APPENDIX E

Restore Files and Scripts

This appendix describes the restore files and scripts included in the N-AWIPS distribution.

E.1 Restore Files

Restore files contain the GEMPAK variables and their values which have been saved from an individual execution of a GEMPAK program. These files can be used to store and retrieve the user inputs for any GEMPAK program by using the GEMPAK save and restore commands, respectively. A few sets of restore files have been included in the distribution. By convention the restore files have an extension of **.nts** and therefore are also called NTS files.

E.1.1 Restore Files for Program Examples

Most of the program examples presented in Chapter 4 have corresponding restore files in the **$GEMNTS/examples** directory. For each program the NTS filename is given by the program name plus the example number. For instance, the following command will restore the first example for SFMAP:

```
GEMPAK-SFMAP> restore examples/sfmap1
```

E.1.2 Metafile Generation Restore Files

The sample metafile generation script provided uses restore files in its execution. The settings for each frame of the metafile are stored in individual NTS files. The files reside in the **$GEMNTS/nawips** directory.

E.1.3 EZ Script Restore Files

Some of the EZ Scripts (described in more detail below) require restore files in order to run. These NTS files are stored in the **$GEMNTS/ez** directory.

E.2 Metafile Generation Scripts

A metafile generation script is provided in the **$NAWIPS/scripts/nawips** directory. This script creates a metafile for display in **NTRANS**. It is included as an example of a UNIX script for use as a batch job to be run after the model has been completely ingested into the workstation environment. The script uses the saved restore files from the **$GEMNTS/nawips** directory to create a metafile with standard levels and fields.

The script is run by entering the script name followed by two parameters: the date as yymmdd, and the cycle time of the model run (00 or 12).

```
eta_meta_grid  950530  12
```

E.3 EZ Scripts

This section describes how to set up and run the GEMPAK EZ scripts. These scripts allow the user to quickly produce a GEMPAK plot of various meteorological fields from gridded data sets. The EZ scripts reside in the **$NAWIPS/scripts/ez** directory.

There are two “set up” programs, ezset and ezarea, that should be executed first to specify the gridded data file and the area of interest to use. Once set, the remaining scripts may be run as often as desired.

To run any of the EZ scripts, type the name of the script at the UNIX prompt. The script will prompt for all necessary parameters. Shortcut the prompting by supplying the necessary parameters on the command line. That is, after typing the name of the desired script, but BEFORE hitting the enter key, type the necessary parameters separated by spaces. For example:

```
ezrelh 700
```

Most of the EZ scripts display the data in plan view. Some require a level or levels to be input by the user. There are also cross section, time-height section, and sounding scripts which require the user to input the location of the section or sounding. See below for more information.

IMPORTANT: ALWAYS run the GEMPAK command gpend at the end of the user session. **Gpend** removes the GEMPAK X window from the screen. **DO NOT CLOSE THIS WINDOW WITH THE X-WINDOW WIDGET** (the button on the upper left corner of the window).

E.3.1 VERTICAL Scripts

Vertical EZ scripts require that the user specify the location of the sounding, time-height section, or spatial cross section. There are two ways to accomplish this.

- Enter the 3-character station identifier(s) or
- Graphically select the locations using the mouse on a map/field window that has already been generated using a different EZ script.

In the first case, run the desired vertical EZ script, such as ezprof, and enter the station ID(s) when prompted. The station ID(s) can also be supplied on the command line. See below for the syntax and examples. In the second case, run a plan-view (horizontal) EZ script such as ezfront and have a display on the screen of frontogenesis. Without removing that graphic, run ezprof to generate a sounding from the gridded data. Once the script is running and all required parameters have been input, place the cursor on the graphics screen. When the cursor changes from an arrow to a + sign, select the location(s) with the mouse. For a single point, just click the left button at the desired location. For a line (spatial cross section), press and hold the left mouse button at the location where the left side of the cross section is to start. Then “drag” the line to the desired ending location and release the left mouse button to select the cross section.

E.3.2 List of scripts and descriptions

E.3.2.1 EZ250

This script will plot the 250 mb isotachs, heights and winds for all of the times for the given model.

Syntax ez250

E.3.2.2 EZ500

This script will plot the 500 mb absolute vorticity and heights for all of the times for the given model.

Syntax: ez500

E.3.2.3 EZ700

This script will plot the 700 mb vertical motions, RH and heights for all of the times for the given model.

Syntax: ez700

E.3.2.4 EZ850

This script will plot the 850 mb temperatures, heights and winds for all of the times for the given model.

Syntax: ez850

E.3.2.5 EZAREA

This script graphically defines the geographic area to view for all subsequent EZ scripts. By default, the script displays a map of North America in medium resolution. The user may also specify the projection, graphics area and map resolution by answering the script's prompts.

When the mouse cursor becomes a + sign while on the graphics window, press and hold down the left button on one corner of the desired area. Then "stretch" the rubber rectangle to the desired size and release the left button to select the area. This area will now be used for ALL EZ scripts until EZAREA is run again.

EZAREA does not take any command line arguments.

Syntax: ezarea

E.3.2.6 EZCROSS.CSI

This script displays a spatial cross section of theta-e, rh and momentum surfaces.

The end points for the cross section may be chosen by (1) entering the station IDs for two stations; or (2) graphically selecting the locations using the mouse on a map/field window that has already been generated using a different EZ script.

The user must enter the fcst_hour and the left and right stations, as above.

Syntax:	ezcross.csi fcst_hour [left_stn right_stn]
Examples:	ezcross.csi 00 (The script will prompt for station IDs or graphical selection.)
	ezcross.csi 18 GEG ELP

E.3.2.7 EZCROSS.IPV

This script displays a cross section of theta, isotachs and potential vorticity.

The end points for the cross section may be chosen by (1) entering the station IDs for two stations; or (2) graphically selecting the locations using the mouse on a map/field window that has already been generated using a different EZ script.

The user must enter the fcst_hour and the left and right stations, as above.

Syntax:	ezcross.ipv fcst_hour [left_stn right_stn]
Examples:	ezcross.ipv 00 (The script will prompt for station IDs or graphical selection.)
	ezcross.ipv 18 GEG ELP

E.3.2.8 EZCROSS.KINEM

This script displays a cross section of circulation vectors, vertical motion and isotachs.

The end points for the cross section may be chosen by (1) entering the station IDs for two stations; or (2) graphically selecting the locations using the mouse on a map/field window that has already been generated using a different EZ script.

The user must enter the fcst_hour and the left and right stations, as above.

Syntax:	ezcross.kinem fcst_hour [left_stn right_stn]
Examples:	ezcross.kinem 00 (The script will prompt for station IDs or graphical selection.)
	ezcross.kinem 18 GEG ELP

E.3.2.9 EZCROSS.THTA

This script plots a cross section of circulation vectors, rh, theta and isotachs.

The end points for the cross section may be chosen by (1) entering the station IDs for two stations; or (2) graphically selecting the locations using the mouse on a map/field window that has already been generated using a different EZ script.

The user must enter the fcst_hour and the left and right stations, as above.

Syntax:	ezcross.thta fcst_hour [left_stn right_stn]
Examples:	ezcross.thta 00 (The script will prompt for station IDs or graphical selection.)
	ezcross.thta 18 GEG ELP

E.3.2.10 EZDELTA

This script displays the 12 hour change of a given field along with the field itself. If the user asks for the change in 700 mb temperature at 24-h, the script will compute the change between the 12- and 24-h 700 mb temperatures and display it, along with the 24-h temperature field.

The user must supply the forecast time (from which 12 hrs will be subtracted to compute the difference), level, and a field.

Syntax:	ezdelta fcst_hour level field
Examples:	ezdelta 24 700 temp
	ezdelta 36 500 hght

E.3.2.11 EZDIVQ

This script displays the divergence of layer averaged Q-vectors along with the lapse rate through the same layer.

The user must supply the script with the bottom and top pressure levels of the layer. Note that the order is important.

Syntax:	ezdivq lower_level upper_level
Example:	ezdivq 500 300

E.3.2.12 EZDOC

This script creates a document from the README file including the headers of all of the scripts.

Syntax:	ezdoc

E.3.2.13 EZFRONT

This script displays the frontogenesis function, wind barbs, and temperature for a given level.

The user must supply the level.

Syntax:	ezfront level
Example:	ezfront 850

E.3.2.14 EZLOOP

This script allows the user to loop the graphics previously created.

Note that the user can loop the plan view graphics so long as he/she has not yet run a vertical (skew-T, time-height section, or cross-section) EZ script. Once one of these has been run, the existing graphics in the plan view window can no longer be looped without re-running the plan view EZ script to regenerate them. However, the vertical graphics generated for the Skew-T may be looped by the user.

The following are the looping commands:

;l = begin looping forward
;r = begin looping backward
;s = step forward one frame
;b = step backward one frame
;N = change loop speed, where N = 1 (slowest) to 5 (fastest).

To stop loop, click the left mouse button on the graphic window. To end the looping script, enter “exit” in the text window.

E.3.2.15 EZMSLP

This script displays the mean sea level pressure, winds, and 1000-500 thickness.

No command line parameters are necessary.

Syntax: ezmslp

E.3.2.16 EZPCPN

This script will plot the precipitation for the shortest interval in the grid file, then overlay the mean sea level pressure.

Syntax: ezpcpn

E.3.2.17 EZPIVA

This script displays the vorticity advection by the 700-300 mb thermal wind along with the 500 mb winds and 850-500 mb lapse rate.

No command line parameters are required.

Syntax: ezpiva

E.3.2.18 EZPMSL

This script plots the mean sea level pressure and the 1000-500 thickness for all of the times in the given model.

Syntax: ezpmsl

E.3.2.19 EZPRINT

This script will print any X windows graphic on a laser printer. It uses the xwd and xpr programs to accomplish this. Both have man pages if you need more information on them. To use, type EZPRINT after you have a window of graphics displayed. When the mouse cursor changes to a + sign, click the mouse on the window you want to print. The script is set up to print on laser jet printers by default but can be easily modified for postscript or other drivers.

Syntax: ezprint

E.3.2.20 EZPROF

This script will plot a Skew-T diagram for a given location.

The location for the Skew-T may be chosen by (1) entering the station ID for a station; or (2) graphically selecting the location using the mouse on a map/field window that has already been generated using a different EZ script.

The user must enter the location, as above.

Syntax: ezprof [station_id]
Examples: ezprof (The script will prompt for station ID or graphical selection.)
ezprof GLD

E.3.2.21 EZQVEC

This script displays the layer averaged Q-vectors with the layer thickness and layer averaged isotachs.

The user must supply the script with the bottom and top pressure levels of the layer. Note that the order is important.

Syntax: ezqvec lower_level upper_level
Example: ezqvec 500 300

E.3.2.22 EZRELH

This script displays the relative humidity, winds and temperature at a given level.

The user must supply the level.

Syntax: ezrelh level
Example: ezrelh 750

E.3.2.23 EZSET

This script allows the user to select the model and the date/time of the model run. For the date/time, the user can enter the full yymmddhh (year, month, day, hour) or merely a 00 or 12 for the current date. The model can be eta, ruc, ngm, avn, or mrf.

EZSET assumes a file naming convention and location. The location is set through the MODEL environment variable, which is defined by the .cshrc file. The file naming convention by default is mdl_yymmddhh, where yymmddhh is the year/month/day/hour of the model run and mdl is the lowercase 3 letter id of the model.

Syntax:	ezset yymmddhh|hh model
Examples:	ezset 94052612 eta
	ezset 00 ngm

E.3.2.24 EZTHETAE

This script displays theta-e, wind barbs, Lifted Index, and convergence. Note that the LI is the "most unstable" LI from the four lowest levels of the model.

The user must supply the level.

Syntax:	ezthetae level
Example:	ezthetae 850

E.3.2.25 EZTHGT.OMEGA

This script will plot a time-height section of omega and zero-divergence.

The location for the time-height section may be chosen by (1) entering the station ID for a station; or (2) graphically selecting the location using the mouse on a map/field window that has already been generated using a different EZ script.

The user must enter the location, as above.

Syntax:	ezthgt.omega [station_id]
Examples:	ezthgt.omega (The script will prompt for station ID or graphical selection.)
	ezthgt.omega GLD

E.3.2.26 EZTHGT.RHOM

This script will plot a time-height section of omega, freezing level and rh.

The location for the time-height section may be chosen by (1) entering the station ID for a station; or (2) graphically selecting the location using the mouse on a map/field window that has already been generated using a different EZ script.

The user must enter the location, as above.

Syntax:	ezthgt.rhom [station_id]
Examples:	ezthgt.rhom (The script will prompt for station ID or graphical selection.)
	ezthgt.rhom GLD

E.3.2.27 EZTHGT.WIND

This script will plot a time-height section of wind freezing level and rh.

The location for the time-height section may be chosen by (1) entering the station ID for a station; or (2) graphically selecting the location using the mouse on a map/field window that has already been generated using a different EZ script.

The user must enter the location, as above.

Syntax:	ezthgt.wind [station_id]
Examples:	ezthgt.wind (The script will prompt for station ID or graphical selection.)
	ezthgt.wind GLD

E.4 HPC Scripts

The following set of scripts demonstrates a possible use of the UNIX scripting language to display observational and gridded data in an operational environment.

Note: The scripts are provided by the HPC for internal use only.

cleanup	Remove unneeded processes and message queues that can clutter the workstation. This command is best used just before logging out or just after logging on. This command will kill all active GEMPAK processes.
gpend	To close a GEMPAK window, always run gpend!!!! (Type: gpend < enter >). Closing a GEMPAK window by any other method clutters the workstation with orphaned processes. Run cleanup to remove them. A GEMPAK window is labeled GEMPAK on the top window bar.

E.4.1 Data Plotting GEMPAK scripts

E.4.1.1 SAMAP

Plot a standard surface map from surface airways observations.

```
samap [area] [hour] [filter] [yymmdd] < print >
default:        wv current .45 current
```

E.4.1.2 SAMORE

Plot a map of extra surface parameters from surface airways observations.

```
samore [area] [hour] [filter] [yymmdd] < print >
default:        wv current .45 current
```

E.4.1.3 SAZOOM / UAZOOM

Zoom in on a surface (upper air) map. Cursor turns into a "+". Select one corner of the new area by positioning the cursor in the desired location and clicking the left mouse button. Release the mouse button and drag the cursor so the box describes the desired area and click the left mouse button again.

```
sazoom
uazoom
```

E.4.1.4 SFC

Display a Rapid Update Cycle surface analysis for the requested area, product and observation hour (or most recent available) combined with a plot of the current surface airways observations.

sfc [product] [area] [hour] [filter] [yymmdd] < print >

[product]:	tmp dwp the rlh qdv qtr fnt div prf dwpc tmpc: Temperature (F), Dew point (F), Equivalent Potential Temperature (K), Relative Humidity, Moisture Convergence, Moisture Transport, Frontogenesis, Divergence, 3-hr Pressure Change, Dew Point (C), Temperature (C).
default:	tmp usa current .40 current

E.4.1.5 UAMAP

Plot a map of standard upper air radiosonde observations.

uamap [level] [area] [hour] [filter] [yymmdd] < print >

default: 850 usa current .40 current

E.4.1.6 UAMORE

Plot a map of indices and misc. parameters from radiosonde observations.

uamore [area] [hour] [filter] [yymmdd] < print >

default: usa current .40 current

E.4.1.7 ANL

Display an analysis of the requested mandatory pressure level and product from the specified model initial analysis (must be available) combined with a plot of the current upper air observations.

anl [level-product] [area] [model] [filter] [yymmddhh] < print >

default:	850dwp usa eta .40 current
[level-product]:	sfcpwt sfctmp sfclft sfckin 850dwp 850tmp 850spd 850qtr 850rlh 850all 700rlh 700tmp 500htf 500tmp 500spd 500abv 400spd 300spd 250spd 200spd 150spd 100spd

E.4.1.8 SKEWT

Plot a Skew-T-ln p diagram for a radiosonde station.

skewt [stnid] [hour] [yymmdd] < print >

default: iad current current

E.4.1.9 HODO

Plot a hodograph for a radiosonde station.

hodo [stnid] [hour] [yymmdd] < print >
default: iad current current

E.4.2 Additional GEMPAK scripts

E.4.2.1 UAPRINT

Print upper air maps for 925, 850, 700, 500, 300, and 250 mb and stability indices from rawinsonde

uaprint [area] [hour] [filter] [yymmdd]
default: afos-usa current .40 current observations. Uses the same plotting model as uamap.

E.4.3 Local Product Metafiles

(View created metafiles as a Local Product under **ntrans**, Select: File; Open: Local Products) These scripts create a metafile on your local workstation that can then be viewed with ntrans. Production of the metafile will take between 1/2 minute (skewtmeta) and up to 5 minutes (qlmeta).

E.4.3.1 SAMETA

Plot a time sequence of surface maps using the SAMAP and SAMORE station models from surface airways observations and place them in a metafile labeled SA_META. The default is the last six hours for the area specified and ending at the current time.

sameta [area] [frames] [final hour] [tinc] [filter] [yymmdd]
default: wv 6 current 1 .45 current

E.4.3.2 QLMETA

Creates a metafile file containing a time-sequence of Sea-level Pressure & 100-500 mb Thickness and of 500 mb Height & Absolute Vorticity for every forecast time available for the selected numerical model. This script can be run before the entire model is complete to get a “quick look” at the model output (esp. for the AVN). The resulting metafile is labeled QL_[model]_[mdlarea]_META in the ntrans local product list.

qlmeta [model] [mdlarea] [yymmddhh]
default: avn usa current
mdlarea can be: usa can car pac atl epa wat nam sam (United States, Canada, Caribbean, Pacific, Atlantic, East Pac., West Atl., North and South America.

E.4.3.3 SKEWTMETA

Plot a Skew-T-ln p diagram for every radiosonde station listed or every radiosonde station in the listed states and place them in a metafile labeled SKEWT_META.

skewtmeta [stn or state] [stn or st] .... [stn or st]
default: none

E.4.4 Command Station Models

samap

TMPF PMSL
WSYM O PTND
DWPF STNID
Visibility (.1 mi)

samore (winter)

GUST (kt)
WCIF TMWF
WSYM O 3-hr Precip (.01”)
THTE STNID
Snow Cover (inches)

samore (summer)

GUST (kt)
HEAT TMWF
WSYM O 3-hr Precip (.01”)
THTE STNID
LTMP

uamap

TMPC STDZ
O
DWPC STNID

uamore

CAPE (J kg^{-1})
LIFT KINX
STNID
TOTL PWTR (.01”)
CINS (J kg^{-1})

TMPF & C:	Temperature (˚F & ˚C)
PMSL:	Sea-level Pressure
WCIF:	Wind Chill Index (˚F)
HEAT:	Heat Index Temperature (˚F)
LTMP:	Temperature of Surface Air Lifted to 500 mb (˚C)
DWPF & C:	Dew Point (˚F & ˚C)
PTND:	3-hr Pressure Tendency
THTE:	Equivalent Potential Temperature (K)
WSYM:	Weather Symbols
STNID:	3-letter Station ID
STDZ:	Geopotential Height (dm)

E.4.5 Command Legend

area: Center map on a state (two letter ID) or station ID. A "-" sign will zoom out (e.g. wv-) For upper air maps you can also specify: usa (USA) can (CANADA) car (CARRIBEAN) afos (AFOS size USA) nam (N. AMERICA)

hour: Hour, hh, in GMT for plot (e.g. 12 = 1200 UTC)

filter: Determines Data Density: 0 = plot all data, 1 = avoid all overplots of data (enter any rational number, 0 or greater)

yymmdd: Date within last two weeks you want to plot. (940126 = 26 January 1994)

level: Mandatory isobaric level for plot (1000, 925, 850, 700, 500, 400, 300, 250, 200, 150, 100)

stnid: Radiosonde station ID for a vertical profile. Can be entered as a number (e.g. 72403 = Dulles) or 3-letter station ID (e.g. IAD = Dulles)

< help > To get help on a command type help or h after the command name on press <enter> (e.g. samap help = help on the command samap)

< print > Optional: Can be placed at the end of any of the above data plotting scripts to get a B&W printout. Printer must be attached to the workstation!!!!

E.4.6 Model Diagnostic [md] GEMPAK script series

E.4.6.1 MDSET

Initialize the md sequence by setting the model, area and forecast hour (f## e.g. f120).

mdset [model] [mdlarea] [fhour] [yymmddhh]
default: avn usa f00 present

E.4.6.2 MDPLOT

Plot the selected product for the default level or when applicable the level specified.

mdplot [mdproduct] [level]

E.4.6.3 MDMDL

Plot the current product for the specified numerical model.

mdmdl [model] [yymmddhh]

E.4.6.4 MDTIME

Plot the current product for the specified forecast hour (f## e.g. f120).

mdtime [fhour]

E.4.6.5 MDAREA

Plot the current product for the specified area.

mdarea [mdlarea]

E.4.6.6 MDZOOM

Zoom in on an area and recreate the current product with full data resolution. The cursor turns into a "+". Select one corner of the new area by positioning the cursor in the desired location and clicking the left mouse button. Release the mouse button and drag the cursor so the box describes the desired area and click the left mouse button again.

mdzoom

E.4.6.7 VP

Plot a vertical profile for the location specified. To choose the location of the vertical profile move the cursor to the location desired and click the left mouse button. The default vertical profile is a Skew-T ln P diagram with temperature, dew point and wind.

vp [vpproduct]

E.4.6.8 XS

Create a vertical cross section at the location specified. To choose the location of the cross section, move the cursor to the desired location for one end point of the section. Click the left mouse button. Move the cursor to the other section end point. Click the left mouse button again. The default cross section is of potential temperature, isotachs, mixing ratio, and ageostrophic wind arrows.

xs [xsproduct]

E.4.6.9 TS

**** Not yet available **** Create a time section at the location specified. To choose the location of the time section, move the cursor to the desired location and click the left mouse button. The default time section is of temperature, relative humidity, omega, and wind barbs.

ts [tsproduct]

E.4.6.10 MDMETA

Creates a metafile file containing a time-sequence of the forecast products specified for every forecast time available for the selected numerical model (use mdset). To specify a product and a specific pressure level enter [mdproduct]_[level]. The resulting metafile is labeled MD_[model]_[mdlarea]_META in the ntrans local product list.

mdmeta [mdproduct1] [mdproduct2] ..... [mdproduct6]
default: bwdspd none none

E.4.6.11 Parameter Definitions

model: lfm eta ngm avn mrf meso fnl ruc rucs (etal, etay, mrfx, rdas, edas, mass when available)

mdlarea: usa can car nam sam pac (or npa) atl (or nat) wat epa tpa spa sat ind eur afr aus mde eas sas ant nhm shm psatl pspac [United States, Canada, Caribbean, North America, South America, (North) Pacific, (North) Atlantic, West Atlantic, East Pacific, Tropical Pacific, South Pacific, South Atlantic, Indian Ocean, Europe, Africa, Australia, Middle East, East Asia, South Asia, Antarctica, Northern Hemisphere, Southern Hemisphere, North Atlantic (polar stereographic) and North Pacific (Polar Stereographic)].

level: Every 50mb for lfm, eta, ngm, meso and ruc; only mandatory levels for avn, mrf and fnl (1000, 925, 850 etc.)

mdproduct: (These products are independent of the level specification)

slpthk	Sea-level pressure and 1000-500 mb Thickness
bliwnd	Best lifted index and boundary layer wind
btmslp	Sea-level pressure, boundary layer temperature and winds
btdqdv	Boundary layer dew point temperature, moisture convergence, and winds
btewnd	Boundary layer equivalent potential temperature and winds
bteqdv	Boundary layer equivalent potential temperature, moisture convergence, and winds
bteq85	Boundary layer equivalent potential temperature, 850 mb water vapor transport
bqttop	Boundary layer water vapor transport and surface topography (m)
bwnspd	Boundary layer winds, isotachs, and sea-level pressure
brhwnd	Boundary Layer Relative Humidity and winds.
10mspd	Estimated 10m winds, isotachs, and sea-level pressure
pwtslp	Sea-level pressure, 1000-500 mb Thickness, and Precipitable Water
pwtv85	Precipitable Water and 850 mb winds
tpislp	Sea-level pressure and 6-hour total precipitation (inches)
tpithk	Sea-level pressure, 1000-500 mb Thickness, and 6-hour total precipitation (inches)
tpi12h	12-hour total accumulated precipitation (inches)
tpi24h	24-hour total accumulated precipitation (inches)
tpi48h	48-hour total accumulated precipitation (inches)
tpz06h	06-hour total accumulated precipitation (inches), sea-level pressure, and surface topography (m)
tpz12h	12-hour total accumulated precipitation (inches) and surface topography (m)

tpz24h	24-hour total accumulated precipitation (inches) and surface topography (m)
tpz48h	48-hour total accumulated precipitation (inches) and surface topography (m)
upvwnd	500-300 mb mean-layer potential vorticity, 400 mb winds, boundary layer equivalent potential temperature, and sea-level pressure
upvhgt	500-300 mb mean-layer potential vorticity, 400 mb heights, boundary layer equivalent potential temperature, and sea-level pressure
ransno	700 mb relative humidity, and near-zero temperatures from the boundary layer, 850 mb, and 700 mb
frzrlh	Freezing level Height (ft) and Relative Humidity
bwntad	Boundary layer winds, isotachs, sea-level pressure, and 850 mb temperature advection
slpkin	Sea-level pressure, K-index, boundary layer dew point, and 700mb temperature
slptti	Sea-level pressure, Total Totals Index, boundary layer dew point, and 700mb temperature
slpcti	Sea-level pressure, Total Totals Index, boundary layer dew point, and 700mb temperature
slpsvr	Sea-level pressure, boundary layer dew point and wind barbs, and 700mb temperature and wind vectors

These mdproducts can be specified for any available pressure level (50 mb levels for regional models, Mandatory levels for global models)

tmphgt [level]	Height, wind, temperature.
tmphgt [level]	Height and temperature.
tdwhgt [level]	Height and dew point temperature
tdwwnd [level]	Height, wind, and dew point temperature
qtrthe [level]	Height, moisture transport and Equivalent potential temperature
tmpfnt [level]	Height, wind, temperature and frontogenesis.

tmptad [level]	Height, wind, temperature and temperature advection.
omgrlh [level]	Height, relative humidity and vertical motion
rlhomg [level]	Height, relative humidity and vertical motion (less detail)
spdhgt [level]	Height and isotachs
spdwnd [level]	Height, isotachs, and winds
divspd [level]	Height, isotachs, and divergence (convergence)
divvag [level]	Height, isotachs, divergence (convergence) and ageostrophic winds (arrows)
divvia [level]	Height, isotachs, divergence (convergence) and inertial advective ageostrophic winds (arrows)
divvdv [level]	Height, isotachs, divergence (convergence) and divergent wind (arrows)
divbag [level]	Height, isotachs, divergence (convergence) and ageostrophic winds (barbs)
divbia [level]	Height, isotachs, divergence (convergence) and inertial advective ageostrophic winds (barbs)
divbdv [level]	Height, isotachs, divergence (convergence) and divergent wind (barbs)
abvhgt [level]	Height and absolute vorticity
abvdiv [level]	Height, absolute vorticity and divergence
abvtad [level]	Height, absolute vorticity and 850 mb temperature advection

vpproduct: (additional vp products are not yet available)

xsproduct: (all circulation vectors only include horizontal wind components tangent to (within) the plane of the cross section)

nsptha	Potential temperature, isotachs of normal wind speed, and ageostrophic circulation
nspdiv	Potential temperature, isotachs of normal wind speed, divergence, and ageostrophic circulation
tsptha	Potential temperature, isotachs of total wind speed, and ageostrophic circulation

omgtha	Potential temperature, vertical motion, and ageostrophic circulation
omgtmp	Temperature, vertical motion, and ageostrophic circulation
mxrtha	Potential temperature, water vapor mixing ratio, and total circulation
rlhtmp	Temperature, relative humidity, and ageostrophic circulation
rlhthe	Equivalent potential temperature, relative humidity, and total circulation
msftha	Potential temperature, M-surfaces, and ageostrophic circulation
msfthe	Equivalent potential temperature, M-surfaces, and total circulation
ipvtha	Potential temperature, potential vorticity, relative humidity, and ageostrophic circulation
ipvthe	Equivalent potential temperature, potential vorticity, relative humidity, and total circulation

tsproduct: (ts products are not yet available)