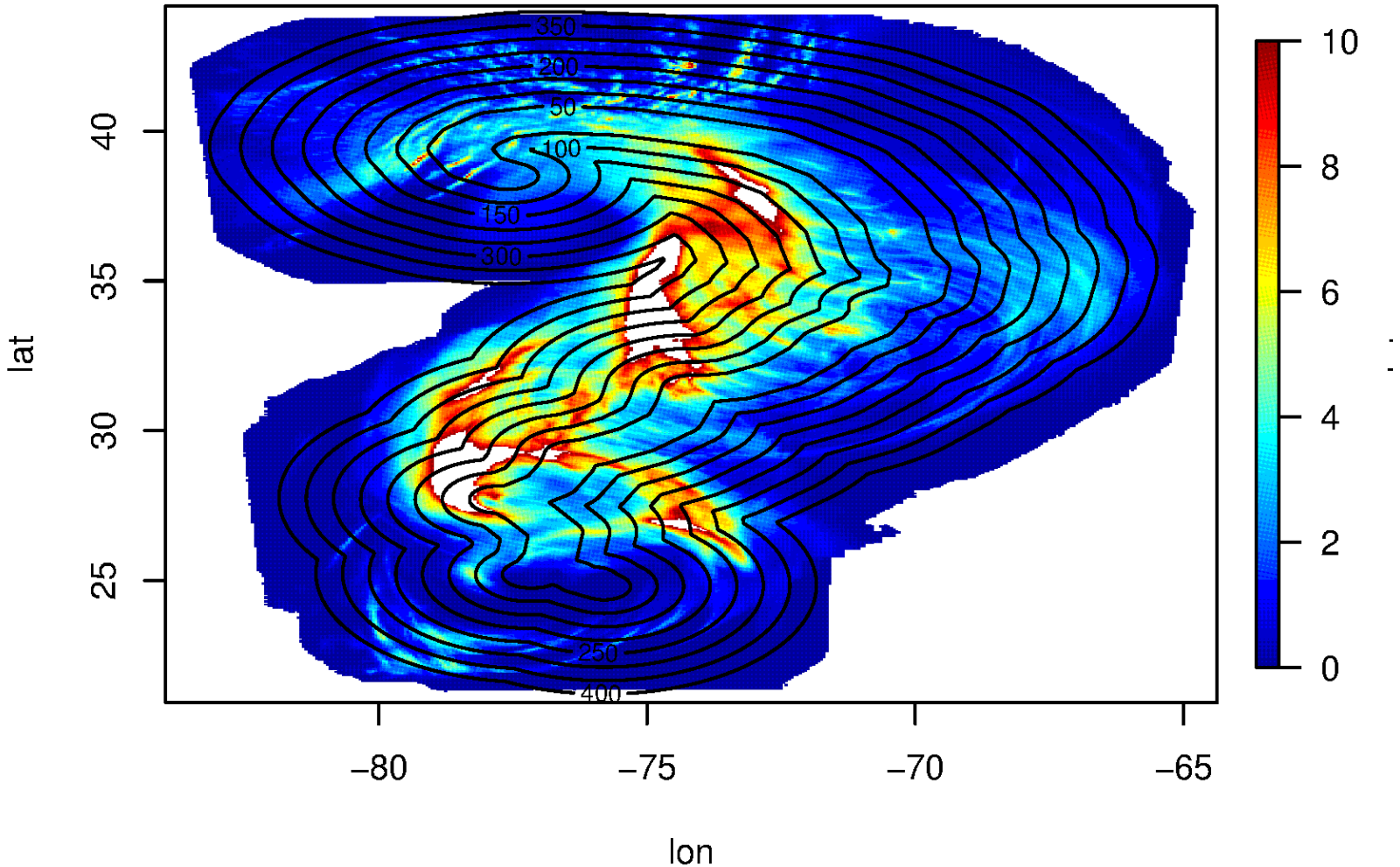


lat
-thresh
'ge25&&le55'



Gen-Vx-Mask

Gen-Vx-Mask: Storm Following



Complex masking definition including storm-following masking

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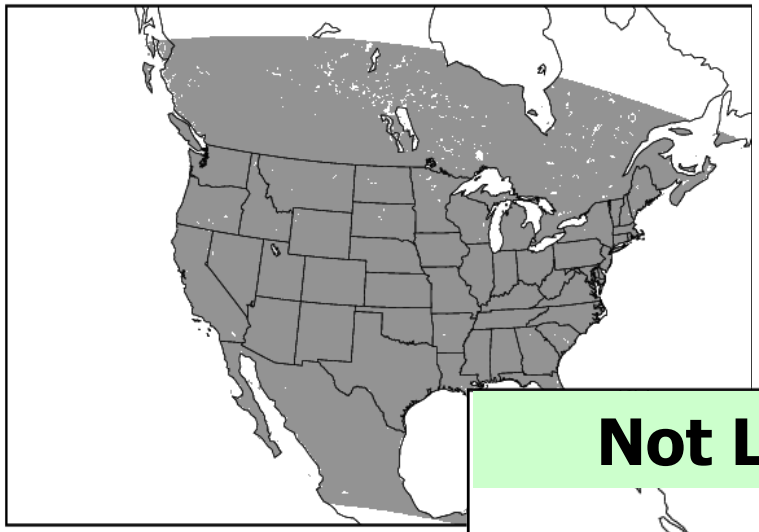
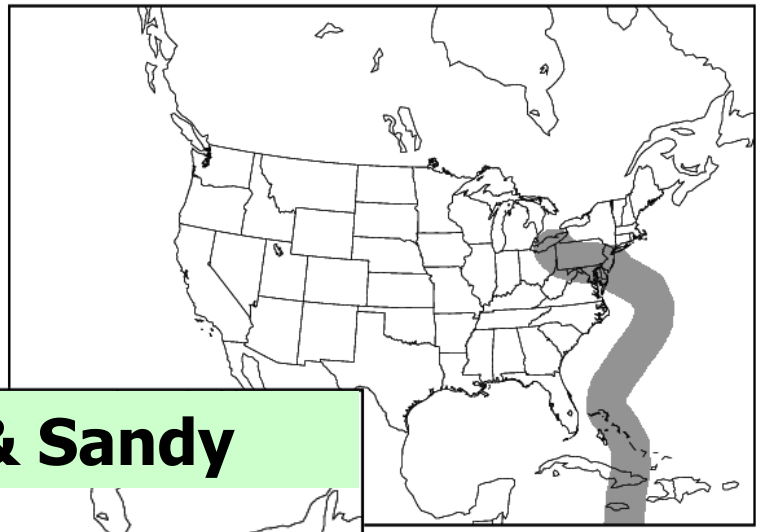
Gen-Vx-Mask: Set Logic

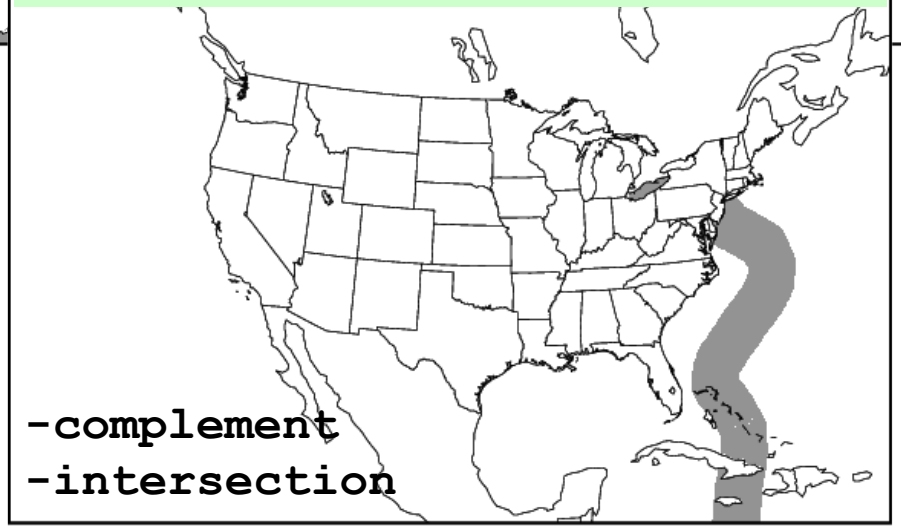
Land == 1



Sandy 200km



Not Land && Sandy



```
-complement
-intersection
```

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REGRIDDING TOOLS

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Regrid Data Plane

Regrid_Data_Plane Tool

- **Functionality:**
  - Stand-alone tool implementing the automated regridding capability of the MET statistics tools.
  - Extract one or more user-specified fields from the input data file.
  - Regrid to the output grid using the specified interpolation method and width.
  - No configuration file.
- **Data formats:**
  - Reads any MET supported gridded data file (i.e. GRIB1/2 and flavors of NetCDF).
  - Writes gridded NetCDF as input to the MET statistics tools.

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Regrid-Data-Plane: Usage

Usage: regrid_data_plane

input_filename
to_grid
output_filename
-field string
[-method type]
[-width n]
[-shape type]
[-vld_thresh n]
[-name list]
[-log file]
[-v level]
[-compress level]

input_filename	Input gridded data file name
to_grid	Output grid as a named grid, gridded data file, or grid specification
output_filename	Output NetCDF file name
-field string	Input field configuration string (may be used multiple times)
-method type	Interpolation method
-shape type	shape of neighborhood (SQUARE or CIRCLE)
-width n	Interpolation width
-vld_thresh n	Interpolation required valid data ratio
-name list	Output NetCDF variable name(s)

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Regrid-Data-Plane: Run

- **met-8.0/bin/regrid_data_plane** \
  in.grb G212 tmp_p500_G212.nc \
  -field ‘name=“TMP”; level=“P500”;’
- **met-8.0/bin/regrid_data_plane** \
  in.grb gfs.t06z.pgrb2full.0p50.f078 \
  surface_winds.nc \
  -field ‘name=“UGRD”; level=“Z10”;’ \
  -field ‘name=“VGRD”; level=“Z10”;’ \
  -field ‘name=“WIND”; level=”Z10”;’ \
  -name UWind,VWind,WindSpeed

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Shift Data Plane

Shift_Data_Plane Tool

- **Functionality:**
  - Tool to perform a rigged shift of the entire grid.
  - Users specifies lat and lon of source and destination points to define shift
  - User may also specify method of interpolation and fields
  - No configuration file.
- **Data formats:**
  - Reads any MET supported gridded data file (i.e. GRIB1/2 and flavors of NetCDF).
  - Writes gridded NetCDF as input to the MET statistics tools.

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Shift-Data-Plane: Usage

Usage: shift_data_plane

input_filename
output_filename
-field string
-from lat lon
-to lat lon
[-method type]
[-width n]
[-log file]
[-v level]
[-compress level]

input_filename	Input gridded data file name
output_filename	Output NetCDF file name
-field string	Input field configuration string (may be used multiple times)
-from lat lon	Specifies starting location to define the shift, lat N, lon E
-to lat lon	Specifies the ending location to define the shift
-method type	Interpolation method
-width n	Regridding width, default 1

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PCP Combine

PCP-Combine Tool

- **Stands for "Precip-Combine"**
- **Functionality:**
  - Mathematically combines precipitation fields across multiple files.
    - Add precipitation over multiple files
      - *2 NMM output files to go from 3-hr to 6-hr accumulation.*
    - Sum precipitation over multiple files
      - *12 WSR-88D Level II data to go from 5 min accumulation to 1-hr accumulation.*
    - Subtract precipitation in 2 files
      - *2 ARW output files to go from 12 hr accumulations to 6 hour accumulation*
  - Specify field name on the command line.
  - No configuration file.
- **Data formats:**
  - Reads GRIB1, GRIB2, or pinterp or CF compliant NetCDF format.
  - Writes gridded NetCDF as input to stats tools.

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PCP-Combine: Usage

Usage: pcp_combine

[-sum sum_args]

or [-add add_args]

or [-subtract sub_args]

[-field string]

[-name variable_name]

[-log file]

[-v level]

[-compress level]

-sum	**Accumulates data over multiple files.** ***Sum_args***: (init_time, in_accum, valid_time, out_accum, out_file, -pcpdir path, -pcprx reg_exp)
-add	**Accumulates data over two files.** ***Add_args:*** (in_file1, Accum1, in_file2, Accum2, out_file).
-subtract	**Subtracts data over two files.** ***Sub_args:*** (in_file1, Accum1, in_file2, Accum2, out_file).
-field	**Defines the data to be extracted from the input files.**
-name	**Name of combined variable in output NetCDF file.**

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PCP-Combine: Sum

- **Two examples of the –sum option**

1) Sum two 6-hourly accumulation forecast files into a single 12-hour accumulation forecast.

   ***met-8.0/bin/pcp_combine ***
   -sum 20050807_000000 6 20050807_120000 12
   sample_fcst.nc -pcpdir data/2005080700

2) Summing 12 1-hourly accumulation observation files into a single 12-hour accumulated observation.

   ***met-8.0/bin/pcp_combine ***
   *-sum 00000000_000000 1 *
   *20050807_120000 12 *
   sample_obs.nc -pcpdir data/ST2ml

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PCP-Combine: Add and Subtract

- Use **-add** option for already binned precipitation:
  - Adding two 6-hourly accumulation forecast files into a single 12-hour accumulation forecast.

```
met-8.0/bin/pcp_combine –add \
20050807_060000.grb 6 \
20050807_120000.grb 6 \
APCP_12_20050807_120000.nc
```

- Use **-subtract** option for "runtime" accumulations:
  - Subtract 36 hour accumulation minus 12 hour accumulation for 24 hours in between.

```
met-8.0/bin/pcp_combine –subtract \
nam_2012040900_F036.grib 36 \
nam_2012040900_F012.grib 12 \
nam_2012040900_F036_APCP_24.nc
```

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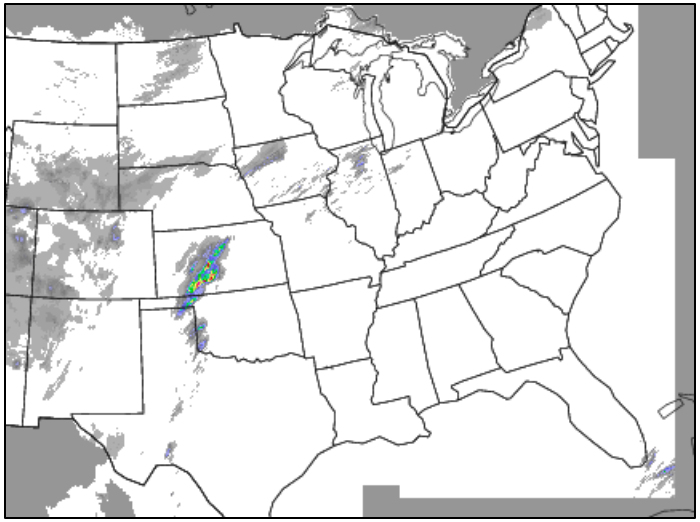
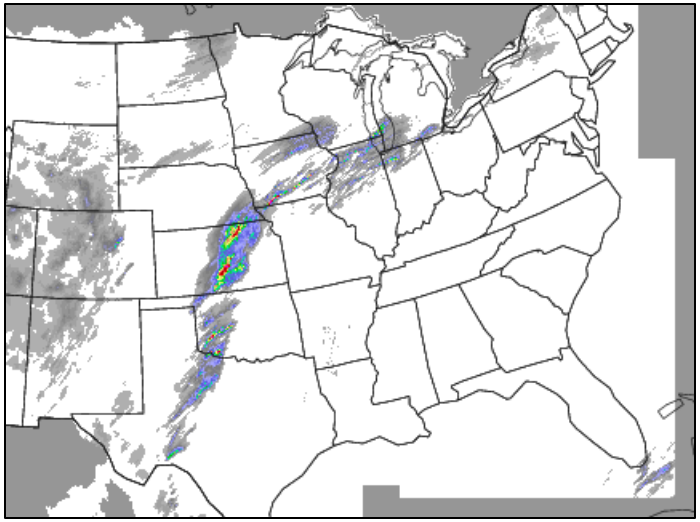
PCP-Combine: Example #1

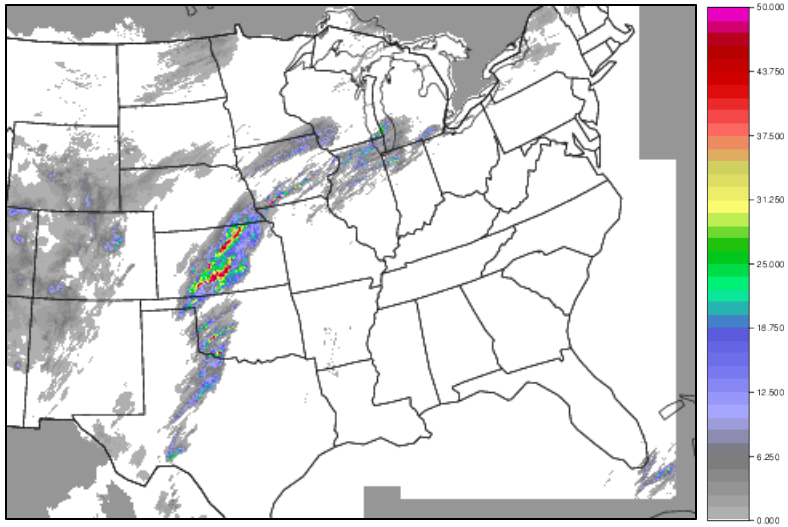
3 hr Acc 05/02 2100 UTC



3 hr Acc 05/03 0000 UTC



6 hr Acc 05/03 0000 UTC



Graphics made with plot_data_plane

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SPECIALIZED SATELLITE PRE-PROCESSING TOOLS

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MODIS Regrid

6. MODIS-Regrid Tool

- **Depends on HDF4/HDFEOS libraries.**
- **Compilation disabled by default (*--enable-modis*)**
- **Functionality:**
  - Reformat MODIS satellite observations into intermediate NetCDF format.
  - No configuration file.

- **Data formats:**
  - Reads MODIS level 2 data.
  - Writes gridded NetCDF as input to the MET statistics tools.

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MODIS-Regrid: Usage

Usage: modis_regrid

- **-data_file path**
- **-field name**
- **-out path**
- **-scale value**
- **-offset value**
- **-fill value**
- **[-units text]**
- **[-compress level]**
- **modis_file**

-data_file path	Gridded data file defining output grid
-field name	Field to process in MODIS file, e.g. temperature
-out path	Output NetCDF file name
-scale value	Scale factor to use
-offset value	Offset factor
-fill value	Bad data value
-units text	Units string to be written to the output file global attributes
modis_file	Input file MODIS file name

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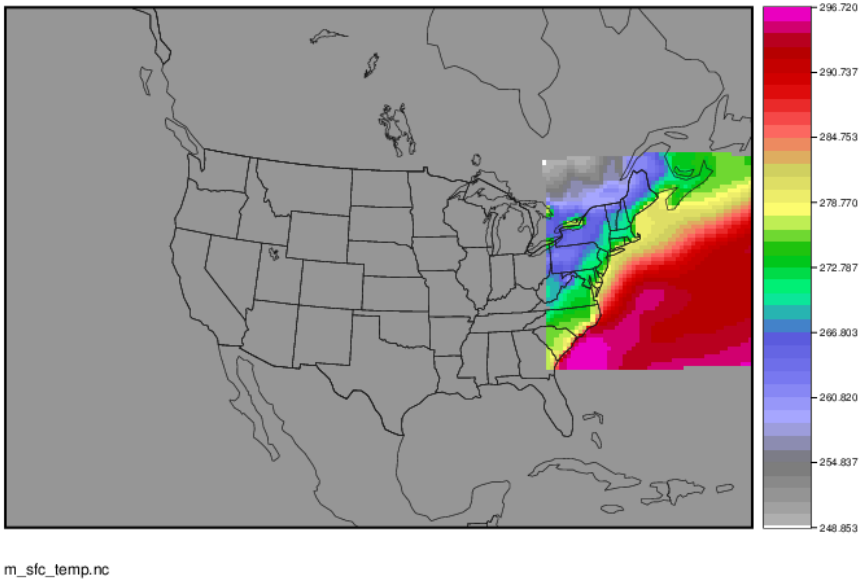
MODIS-Regrid: Run

- **met-8.0/bin/modis_regrid** -field Cloud_Fraction \
  -data_file grid_file -out t2.nc \
  -units percent -scale 0.01 -offset 0 -fill 127 \
  ~/modis_regrid_test_data/modisfile



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7. WWMCA-Regrid Tool

- **Functionality:**
  - Reformat Air Force binary World Wide Merged Cloud Analysis into intermediate NetCDF format.
  - Attempts to parse timing, hemisphere information from file
- **Data formats:**
  - Reads binary WWMCA files.
  - Writes gridded NetCDF as input to the MET statistics tools.

```
regrid = {
   to_grid    = "lambert 614 428 12.190 -133.459 -95.0 12.19058 6367.47 25.0 N";
   method     = UW_MEAN;
   width      = 5;
   vld_thresh = 0.5;
   shape      = SQUARE;
}

////////////////////////////////////////////////////////////////////////////////

//
// NetCDF output variable information.
//
variable_name = "Cloud_Pct";
units         = "percent";
long_name     = "cloud cover percent";
level         = "SFC";
```


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WWMCA-Regrid: Usage

Usage: wwmca_regrid

-out filename

-config filename

-nh filename

[pt_filename]

-sh filename

[pt_filename]

[-log file]

[-v level]

[-compress level]

-out filename	Output NetCDF file name
-config filename	Configuration file name
-nh filename	Northern Hemisphere data file
-sh filename	Southern Hemisphere data file
[pt_filename]	Pixel time files for the Northern and Southern hemispheres to mask data by pixel age

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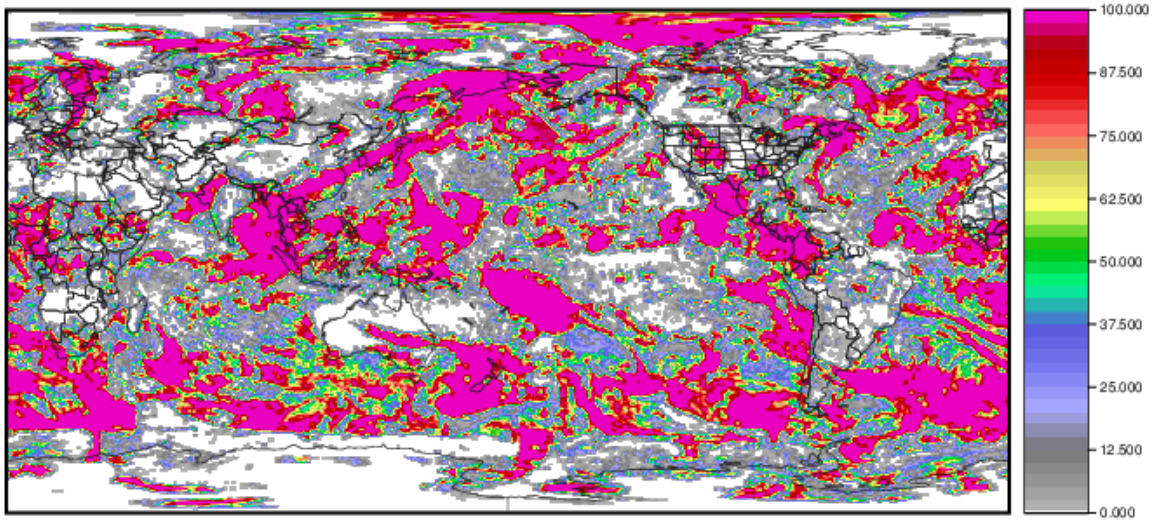
WWMCA-Regrid: Run

- **met-8.0/bin/wwmca_regrid** \
  -config WWMCARegridConfig \
  -nh WWMCA_TOTAL_CLOUD_PCT_NH_2009083005 \
  -sh WWMCA_TOTAL_CLOUD_PCT_SH_2009083005 \
  -out WWMCA_TOTAL_CLOUD_PCT_2009083005_GFS_LATLON.nc \
  -v 2



WWMCA_TOTAL_CLOUD_PCT_2009083005_GFS_LATLON.nc

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