

REVU

RAMS/HYPACT Evaluation and Visualization Utilities

Version 2.3.1

User's Guide

by

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REVU User Guide

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About REVU

This chapter describes the RAMS/HYPACT Evaluation and Visualization Utilities (*REVU*) which is the standard supported package for generating graphical representations and reformatting *RAMS* model output (VAN is no longer supported). *REVU*'s function is to read *analysis files* written from a *RAMS* or *HYPACT* simulation, select user-specified fields and cross sections from the file data, and plot the field cross sections, or output the selected data in one of several available formats (e.g. Vis5D, GrADS, GRIB). *REVU* utilizes NCAR graphics to perform most of the plot functions.

New in REVU 2.3.1

New features since REVU version 2.3.0 include:

- GRIB file format output option (works the same way as Vis5D and GrADS).
- The overlay filed may now be filled. Filling does not go beyond the specified high/low range. This allows the user to see the map in the unfilled portions. Map boundaries can be placed under or on top of the color fills. There is also an option for enhanced map boundaries.
- Color options include an array of new color fill schemes for tiles and contours and line colors for contours and vectors. They also include user defined color options, control on axis and tile colors, white background and grayscale color options and control on landmark plotting.
- Panels option (up to 4 plots per frame).
- Accepts 1 argument, the REVU_IN file name (i.e. `revu -f <namelist file>`)
- Dump option and correct plotting of soil variables.
- In addition, many of the routines now use "implicit none" statements and all c iralloc memory allocations are now done with Fortran 90 allocations. This has allowed us to do bounds checking on arrays has which in turn has resulted in the cleaning up of a number of known and unknown bugs.

Patches will be made available at <http://www.aster.com/revu-2.3.1/patch.shtml> as they made (this list includes all those made for 2.3.0). Notification of new patches will be sent to the rams-users mailing list and are available for viewing on the Announce archive <http://www.aster.com/lists/announce>. You can apply to join the rams-users mailing list at <http://www.aster.com/lists/index.shtml>.

REVV Parameters

All **REVV** parameters are set in *vcomm2.h*. Note that if any of these parameters are changed **REVV** must be recompiled.

MAXFORE	The maximum number of variables to plot or output (default set to 30).
MAXFILS	The maximum number of input files (default set to 200).
MAXLOC	The maximum number of observation locations (default set to 1000).
MAXLEV	The maximum number of levels in a profile (default set to 500).

REVU_IN Namelists

The namelist file **REVU_IN** contains four namelists, with the names **\$CONTROL**, **\$GRAB**, **\$GLL** and **\$STATS**. The **\$CONTROL** namelist is required for all runs and specifies the general data extraction scenario and all plotting parameters if **ANPREF='SPACE'**, The remaining namelists all control some portion of the non-plotting **ANPREF** settings and are not always required.

CONTROL Namelist

In the following documentation a background or frame refers to the plotting or output of each **CFRAME_A**, **CFRAME_B** and **CFRAME_C** element (described below), except in the case where multiple panels are plotted into a single frame, as specified by **IPANELS** (described below).

ANPREF	<p>The Unix path name and prefix of the names of RAMS or HYPACT analysis files to be read and used to drive REVU (up to 128 characters). Note that the path name is optional and can be either relative or absolute (no path is equivalent to './').</p> <p>Depending on what was output by RAMS or HYPACT, ANPREF could be:</p> <ul style="list-style-type: none"> • <prefix>-A-<date> Standard RAMS analysis files • <prefix>-L-<date> Lite RAMS analysis files • <prefix>-M-<date> Averaged RAMS analysis files • <prefix>-B-<date> Lite averaged RAMS analysis files • <prefix>-C-<date> HYPACT analysis files <p><prefix> is the directory location and file prefix given by AFILOUT or HYPREF, the RAMS and HYPACT output files name prefixes respectively.</p> <p><date> is the output filename date string in which Unix wild cards can be used, for example:</p> <p style="padding-left: 40px;"><prefix>-A* will give all standard RAMS analysis files</p> <p style="padding-left: 40px;"><prefix>-A-2000-10-??-000000* will give the analysis files for 0Z each day</p> <p>REVU finds all files in the specified directory that have that match ANPREF (it looks for the header files by listing ANPREF*-head.txt) and determines their chronological order from the time suffix encoded into the filenames. The user selects some or all of these files to be plotted in the namelist variable TVAR (see below).</p>
REVPREF	<p>The Unix path name and prefix for the REVU output files (up to 128 characters). Note that the path is optional and can be either relative or absolute (no path is equivalent to './').</p>

ANATYPE	<p>Designates what type of <i>REVU</i> run to make. Options are:</p> <ul style="list-style-type: none"> • SPACE Produce NCAR Graphics spatial axis plots of the fields specified in CFRAME_A, CFRAME_B and CFRAME_C (see below). No time axis plots are available in the current version. • V5D Create Vis5D files of the fields specified in CFRAME_A. • GRADS Create GrADS files of the fields specified in CFRAME_A. • GRIB Create GRIB files. of the fields specified in CFRAME_A • DUMP Dump the fields specified in CFRAME_A in a user defined format. The format is specified in <i>dumpout.f90</i> module, which may be modified by the user. The purpose of this option is to extract fields from analysis files that are written in packed format. • GRAB Output the fields specified in CFRAME_A at the points specified by latitude-longitude-height locations or vertical profiles at latitude-longitude locations in RALPH2 or a user defined format. The format is specified in <i>grabstat.f90</i> module, which may be modified by the user. • STATS Do statistical comparisons between RAMS data and observations.
HEAD1	A 24 character long string used to title all plots.
IGRID	<p>Specifies which grid is to be processed.</p> <ul style="list-style-type: none"> • If set to zero, all grids will be processed, on separate backgrounds if ANATYPE (above) is set to 'SPACE'. • If set to > 0, only the specified grid will be processed. • If set to < 0, all grids finer than abs(IGRID) will be processed, on separate backgrounds if ANATYPE (above) is set to 'SPACE'.
IZTRAN	<p>A background dependant parameter that, if plotting a horizontal cross-section (see ZVAR, XVAR, and YVAR below), determines the vertical coordinate.</p> <ul style="list-style-type: none"> • If set to 1, fields are output on the model's terrain-following coordinate surfaces. • If set to 2, fields are interpolated to horizontal (Cartesian) surfaces which have the same heights as the terrain-following heights of a grid point at sea level. • If set to 3, fields are interpolated to pressure surfaces. If plotting, the surface output is determined by IPLEVEL, otherwise the vertical extent of the field output is determined by ZVAR, XVAR, and YVAR acting on the standard pressure levels 1000, 925, 850, 700, 600, 500, 400, 300, 200 and 100 mb. <p>If CFRAME_A, CFRAME_B and CFRAME_C (see below) indicate multiple backgrounds and IZTRAN is not specified for a background, then the IZTRAN for the first background will be used for the unspecified background (i.e. in most cases you only need to specify IZTARN for the first background).</p>

IPLEVEL	<p>A background dependant parameter that, if plotting a horizontal cross-section (see ZVAR, XVAR, and YVAR below) and IZTRAN is set to 3 (see above), IPLEVEL denotes a pressure surface (in mb) on which to generate the plot. Only standard pressure levels 1000, 925, 850, 700, 600, 500, 400, 300, 200 and 100 mb may be specified.</p> <p>If CFRAME_A, CFRAME_B and CFRAME_C (see below) indicate multiple backgrounds and IPLEVEL is not specified for a background, then the IPLEVEL for the first background will be used for the unspecified background (i.e. in most cases you only need to specify IPLEVEL for the first background).</p>
MAPFILL	<p>If plotting a horizontal cross-section (see ZVAR, XVAR, and YVAR below), specifies whether a map projection will be plotted and if so, whether it will be color-filled.</p> <ul style="list-style-type: none"> • If set to 0, no map will be drawn. • If set to 1, draw a map outline (filled contours and tiles will be drawn on top on the map). • If set to 2, draw a map outline and fill the land in green and water in blue. • If set to 3, as with 2, except the map outline will be drawn on top of all filled contours and tiles. • If set to <0, as with any setting of MAPFILL>0, but with the map outline drawn in a highlighted shadow (enhances the geographic boundaries). <p>Users can modify the <i>mkmap.f90</i> module to draw other geographic and demographic information (the user will also need to supply the data).</p>
IBACKGND	<p>If plotting, specifies the plot background color.</p> <ul style="list-style-type: none"> • If set to 1, the plot background is set to black and the foreground to white. This setting is intended for display on electronic media. • If set to 2: the plot background is set to white and the foreground to black. This setting is intended for display on electronic media. • If set to 3: the plot background is set to white and the foreground to black. This setting is intended for display on white paper. • If set to <0, as with any setting of IBACKGND>0, but all colors are set to the foreground color (titles, plot scales, etc) and grayscale (map fills, filled contours and tiles). <p>Users can modify the <i>rcolors.f90</i> module to specify their own color schemes (especially relevant to setting up the color tables for printing on specific printers), noting that some user color customization is available with COLORS (below) without any modifications to the code.</p>

IPLTINFO	<p>If plotting, specifies whether to draw the plot information table that appears at the bottom of each plot.</p> <ul style="list-style-type: none"> • If set to 0, do not draw the information table (this maximizes the plot space for the actual plot) • If set to 1, draw the information table. <p>This does not control the reduced plot information for multi-paneled plots as specified by IPANEL (below).</p>
IPANEL	<p>If plotting, specifies the number of plots drawn per frame (1 to 4).</p> <ul style="list-style-type: none"> • If set to 1, one plot is drawn on the full frame and the number of frames drawn equals the number of plots specified by CFRAME_A, CFRAME_B and CFRAME_C (below). • If set to 2, 3 or 4, that number of plots are drawn per frame and the number of frames drawn equals the number of plots specified by CFRAME_A, CFRAME_B and CFRAME_C (below) divided by the IPANEL setting. The size of each plot is one quarter the size of the plots when IPANEL is set to 1. Also, a reduced set of plot information is included for each plot and the axis appear without any labels. You can use this setting to create classic four panel plots. • If set to 0, not plotting is done. Instead a series of tables are output with the colors that are going to be used in the first frame (i.e. taking into account the settings of CFRAME_A(1), IBACKGND and COLORS).

<p>LANDMARK</p>	<p>If plotting a horizontal cross-section (see ZVAR, XVAR, and YVAR below), controls the drawing of the landmarks specified in the <i>LANDMARKS</i> file. LANDMARKS is a text string that has two slash delimited components, the first controlling the drawing of the markers and the second controlling the labeling of the markers. Each of these has further colon delimited components. The marker component:</p> <ul style="list-style-type: none"> • M component (integer): Marker control (M0 does not mark the landmarks and M1 marks the landmarks). • b component (real): Landmark separation or buffer - min separation between markers (b.03 gives a spacious separation and b.01 gives a tight packing). • t component (integer): Controls the marker type (t1: dot, t2: plus, t3: asterisk, t4: circle, t5: cross). • s component (real): Controls the scale of the markers (s1. is a good setting). • x component (character string): The color of the marker. This can be any in the color table (below), or any user defined color specified by COLORS (below). <p>The Label components:</p> <ul style="list-style-type: none"> • L component (integer): Label control (L0 does not label the landmarks and L1 labels the landmarks). • s component (real): Controls the size of the label characters (s.01 is a good setting). • x component (character string): The color of the label. This can be any in the color table (below), or any user defined color specified by COLORS (below). <p>For example, a LANDMARK setting of</p> <pre>LANDMARK(1)=' /M1:b.03:t2:s1.:xyellow/L1:s.01:xred/ ',</pre> <p>Draws yellow + markers and red labels with sufficient buffer as to avoid a clutter of markers on the plots.</p> <p>If CFRAME_A, CFRAME_B and CFRAME_C (see below) indicate multiple backgrounds and LANDMARK is not specified for a background, then the LANDMARK for the first background will be used for the unspecified background (i.e. in most cases you only need to specify LANDMARK for the first background).</p>
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COLORS

If plotting, specifies the re-mapping of colors in the color table. **COLORS** is a slash delimited text string. Each slash delimited component has a further two or four colon delimited components as illustrated below:

```
COLORS(1)='/axis:yellow/title0:rgb:0.0:0.4:0.0/'
```

In the first example of **COLORS(1)**, the color table element 'axis' (defined below) is redefined from its default of white on a black background, or back on a white background, to the color table element yellow (also defined below).

In the second example of **COLORS(1)**, the color table element 'title0' (defined below) is redefined in red-green-blue (RGB) color space as a dark green, a shade of green not previously defined in the color table.

```
COLORS(2)='/red:rgb:0.8:0.0:0.0/dred:rgb:0.8:0.0:0.0/'
```

In the first example of **COLORS(2)**, the color table element 'red' (defined below) is redefined from its default RGB value to a slightly darker shade of red.

In the second example of **COLORS(2)**, a new color table element, 'dred', defined in RGB color space.

You can redefine up to around 8 colors (the string has a maximum length of 128 characters) in either RGB or HLS (hue-lightness-saturation) color space, each as a slash delimited item.

Background independent colors:

<i>Color</i>	<i>RGB Values</i>			<i>Color</i>	<i>RGB Values</i>		
white	1.0	1.0	1.0	purple	1.0	0.0	1.0
black	0.0	0.0	0.0	cyan	0.0	1.0	1.0
grayblack	0.3	0.3	0.3	tan	0.86	0.58	0.44
darkgray	0.65	0.65	0.65	sienna	0.63	0.32	0.18
gray	0.5	0.5	0.5	brown	0.65	0.16	0.16
lightgray	0.8	0.8	0.8	orangered	1.0	0.0	0.2
darkred	0.5	0.0	0.0	orange	1.0	0.5	0.0
red	1.0	0.0	0.0	gold	1.0	0.85	0.0
midred	1.0	0.65	0.65	greenyellow	0.70	1.0	0.2
lightred	1.0	0.8	0.8	forestgreen	0.14	0.56	0.14
darkgreen	0.0	0.5	0.0	aqua	0.1	1.0	0.85
green	0.0	1.0	0.0	deepskyblue	0.0	0.75	1.0
midgreen	0.65	1.0	0.65	skyblue	0.2	0.56	0.8
lightgreen	0.8	1.0	0.8	royalblue	0.25	0.45	0.95
darkblue	0.0	0.0	0.5	slateblue	0.4	0.35	0.8
blue	0.0	0.0	1.0	bluemagenta	0.5	0.0	1.0
midblue	0.65	0.65	1.0	darkviolet	0.6	0.0	0.8
lightblue	0.8	0.8	1.0	magenta	1.0	0.0	1.0
yellow	1.0	1.0	0.0	lavender	0.8	0.8	1.0
yellowgreen	0.5	1.0	0.0				

<p>COLORS (cont)</p>	<p>Background dependent colors:</p> <table border="1"> <thead> <tr> <th><i>Name</i></th> <th colspan="3"><i>Black Background</i></th> <th colspan="3"><i>White Background</i></th> <th><i>Description</i></th> </tr> </thead> <tbody> <tr> <td>title0</td> <td>1.0</td> <td>1.0</td> <td>1.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>information box</td> </tr> <tr> <td>title1</td> <td>1.0</td> <td>0.7</td> <td>0.7</td> <td>0.1</td> <td>0.0</td> <td>0.0</td> <td>first info line</td> </tr> <tr> <td>title2</td> <td>0.0</td> <td>0.95</td> <td>0.8</td> <td>0.0</td> <td>0.5</td> <td>0.2</td> <td>second info line</td> </tr> <tr> <td>axis</td> <td>1.0</td> <td>1.0</td> <td>1.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>axis and labels</td> </tr> <tr> <td>roads0</td> <td>0.65</td> <td>0.65</td> <td>0.65</td> <td>0.65</td> <td>0.65</td> <td>0.65</td> <td>roads (filled)</td> </tr> <tr> <td>roads1</td> <td>0.6</td> <td>0.6</td> <td>0.6</td> <td>0.6</td> <td>0.6</td> <td>0.6</td> <td>roads (outline)</td> </tr> <tr> <td>land</td> <td>0.0</td> <td>0.5</td> <td>0.0</td> <td>0.8</td> <td>1.0</td> <td>0.8</td> <td>land</td> </tr> <tr> <td>water</td> <td>0.0</td> <td>0.0</td> <td>0.5</td> <td>0.8</td> <td>0.8</td> <td>1.0</td> <td>water</td> </tr> <tr> <td>bound0</td> <td>0.0</td> <td>0.3</td> <td>0.0</td> <td>0.45</td> <td>1.0</td> <td>0.45</td> <td>map lines (filled)</td> </tr> <tr> <td>bound1</td> <td>0.0</td> <td>0.5</td> <td>0.0</td> <td>0.6</td> <td>1.0</td> <td>0.6</td> <td>map lines (outline)</td> </tr> <tr> <td>shadow0</td> <td>0.0</td> <td>1.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>map shadow (filled)</td> </tr> <tr> <td>shadow1</td> <td>0.0</td> <td>1.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>map shadow (outline)</td> </tr> </tbody> </table> <p>If CFRAME_A, CFRAME_B and CFRAME_C (see below) indicate multiple backgrounds and COLORS is not specified for a background, then the COLORS for the first background will be used for the unspecified background (i.e. in most cases you only need to specify COLORS for the first background).</p>	<i>Name</i>	<i>Black Background</i>			<i>White Background</i>			<i>Description</i>	title0	1.0	1.0	1.0	0.0	0.0	0.0	information box	title1	1.0	0.7	0.7	0.1	0.0	0.0	first info line	title2	0.0	0.95	0.8	0.0	0.5	0.2	second info line	axis	1.0	1.0	1.0	0.0	0.0	0.0	axis and labels	roads0	0.65	0.65	0.65	0.65	0.65	0.65	roads (filled)	roads1	0.6	0.6	0.6	0.6	0.6	0.6	roads (outline)	land	0.0	0.5	0.0	0.8	1.0	0.8	land	water	0.0	0.0	0.5	0.8	0.8	1.0	water	bound0	0.0	0.3	0.0	0.45	1.0	0.45	map lines (filled)	bound1	0.0	0.5	0.0	0.6	1.0	0.6	map lines (outline)	shadow0	0.0	1.0	0.0	0.0	0.0	0.0	map shadow (filled)	shadow1	0.0	1.0	0.0	0.0	0.0	0.0	map shadow (outline)
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roads1	0.6	0.6	0.6	0.6	0.6	0.6	roads (outline)																																																																																																		
land	0.0	0.5	0.0	0.8	1.0	0.8	land																																																																																																		
water	0.0	0.0	0.5	0.8	0.8	1.0	water																																																																																																		
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shadow1	0.0	1.0	0.0	0.0	0.0	0.0	map shadow (outline)																																																																																																		
<p>TVAR ZVAR YVAR XVAR</p>	<p>Character strings that specify the orientation, location, and size of the two-dimensional slab to be plotted or 3 dimensional field to be extracted. Each is a slash delimited text string with two components, the second of which has further colon delimiting.</p> <p>The first component is a single character that describes how this direction will appear on the background and is only relevant if plotting. The characters and their meanings are described as follows:</p> <ul style="list-style-type: none"> • H : direction will be plotted horizontally • V : direction will be plotted vertically • F : fix the direction to the following value <p>Note that the option of plotting variables with respect to time is not yet implemented.</p> <p>The second component specifies the range information for the directions and time and is applicable to all types of REJU runs. The syntax is:</p> <pre>left_value : right_value : increment</pre> <p>where the values, if positive, are actual grid point values. If the left or right values are negative or zero, they are interpreted as an offset from the boundaries of the grid. For the time direction, the values refer to the analysis file number found according to the filtering of ANPREF (see above). If CFRAME_A, CFRAME_B and CFRAME_C (see below) indicate multiple backgrounds and TVAR indicate multiple times, then the settings for each background apply to each time. If plotting, the increment is only applied to T in TVAR. If the increment is not specified, it defaults to 1.</p>																																																																																																								

TVAR ZVAR YVAR XVAR (cont)	<p>For example and series of vertical Y-Z slabs may be specified as:</p> <pre>TVAR(1)=' /F/1:5:1/' , ZVAR(1)=' /V/0:0:1/' , YVAR(1)=' /F/8:8:1/' , XVAR(1)=' /H/0:0:1/' ,</pre> <p>This means that this background will have X horizontally on the plots and Z vertical (both will have the full domain of grid points for the grid specified by IGRID above). The Y direction will be fixed to the 8th grid point from the southern edge of the domain and time T will range from the 1st to the 5th file found after filtering with ANPREF (see above).</p> <p>Or a series of horizontal X-Y slabs of may be specified as:</p> <pre>TVAR(1)=' /F/ 1:25:2/' , ZVAR(1)=' /F/ 2: 2:1/' , YVAR(1)=' /V/-1:-2:1/' , XVAR(1)=' /H/ 3:15:1/' ,</pre> <p>This means that this background will have X horizontally on the plots and Y vertical. For the grid specified by IGRID (see above) X will span from the 3rd to the 15th grid point from the western edge of the domain. Y will span from the 2nd grid point from the southern edge of the domain to the 3rd grid point from the northern edge of the domain. Time T will range from the 1st to the 25th file found after filtering with ANPREF (see above), skipping every 2nd file (so 13 plots will be drawn).</p> <p>If not plotting, the following settings may be appropriate (noting that the F, V and H values are ignored):</p> <pre>TVAR(1)=' /F/ 1:25:1/' , ZVAR(1)=' /F/ 2: 0:1/' , YVAR(1)=' /V/-1:-1:2/' , XVAR(1)=' /H/-1:-1:2/' ,</pre> <p>Which will output all 25 times for a horizontal (X-Y) domain that does not include the boundary grid points for the grid specified by IGRID (see above) and skips every other grid point in between, and includes all vertical levels other than the lowest which is below the terrain surface.</p> <p>If CFRAME_A, CFRAME_B and CFRAME_C (see below) indicate multiple backgrounds and TVAR, ZVAR, YVAR and XVAR are not specified for a background, then the settings for the first background will be used for the unspecified background (i.e. in most cases you only need to specify them for the first background).</p>
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CFRAME_A	<p>CFRAME_A specifies the variables to plot if ANATYPE is set 'SPACE', or extract for other ANATYPE settings. All available variables are detailed below (default is 'none').</p> <p>If not plotting, only the variable is required. For example, a set of CFRAME_A settings for ANATYPE='V5D' might be:</p> <pre>CFRAME_A(1)=' /u/ ', CFRAME_A(2)=' /v/ ', CFRAME_A(3)=' /w/ ', CFRAME_A(4)=' /tempk/ ', CFRAME_A(5)=' /dewptk/ ',</pre> <p>If plotting, a series of slash delimited components containing plotting options can follow the variable. These control the way in which the variable is represented in the plot. Order is important and, although you can leave components at the end of the list unspecified, you must specify each component (at least with placeholders) up to the last component you wish to specify (an example of this is shown below). Options that are left unspecified are given sensible defaults. Note that the subscript of CFRAME_A denotes the background number (equals the frame number if IPANEL is set to 0). The subscript on CFRAME_A is tied to those on CFRAME_B and CFRAME_C in that sets of these parameters with the same subscript appear on the same plots. Describing each slash delimited component following the variable:</p> <ol style="list-style-type: none"> 2. A 1 or 2 character string that defines the method of plotting (first character), and whether or not to include a color scale bar (second character) if the viable is to be plotted with a range of colors. First character setting may be: <ul style="list-style-type: none"> • c : draw contour lines • f : draw and fill contours • t : fill tiles <p>Second character settings may be:</p> <ul style="list-style-type: none"> • n or blank : no color bar • b : draw color bar <p>For example:</p> <pre>CFRAME_A(n)=' /tempc/fb/ ',</pre> <p>will result in a filled contour plot of temperature in degrees centigrade and include color bar (default is fb).</p> 3. Minimum contour level for the field named in component 1. A value of zero allows the code to choose its own minimum. 4. Maximum contour level for the field named in component 1. A value of zero allows the code to choose its own maximum.
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<p>CFRAME_A (cont)</p>	<p>5. If positive, this is the contour interval for the field named in component 1. If negative, then it indicates about how many contour lines will be drawn between the lowest and highest values. If set to zero, a value will be chosen in the code.</p> <p>For example:</p> <pre>CFRAME_A(n)=' /tempc/fb/10.0/30.0/2.0/ ',</pre> <p>will set the contour levels for temperature from 10.0 to 30.0 degrees with a contouring interval of 2.0 degrees centigrade. If value exist outside of this range they will not be contoured.</p> <p>6. Options for plotting the field named in component 1. This is a string of colon delimited options. Only those options you wish to specify need be included. An array of examples follow the definitions:</p> <ul style="list-style-type: none"> • m : Graduated color method (integer). There are a variety of ways to specify the color increments with contour or tile values (all methods interpolate between colors in HLS space): <ul style="list-style-type: none"> m0 : Default color table (mixture of predefined and easily distinguished colors). <i>Single color schemes:</i> <ul style="list-style-type: none"> m1 : Single color scheme with component 7 (first specified color) at the maximum slab value, fading to the background color at the minimum slab value. m2 : Single color scheme that is the same as m1, but fades to the foreground color. m3 : Single color scheme with component 7 (first specified color) at the middle value, lightening above to white at the maximum slab value and darkening to black at the minimum slab value. <i>Two color schemes:</i> <ul style="list-style-type: none"> m4 : Two color scheme with component 7 (first specified color) covering slab values greater than the central color value (specified in option 'c' below) and component 8 (second specified color) covering slab values less than the central color value. The maximum saturation for the specified colors occur at the maximum and minimum slab values, fading to the background color at the interface (the central color value) (default). m5 : Two color scheme that is the same as m4, but fades to the foreground color. m6 : Two color blending scheme with component 7 (first specified color) at the maximum slab value and component 8 (second specified color) at the minimum slab value. Colors are blended between the maximum and minimum without going through either the foreground or background colors. This can lead to some odd color ranges if the user is not careful with the bounding color selections. <p>Negative values for m switch the order of color graduation (what appeared at the maximum values appear at the minimum values and vice versa).</p>
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<p>CFRAME_A (cont)</p>	<ul style="list-style-type: none"> • b : Graduated color bias (real) that gives a departure from linear the interpolation between colors since bias towards lighter colors is preferred as this gives more intervals in the human eyes sensitive range (e.g. b1. = linear, b1.5 = lighten and b.75 = darken) (default is 1.5). • c : Central color value (real) for splitting colors and contour lines in the scheme described above (default=0.). • i : Major contour line interval (integer) (default is 5). • g : Graduated contour line color offset (real). >0.0 : Graduate contour line colors> the value is used for the lightness color offset (default is 30). 0.0 : Use component 7 (first specified color) and component 8 (second specified color) for positive and negative contours respectively. <0.0 : Use contour and high/low labels color parameter (x described below) for the contour line color. • t : Contour line thickness (real). t1.0 is the standard line thickness. Major contour lines are drawn at 1.5*t (default is 1.0) • d : Dashed / solid line control (integer) d0 : Solid lines for all contours. d1 : Dashed lines for contours with values less that the central color values ('c' described above) and solid lines for all other contours (default). d2 : Dashed lines for all contours. • o : Overlay lines on top of any filled contours and tiles (integer). o0 : Do not overlay contour lines. o1 : Overlay contour lines (default) • l : Contour line label controls (integer). l-1: No labels. 10 : Draw labels with the color defined in 'x' below, but without filling a background behind the label or outlining the labels with boxes (default). 11 : Draw labels in box outlined with the foreground color. 12 : Draw labels in box filled with the background color. 13 : Draw labels in box outlined with the foreground color and led with the background color. • h : High and low label controls (integer). The options for 'h' are identical to those for 'l' described above. • s : Size of the contour and high/low labels (real) (default is 0.01). • x : Color of contour and high/low labels (text), and contour lines if option 'g' described above is set to less that zero (default is lightgray).
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CFRAME_A (cont)	<p>7. First specified color used for color contours and fills (text). Use of this color is determined by the m and g options above (default is red).</p> <p>8. Second specified color used for color contours and fills (text). Use of this color is determined by the m and g options above (default is blue).</p> <p>The default setting for CFRAME_A is:</p> <pre>CFRAME_A(1) = '/none/fb/0./0./0./m4:c0.:b1.5:i5:d1:g30.:t1.:o1:l0:h0:s.01:xlightgray/red/blue/'</pre> <p>Examples:</p> <pre>CFRAME_A(1) = '/tempc/fb/10./30./2.0/m5:c20.:xgray/red/blue/'</pre> <p>will fill contours of temperature from 10 to 20 degrees centigrade at 2 degree intervals with the 28 to 30 degree area filled in red and the 10 to 12 degree area in blue. The color fill dividing line is set to 20 degrees, so on a black background with color scheme 5, the two areas either side to 20 degrees (18 to 20 and 20 to 22) will be filled in white. The colors will graduate from white to red above 20 and white to blue below. The contour lines will follow the same color pattern, but each line will have a lightness offset of 30% from the fill color. Contour line and high/low labels will be drawn in gray without boxes or fill. A color scale bar will also be drawn.</p> <pre>CFRAME_A(2) = '/relhum/f/50./100./5./m1:g20.:h-1:xblue/midblue/'</pre> <p>will fill contours of relative humidity from 50 to 100% at 5% intervals. The 95 to 100% interval will be filled with midblue. From there the fill colors will fade to the background color in the 50 to 55% interval. Contour lines will be drawn with a 20% lightness offset from the adjacent fill color and contour line labels will be drawn in blue. No high/low labels or color scale bar will be drawn.</p> <pre>CFRAME_A(3) = '/relhum/c////c50.:g-1.:h-1/yellow/purple/'</pre> <p>will draw contours of relative humidity from the minimum value in the plotted slab to the maximum value with some convenient interval (still centered around a central color value of 50%). With the central color set at 50%, yellow contour lines of the same color will be drawn above 50% and purple below. Not high/low labels or color fill scale bar will be drawn. Note that the /'s after the /c/ are placeholders for the contour range and interval settings. They will take on the default values. The placeholders are required as order and occurrence of each component in the slash-delimited string is important.</p>
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CFRAME_B	<p>If plotting, CFRAME_B specifies what wind information should be plotted. It is a slash-delimited string with up to 10 components. Order is important and, although you can leave components at the end of the list unspecified, you must specify each component (at least with placeholders) up to the last component you wish to specify (an example of this is in CFRAME_A). Options that are left unspecified are given sensible defaults. The subscript on CFRAME_B is tied to those on CFRAME_A and CFRAME_C in that sets of these parameters with the same subscript appear on the same plots. Describing each slash delimited component:</p> <ol style="list-style-type: none"> 1. Character value to denote how to depict the wind field: <ul style="list-style-type: none"> • n : none (default) • s : draw streamlines. • b : draw wind barbs. • v : draw wind vectors. • t : draw turbulence with vectors. • r : draw relative vorticity vectors. 2. Variable indicating the number of horizontal grid points between adjacent wind vector or barb plots (integer <i>intindi</i>) (default is 1). 3. Variable indicating the number of vertical grid points between adjacent wind vector or barb plots (integer <i>intindj</i>) (default is 1). 4. Variable specifying the wind barb flags, staff and half staff values (integer) (default is (not used for vectors, but place holder still required): <ul style="list-style-type: none"> • 1 : 50, 10, 5 m/s • 2 : 20, 4, 2 m/s • 3 : 10, 2, 1 m/s (default) • 4 : 5, 1, 0.5 m/s 5. Wind marker color (test) 6. Stem length for vector or barb (scales the whole barb) (real) (default is <i>intindi</i>). The default behavior for the size of the vectors and barbs is to double in size when <i>intindi</i> is doubled, in which case they tend to dominate the picture. You can prevent this by halving the stem length when <i>intindi</i> is doubled. 7. Maximum wind vector scale (real) (default is -1. which get recomputed to the maximum wind speed). 8. Wind vector head length (real) (default is -1. which get recomputed to 0.1* <i>intindi</i>). 9. Wind vector head length for 0 wind speed (real) (default is -1. which get recomputed to 0.2* <i>intindi</i>). 10. Wind vector head angle (real) (default is 25.0 degrees).
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<p>CFRAME_B (cont)</p>	<p>The default setting for CFRAME_A is: <code>CFRAME_B(1)='/n/1/1/3/yellow/1./0./-1./-1./-1./'</code></p> <p>Examples: <code>CFRAME_B(1)='/b/2/2/4/green/.5/ '</code></p> <p>will draw green wind barbs on every other grid point in both the horizontal and vertical with flag, staff and half staff values of 5, 1 and 0.5 m/s respectively. The size of the barbs will be maintained the same as for drawing them at every grid point with the 0.5 stem length setting.</p>
<p>CFRAME_C</p>	<p>If plotting, CFRAME_C is a second variable that can be contoured or tiled. It can also be used to color wind vectors with or without a color scale bar (second component setting of 'vb' or 'vn'). The subscript on CFRAME_C is tied to those on CFRAME_A and CFRAME_B in that sets of these parameters with the same subscript appear on the same plots.</p> <p>The default setting for CFRAME_C is: <code>CFRAME_C(1)='/none/cn/0./0./0./m2:c0.:b1.5:i5:d1:g30.: t1.:o1:l0:h0:s.01:xlightgray/darkgreen/purple/'</code></p>

GRAB Namelist

Required only for run types **ANATYPE='GRAB'** and described the I/O of the grabbed data.

GRABIN	Specifies the filename that contains the locations where we want to grab the data. Each latitude-longitude location can be specified as either a point in space (requires a height AGL to be given), or a profile of the model levels. The output data for each latitude-longitude-height location is then interpolated from the surrounding RAMS grid points on the finest possible grid specified by IGRID . The format of this file is specified below.
IGRABFMT	Specifies the output data format: <ul style="list-style-type: none"> • If set to 1, output selected CFRAME_A (see above) variables in an ASCII file (format is specified below). • If set to 2, output the data in the RALPH2 ASCII format (requires that CFRAME_A be set, in order, to the following fields 'u', 'v', 'tempc', 'dewptc' and 'press').

GLL Namelist

Required only for run types **ANATYPE**='GRIB', 'V5D' or 'GrADS' and described the latitude-longitude grid that the output data is interpolated to.

IGRIDLL	<p>For output that is interpolated to a latitude-longitude grid (e.g. GRIB, GrADS and Vis5D), this specifies the method by which the size and resolution of the output grid are determined.</p> <ul style="list-style-type: none"> • If set to 0, the remaining variables in this namelist specify the size and resolution of the latitude-longitude grid. • If set to 1, the maximum sized latitude-longitude grid that fits within the RAMS grid specified by IGRID is determined in the code. • If set to 2, the minimum sized latitude-longitude grid that contains the RAMS grid specified by IGRID is determined in the code.
GLLDLLAT	If IGRIDLL =0, specifies the latitude grid spacing of the latitude-longitude grid.
GLLDLLON	If IGRIDLL =0, specifies the longitude grid spacing of the latitude-longitude grid.
GLLWLON	If IGRIDLL =0, specifies the western edge of the latitude-longitude grid
GLLELON	If IGRIDLL =0, specifies the eastern edge of the latitude-longitude grid
GLLSLAT	If IGRIDLL =0, specifies the southern edge of the latitude-longitude grid
GLLNLAT	If IGRIDLL =0, specifies the northern edge of the latitude-longitude grid

STATS Namelist

Required only for run types **ANATYPE='STATS'** and describes the run mode and I/O.

CMODE	<p>Specifies the observations to process:</p> <ul style="list-style-type: none"> • If set to 'all', process both surface and upper air observations. • If set to 'sfc', process surface only. • If set to 'rawin', process upper air observations only.
SFCPREF	Prefix for the surface observational file names (file must be in RALPH2 format).
RWNPREF	Prefix for the upper air observational file names (file must be in RALPH2 format).
NOQ	Quality control suffix for the file names. -NOQ is tagged to the original data file if quality control has been run on it.
IPDIFF IPVALS IPWIND IPHIST IPCONT	<p>Switches for plotting statistical results (not fully functional):</p> <ul style="list-style-type: none"> • If set to 0, switch is off. • If set to 1, switch is on. <p>IPDIFF specifies whether to plot predicted-observed difference values. IPVALS specifies whether to plot actual predicted and observed values. IPWIND specifies whether to plot winds comparison. IPHIST specifies whether to plot histograms of predicted-observed. IPCONT specifies whether to plot contours of predicted-observed differences.</p>

REVU Variables for Plotting or Output

The list of variables that are currently configured in REVU 2.3 (for RAMS 4.3) is described below. These may be selected for plotting or output into the GrADS, GRIB or Vis5D files (except for the LEAF patch variables).

The field name is what you may use in CFRAME_A or CFRAME_C in your REVU_IN file. The model variables indicate what you need to have selected in your VTABLES file when you run RAMS to ensure that you can look at field or extract the data with REVU. To select a VTABLE field for output to the analysis files, ensure that the “anal” tag is included in the ctables list. Likewise, for output to the lite files, ensure that the “lite” tag is included in the ctables list.

Some of the model variables indicated are not directly listed in the VTABLE file. Specifically selecting PP in VTABLE will output PI and VKM will output HKH. The model variables indicated for the LEAF fields are relevant to the future RAMS version 4.4. If you wish to view any of these select all of TGP, WGP, SCHAR and GS. SCHAR is also required to get the patch area that is used to obtain land percentages for most plots.

3-D Atmospheric Variables

The following variables are defined on the 3-D atmospheric grid and may be plotted in either horizontal or vertical cross section. Obviously, many of these variables are dependent on which options were activated for a particular run.

<i>Field name</i>	<i>Description [units]</i>	<i>Model Variables</i>
<i>u</i>	x-direction wind component [m/s]	UP
<i>v</i>	y-direction wind component [m/s]	VP
<i>u_avg</i>	eastward wind component averaged to T point [m/s]	UP, VP
<i>u_avg</i>	northward wind component averaged to T point [m/s]	UP, VP
<i>ue</i>	earth rotated eastward wind component [m/s]	UP, VP
<i>ve</i>	earth rotated northward wind component [m/s]	UP, VP
<i>ue_avg</i>	eastward wind component earth rotated and averaged to T point [m/s]	UP, VP
<i>ve_avg</i>	northward wind component earth rotated averaged to T point [m/s]	UP, VP
<i>w</i>	z-direction wind component [m/s]	WP
<i>wcms</i>	z-direction wind component [cm/s]	WP
<i>w_avg</i>	z-direction wind component averaged to T point [m/s]	WP
<i>speed</i>	horizontal wind speed [m/s]	UP, VP
<i>speed_mph</i>	horizontal wind speed [mph]	UP, VP
<i>speed_avg</i>	horizontal wind speed averaged to T point [m/s]	UP, VP
<i>direction</i>	horizontal wind direction [deg]	UP, VP
<i>relvortx</i>	x-component of relative vorticity [rad/s]	UP, VP, TOPT

<i>relvorty</i>	y-component of relative vorticity [rad/s]	UP, VP, TOPT
<i>relvortz</i>	z-component of relative vorticity [rad/s]	UP, VP, TOPT
<i>absvortz</i>	z-component of absolute vorticity [rad/s]	UP, VP, TOPT
<i>potvortz</i>	z-component of potential vorticity [rad/s]	UP, VP, TOPT, THETA
<i>horiz_div</i>	horizontal divergence [s ⁻¹]	WP
<i>pi</i>	Exner function [J/(kg K)]	PI
<i>press</i>	pressure [mb]	PI
<i>theta</i>	potential temperature [K]	THETA
<i>dn0</i>	reference state density [kg/m ³]	TOPT
<i>pi0</i>	reference state Exner function [J/(kg K)]	TOPT
<i>th0</i>	reference state virtual potential temperature [K]	TOPT
<i>pert_pressure</i>	perturbation pressure [mb]	TOPT, PI
<i>tempk</i>	temperature [K]	THETA, PI
<i>tempc</i>	temperature [deg C]	THETA, PI
<i>tempf</i>	temperature [deg F]	THETA, PI
<i>theta_e</i>	equivalent potential temperature [K]	RV, THETA, PI
<i>theta_v</i>	virtual potential temperature [K]	THETA, PI
<i>vapor</i>	water vapor mixing ratio [g/kg]	RV
<i>cloud</i>	cloud water mixing ratio [g/kg]	RCP
<i>rain</i>	rain mixing ratio [g/kg]	RRP
<i>pristine</i>	pristine ice mixing ratio [g/kg]	RPP
<i>snow</i>	snow mixing ratio [g/kg]	RSP
<i>aggregates</i>	aggregates mixing ratio [g/kg]	RAP
<i>graupel</i>	graupel mixing ratio [g/kg]	RPP
<i>hail</i>	hail mixing ratio [g/kg]	RHP
<i>liquid</i>	liquid water mixing ratio [g/kg]	RCP, RRP, RGP, Q6, RHP, Q7
<i>ice</i>	ice mixing ratio [g/kg]	RPP, RSP, RAP, RGP, Q6, RHP, Q7
<i>total_cond</i>	total condensate mixing ratio [g/kg]	RPP, RSP, RAP, RGP, Q6, RHP, Q7
<i>r_total</i>	total water mixing ratio [g/kg]	RV, RCP, RRP, RPP, RSP, RAP, RGP, RHP
<i>rtotal_orig</i>	total water mixing ratio (original method) [g/kg]	RTP
<i>dewptk</i>	dew point temperature [K]	RV, PI, THETA
<i>dewptf</i>	dew point temperature [deg F]	RV, PI, THETA
<i>dewptc</i>	dew point temperature [deg C]	RV, PI, THETA
<i>relhum</i>	relative humidity [percent]	RV, PI, THETA
<i>relhum_frac</i>	relative humidity [fraction]	RV, PI, THETA
<i>cloud_concen_mg</i>	cloud droplet number concentration [#mg]	CCP
<i>rain_concen_kg</i>	rain number concentration [#kg]	CRP
<i>pris_concen_kg</i>	pristine ice number concentration [#kg]	CPP
<i>snow_concen_kg</i>	snow number concentration [#kg]	CSP
<i>agg_concen_kg</i>	aggregates number concentration [#kg]	CAP
<i>graup_concen_kg</i>	graupel number concentration [#kg]	CGP
<i>hail_concen_kg</i>	hail number concentration [#kg]	CHP
<i>cloud_concen_cm3</i>	cloud droplet number concentration [#cm ³]	CCP, TOPT
<i>rain_concen_m3</i>	rain number concentration [#m ³]	CRP, TOPT

<i>pris_concen_m3</i>	pristine ice number concentration [#/ m^3]	CPP, TOPT
<i>snow_concen_m3</i>	snow number concentration [#/ m^3]	CSP, TOPT
<i>agg_concen_m3</i>	aggregates number concentration [#/ m^3]	CAP, TOPT
<i>graup_concen_m3</i>	graupel number concentration [#/ m^3]	CGP, TOPT
<i>hail_concen_m3</i>	hail number concentration [#/ m^3]	CHP, TOPT
<i>ccn_concen</i>	CCN number concentration [#/ mg]	CCCNP
<i>ifn_conc</i>	IFN number concentration [#/ kg]	CIFNP
<i>cloud_diam</i>	cloud droplet mean-mass diameter [microns]	RCP, CCP
<i>rain_diam</i>	rain mean-mass diameter [mm]	RRP, CRP
<i>pris_diam</i>	pristine ice mean-mass diameter [microns]	RPP, CPP
<i>snow_diam</i>	snow mean-mass diameter [mm]	RSP, CSP
<i>agg_diam</i>	aggregates mean-mass diameter [mm]	RAP, CAP
<i>graup_diam</i>	graupel mean-mass diameter [mm]	RGP, CGP
<i>hail_diam</i>	hail mean-mass diameter [mm]	RHP, CHP
<i>q2</i>	rain internal energy parameter [J/ kg]	Q2
<i>q6</i>	graupel internal energy parameter [J/ kg]	Q6
<i>q7</i>	hail internal energy parameter [J/ kg]	Q7
<i>rain_temp</i>	rain temperature [deg C]	Q2
<i>graup_temp</i>	graupel temperature [deg C]	Q6
<i>hail_temp</i>	hail temperature [deg C]	Q7
<i>rain_air_tempdif</i>	rain-air temperature difference [K]	Q2, THETA, PI
<i>graup_air_tempdif</i>	graupel-air temperature difference [K]	Q6, THETA, PI
<i>hail_air_tempdif</i>	hail-air temperature difference [K]	Q7, THETA, PI
<i>graup_fracliq</i>	liquid fraction in graupel []	Q6
<i>hail_fracliq</i>	liquid fraction in hail []	Q7
<i>geo</i>	geopotential height [m]	TOPT
<i>tke</i>	turbulent kinetic energy [m^2/s^2]	TKEP
<i>scalar1_mixrat</i>	scalar # 1 mixing ratio [units/ kg]	SCLP1
<i>scalar2_mixrat</i>	scalar # 2 mixing ratio [units/ kg]	SCLP2
<i>cuparm_thetasrc</i>	cumulus parameterization heating rate {K/s}	THSRC
<i>cuparm_rtsrc</i>	cumulus parameterization moistening rate [kg/ kg/s]	RTSRC
<i>rad_thetasrc</i>	radiative transfer heating rate [K/s]	FTHRD
<i>khh</i>	horizontal scalar mixing coefficient [m^2/s]	HKH
<i>khv</i>	vertical scalar mixing coefficient [m^2/s]	VKH

2-D Variables

The following variables are defined as a function of horizontal coordinates only and may only be plotted in horizontal cross section.

<i>Field Name</i>	<i>Description [units]</i>	<i>Model Variables</i>
<i>tempf2m</i>	2-meter-height air temperature [deg F.]	UP, VP, THETA, TOPT, TGP, SCHAR, GSF, PI
<i>speed10m</i>	10-meter-height wind speed [m/s]	UP, VP, THETA, TOPT, GSF, SCHAR, TGP
<i>clear_frac</i>	clear sky fraction [fraction]	RV, PI, THETA
<i>cloud_frac</i>	cloud cover fraction [fraction]	RV, PI, THETA
<i>pbl_ht</i>	planetary boundary layer height [m]	TOPT, TKE
<i>accpr</i>	surface accumulated rain [kg/m ²]	ACCPR
<i>accpp</i>	surface accumulated pristine ice [kg/m ²]	ACCPP
<i>accps</i>	surface accumulated snow [kg/m ²]	ACCPs
<i>accpa</i>	surface accumulated aggregates [kg/m ²]	ACCPA
<i>accpg</i>	surface accumulated graupel [kg/m ²]	ACCPG
<i>accph</i>	surface accumulated hail [kg/m ²]	ACCPH
<i>totpcp</i>	surface accumulated resolved precipitation [mm liquid equivalent]	ACCPR, ACCPP, ACCPS, ACCPA, ACCPG, ACCPH
<i>totpcp_in</i>	surface accumulated resolved precipitation [inches liquid equivalent]	ACCPR, ACCPP, ACCPS, ACCPA, ACCPG, ACCPH
<i>precip</i>	surface accumulated resolved plus convective precipitation [mm liquid equivalent]	ACCPR, ACCPP, ACCPS, ACCPA, ACCPG, ACCPH, ACONPR
<i>precip_in</i>	surface accumulated resolved plus convective precipitation [inches liquid equivalent]	ACCPR, ACCPP, ACCPS, ACCPA, ACCPG, ACCPH, ACONPR
<i>pcpr</i>	surface precipitation rate of rain [mm/hr liquid equivalent]	PCPRR
<i>pcprp</i>	surface precipitation rate of pristine ice [mm/hr liquid equivalent]	PCPRP
<i>psprs</i>	surface precipitation rate of snow [mm/hr liquid equivalent]	PCPRS
<i>pcpra</i>	surface precipitation rate of aggregates [mm/hr liquid equivalent]	PCPRA
<i>pcprg</i>	surface precipitation rate of graupel [mm/hr liquid equivalent]	PCPRG
<i>pcprh</i>	surface precipitation rate of hail [mm/hr liquid equivalent]	PCPRH
<i>pcpg</i>	total surface precipitation falling this timestep [kg/m ²]	PCPG
<i>qpcpg</i>	total internal energy of surface precipitation falling this timestep [J/m ²]	QPCPG
<i>dpcpg</i>	total added depth of surface precipitation falling this	DPCPG

	timestep [m]	
<i>pcprate</i>	resolved surface precipitation [mm/hr liquid equivalent]	PCPRR, PCPRP, PCPRS, PCPRA, PCPRH, PCPRG, CONPRR
<i>pcprate_in</i>	resolved surface precipitation [inches/hr liquid equivalent]	PCPRR, PCPRP, PCPRS, PCPRA, PCPRH, PCPRG, CONPRR
<i>precipr</i>	resolved plus convective surface precipitation [mm/hr liquid equivalent]	PCPRR, PCPRP, PCPRS, PCPRA, PCPRH, PCPRG, CONPRR
<i>precipr_in</i>	resolved plus convective surface precipitation [inches/hr liquid equivalent]	PCPRR, PCPRP, PCPRS, PCPRA, PCPRH, PCPRG, CONPRR
<i>conpcp</i>	cumulus parameterization precipitation rate [mm/hr]	CONPRR
<i>accon</i>	cumulus parameterization accumulated surface precipitation [mm]	CONPRR
<i>vertint_rt</i>	vertically-integrated total water mixing ratio [mm liquid equivalent]	TOPT, RCP, RRP, RPP, RSP, RAP, RGP, RHP,RV
<i>vertint_cond</i>	vertically-integrated total condensate mixing ratio [mm liquid equivalent]	TOPT, RCP, RRP, RPP, RSP, RAP, RGP, RHP
<i>tfz</i>	surface sensible heat flux [K m/s]	TFZ
<i>qfz</i>	surface water vapor flux [kg/kg m/s]	QFZ
<i>uw</i>	surface x-component momentum flux [m^2/s^2]	UW
<i>vw</i>	surface y-component momentum flux [m^2/s^2]	VW
<i>wfz</i>	surface y-component momentum flux [m^2/s^2]	WFZ
<i>sens_flux</i>	surface sensible heat flux [W/m^2]	TFZ, TOPT
<i>lat_flux</i>	surface latent heat flux [W/m^2]	QFZ, TOPT
<i>etrans</i>	evapotranspiration rate [mm/hr]	QFZ, TOPT
<i>etrans_in</i>	evapotranspiration rate [in/hr]	QFZ, TOPT
<i>umom_flux</i>	surface x-component momentum flux [Pa]	UW, TOPT
<i>vmom_flux</i>	surface y-component momentum flux [Pa]	VW, TOPT
<i>wmom_flux</i>	surface x-component momentum flux [Pa]	WFZ, TOPT
<i>bowen</i>	Bowen ratio []	TFZ, QFZ
<i>rshort</i>	incident surface flux of shortwave radiation [W/m^2]	RSHORT
<i>rlong</i>	incident surface flux of longwave radiation [W/m^2]	RLONG
<i>rlongup</i>	upward surface flux of longwave radiation [W/m^2]	RLONGUP
<i>albedt</i>	grid-cell-averaged surface albedo []	ALBEDT
<i>topo</i>	topography height [m]	TOPT
<i>lat</i>	latitude [deg]	GLAT
<i>lon</i>	longitude [deg]	GLON
<i>sea_press</i>	sea level pressure [mb]	TOPT, PI, THETA
<i>sfc_div</i>	horizontal divergence at surface [s^{-1}]	WP
<i>land</i>	land fractional area []	SCHAR
<i>ctprof</i>	cloud top height [m]	???
<i>sst</i>	water temperature [deg C]	TGP

LEAF Variables

These variables are from the LEAF2 parameterization and comprise all the soil and vegetation parameters.

The following variables are defined in RAMS for land subgrid patches only. They are averaged over all land patches and are defined for the entire grid cell regardless of how little area of the grid cell is occupied by land. *In grid cells that contain no land, these field values will retain their initial values in the RAMS simulation.* These fields may be plotted only in horizontal cross section.

<i>Field Name</i>	<i>Description [units]</i>	<i>Model Variables</i>
<i>soil_z0_ps</i>	soil roughness height by grid cell [m]	SCHAR
<i>veg_fracarea_ps</i>	vegetation fractional area by grid cell []	SCHAR
<i>veg_lai_ps</i>	vegetation leaf area index by grid cell []	SCHAR
<i>veg_z0_ps</i>	vegetation roughness height by grid cell [m]	SCHAR
<i>veg_disp_ps</i>	vegetation displacement height by grid cell [m]	SCHAR
<i>grnd_mixrat_ps</i>	ground mixing ratio by grid cell [g/kg]	SCHAR, WGP
<i>soil_mixrat_ps</i>	soil mixing ratio by grid cell [g/kg]	SCHAR, TGP
<i>veg_moist_ps</i>	vegetation surface moisture by grid cell [kg/m ²]	SCHAR, WGP
<i>veg_temp_ps</i>	vegetation temperature by grid cell [deg C]	SCHAR, TGP
<i>snow_depth_ps</i>	snow depth by grid cell [m]	SCHAR, TGP
<i>snowcover_ps</i>	snowcover content by grid cell [kg/m ²]	SCHAR, TGP

The following variables are defined in RAMS for all grid cells, but they are not averageable quantities. A single value is taken here for the entire grid cell from the subgrid patch having the largest area in the cell. They may be plotted only in horizontal cross section.

<i>Field Name</i>	<i>Description [units]</i>	<i>Model Variables</i>
<i>veg_class_bp</i>	vegetation class of the biggest patch in the grid cell []	SCHAR
<i>qveg_class_bp</i>	“q” vegetation class of the biggest patch in the grid cell []	SCHAR

The following variables are defined in RAMS for all subgrid patches. They are averaged over all patches here. They may be plotted only in horizontal cross section.

<i>Field Name</i>	<i>Description [units]</i>	<i>Model Variables</i>
<i>net_z0_ps</i>	net roughness height by grid cell [m]	SCHAR
<i>canopy_mixrat_ps</i>	canopy mixing ratio by grid cell [g/kg]	SCHAR, WGP
<i>canopy_temp_ps</i>	canopy temperature by grid cell [deg C]	SCHAR, TGP
<i>ustar_ps</i>	ustar by grid cell [m/s]	SCHAR, GSF
<i>tstar_ps</i>	tstar by grid cell [K]	SCHAR, GSF

<i>rstar_ps</i>	rstar by grid cell [kg/kg]	SCHAR, GSF
<i>sens_heat_flux_ps</i>	surface sensible heat flux by grid cell [W/m ²]	SCHAR, GSF, TOPT
<i>lat_heat_flux_ps</i>	surface latent heat flux by grid cell [W/m ²]	SCHAR, GSF, TOPT
<i>5050_temp_ps</i>	average of k=2 air and canopy air temperatures by grid cell [deg C]	SCHAR, TGP, THETA, PI
<i>5050_tempf_ps</i>	average of k=2 air and canopy air temperatures by grid cell [deg F]	SCHAR, TGP, THETA, PI

The following variables are defined in RAMS for subgrid patches and remain defined by patch here. They may be plotted only in horizontal cross section and only with the tile plot function. *These variables cannot be output to GrADS, GRIB or Vis5D.*

<i>Field Name</i>	<i>Description [units]</i>	<i>Model Variables</i>
<i>patch_area</i>	fractional area of patches []	SCHAR
<i>soil_z0_p</i>	soil roughness height by patch [m]	SCHAR
<i>veg_class_p</i>	vegetation class by patch []	SCHAR
<i>qveg_class_p</i>	"q" vegetation class by patch	SCHAR
<i>veg_fracarea_p</i>	vegetation fractional area by patch []	SCHAR
<i>veg_lai_p</i>	vegetation leaf area index by patch []	SCHAR
<i>net_z0_p</i>	net roughness height by patch [m]	SCHAR
<i>veg_z0_p</i>	vegetation roughness height by patch [m]	SCHAR
<i>veg_disp_p</i>	vegetation displacement height by patch [m]	SCHAR
<i>patch_wetind</i>	wetness index by patch []	SCHAR
<i>snowlevels</i>	number of snow levels by patch []	SCHAR
<i>grnd_mixrat_p</i>	ground mixing ratio by patch [g/kg]	SCHAR, WGP
<i>soil_mixrat_p</i>	soil mixing ratio by patch [g/kg]	SCHAR, TGP
<i>veg_moist_p</i>	vegetation surface moisture by patch [kg/m ²]	SCHAR, WGP
<i>canopy_mixrat_p</i>	canopy mixing ratio by patch [g/kg]	SCHAR, WGP
<i>veg_temp_p</i>	vegetation temperature by patch [deg C]	SCHAR, TGP
<i>canopy_temp_p</i>	canopy temperature by patch [deg C]	SCHAR, TGP
<i>ustar_p</i>	ustar by patch [m/s]	SCHAR, GSF
<i>tstar_p</i>	tstar by patch [K]	SCHAR, GSF
<i>rstar_p</i>	rstar by patch [kg/kg]	SCHAR, GSF
<i>sens_heat_flux_p</i>	surface sensible heat flux by patch [W/m ²]	SCHAR, GSF, TOPT
<i>lat_heat_flux_p</i>	surface latent heat flux by patch [W/m ²]	SCHAR, GSF, TOPT
<i>snow_depth_p</i>	snow depth by patch [m]	SCHAR, TGP
<i>snowcover_p</i>	snowcover content by patch [kg/m ²]	SCHAR, TGP

The following variables are defined in RAMS for land subgrid patches only and as a function of depth. They are averaged over land patches here and are expanded to cover the entire grid regardless of how little area of the grid cell is occupied by land. *In grid cells that contain no land, these field values will retain their initial values in the RAMS simulation.* These fields may be plotted either in horizontal or vertical cross section. These variables cannot be output to GrADS, GRIB or Vis5D.

<i>Field Name</i>	<i>Description [units]</i>	<i>Model Variables</i>
<i>sltex_bp</i>	soil textural class of biggest patch in grid cell []	SCHAR, TGP
<i>soilq_ps</i>	soil internal energy parameter by grid cell [j/m ²]	SCHAR, TGP
<i>soil_temp_ps</i>	soil/sea temperature by grid cell [deg C]	SCHAR, TGP
<i>soil_moist_ps</i>	soil moisture by grid cell [m ³ /m ³]	SCHAR, TGP
<i>soil_moistf_ps</i>	soil moisture fraction by grid cell [m ³ /m ³]	SCHAR, TGP

The following variables are defined in RAMS for all subgrid patches and as a function of depth. They remain defined in that way here. They may be plotted either in horizontal or vertical cross section, but only with the tile plot function. *These variables cannot be output to GrADS, GRIB or Vis5D.*

<i>Field Name</i>	<i>Description [units]</i>	<i>Model Variables</i>
<i>sltex_p</i>	soil textural class by patch []	SCHAR, TGP
<i>soilq_p</i>	soil internal energy parameter by patch [J/m ³]	SCHAR, TGP
<i>soil_temp_p</i>	soil/sea temperature by patch [deg C]	SCHAR, TGP
<i>soil_moist_p</i>	soil moisture by patch [m ³ /m ³]	SCHAR, TGP
<i>soil_moistf_p</i>	soil moisture fraction by patch [m ³ /m ³]	SCHAR, TGP

The following variables are made up from a combination of leaf2 variables defined by both patch and depth and those defined by patch only, plus atmospheric variables from the lowest model level. They remain defined in that way here. They may be plotted only in vertical cross section, and only with the tile plot function. *These variables cannot be output to GrADS, GRIB or Vis5D.*

<i>Field Name</i>	<i>Description [units]</i>	<i>Model Variables</i>
<i>leaf2_moisture</i>	moisture of all leaf2 components	SCHAR, TGP, WGP
<i>leaf2_temp</i>	temperature of all leaf2 components	???

REVU Input Files

The *REVU_IN* namelist file, required for all *REVU* runs, is described in full above. Two other input files are described below.

LANDMARKS

If plotting a horizontal cross-section (see **ZVAR**, **XVAR**, and **YVAR** above) and the **LANDMARK** parameter (see above) is set to draw landmarks, the locations available for plotting are specified in the *LANDMARKS* file which must reside in the run directory. Landmark locations are specified by a name (up to 16 characters in length) and its latitude-longitude coordinates (as either degree minute second integer qualities, or degree real quantities), noting that line beginning with # are ignored. For example:

```
# ----- NY -----
ISP          40 47 38   -073 06 06
MTP          41 04 23   -071 55 24
LGA          40 46 45   -073 52 48
POU          41 37 32   -073 52 55
```

Is equivalent to:

```
# ----- NY -----
ISP          40.7939   -73.1017
MTP          41.0731   -71.9233
LGA          40.7792   -73.8800
POU          41.6256   -73.8819
```

Since not all the locations specified in the *LANDMARKS* file are plotted when doing so will cause label text to overlap or the plot to be cluttered (controlled by the **LANDMARK** 'b' component setting), those locations that appear nearer the beginning of the file may get plotted at the expense of those later in the file. Thus, to ensure you see the locations you wish to see, ensure those locations are at the top of the file, in order of drawing priority.

grab_in

The **GRAB** namelist parameter **GRABIN** by default points to the file *grab_in*. This file specifies the locations where we want to grab the data for an **ANATYPE** (see above) setting of 'GRAB'. Each latitude-longitude location can be specified as either a point in space (requires a height AGL to be given), or a profile of the model levels. The first line contains the file format version number (integer). The remaining lines are either comments or space delimited station location data (one station per line):

```
stat lat lon elev type
```

where:

```
stat = station id number (integer)
lat  = latitude [degrees] (real)
lon  = longitude [degrees] (real)
elev = height AGL in m (real) [=0. for itype=2]
type = 1, get point data at lat,lon,elev (integer)
      = 2, get profile data at lat,lon (RAMS levels)
```

Noting that anything after a # or ! is ignored. For example:

```
1
# some test data (! and # indicate comments)
! st id    lat          lon          elev  itype
1   40.79388889 -73.10166667  10.    1   ! point data at 10m AGL
2   41.07305556 -71.92333333  10.    1
3   41.07305556 -71.92333333  0.     2   ! profile data
4   40.77916667 -73.88000000  500.   1   ! point data at 500m AGL
5   41.62555556 -73.88194444  10.    1
```


REVU Output Files

If the type of run defined by **ANATYPE** (above) is 'SPACE', an NCAR Graphics NCGM file named *gmeta* will be output in the current directory (not the directory specified by **REVPREF**). For all other run types the file format:

```
REVPREF<analpref>[SCP]-<date>-g<grid>.<format>
```

where:

- <analpref> is the file prefix given by **AFIOUT** or **HYPREF**, the **RAMS** and **HYPACT** output files name prefixes respectively, without the path component.
- [SCP] is determined by **IZTRAN** (below), i.e.
 - S - for **IZTRAN**=1, output on sigma surfaces.
 - C - for **IZTRAN**=2, output on Cartesian surfaces.
 - P - for **IZTRAN**=3, output on pressure surfaces.
- <date> is the standard date string of the analysis files for the beginning of the **RAMS** simulation.
- <grid> is the **RAMS** grid number of the data. A grid number of 0 indicates that the file contains information on all grids.
- <format> is the type of output file, as determined by **ANATYPE** (below), i.e.
 - v5d - for **ANATYPE**=V5D, Vis5d files.
 - gra - for **ANATYPE**=GRADS, GrADS files.
 - grb - for **ANATYPE**=GRIB, GRIB files.
 - gbr - for **ANATYPE**=GRAB, grabber files.
 - dmp - for **ANATYPE**=DUMP, dumped files.

If the types of run defined by **ANATYPE** (see above) is 'GRAB' and **IGRABFMT** (see above) is 0, the selected **CFRAME_A** (see above) variables are output in an ASCII file with the following format:

```
date time istat lat lon elev x y z grd (var(i),(i=1,nvars))
```

where:

```
date = YYYYMMDD (integer, i10)
time = HHMMSS (integer, i10)
stat = station id number (integer, i10)
lat = latitude [degrees] (real, e15.6)
lon = longitude [degrees] (real, e15.6)
elev = height AGL [m] (real, e15.6) [=0. for itype=2]
x = RAMS x coordinate [m] (real, e15.6)
y = RAMS y coordinate [m] (real, e15.6)
z = RAMS z coordinate [m AGL] (real, e15.6)
grd = RAMS grid used (integer, i10)
var = variable values (real, e15.6) [up to 30]
```

If the types of run defined by **ANATYPE** (see above) is 'GRAB' and **IGRABFMT** (see above) is 1, the selected **CFRAME_A** are output in a RALPH2 format ASCII file.

Installing REVU

This section describes the installation of *REVU* version 2.3.1. This version is compatible with *RAMS* version 4.3.0 and *UTILS* version 1.0.0.

Downloading REVU

- Download the Unix gzipped tar file *revu-2.3.1.tar.gz* from the web address:

<http://www.aster.com/revu-2.3.1/revu-2.3.1.tar.gz>

Or, download *mrc-4.3.0.tar.gz*, which contains *REVU* version 2.3.1 (as well as the *UTILS* and *RAMS* distributions), from the web address:

<http://www.aster.com/rams-4.3.0/mrc-4.3.0.tar.gz>

- For first time installations:

1. Move the tar file into your rams root:

```
mv revu-2.3.1.tar.gz rams
```

2. Unpack the contents of the tar file:

```
gunzip < revu-2.3.1.tar.gz | tar -xf -
```

3. Upon completion of this step you should find updated versions of the *README_REVU* and *Copyright* files and updated code, make and input files in the *src*, *bin* and *run* directories in your rams root.

- For upgrade (patch) installations:

1. Make a temporary directory and move the tar file in to that directory:

```
mkdir tmp  
mv revu-2.3.1-patch.tar.gz tmp
```

2. Unpack the contents of the patch tar file:

```
gunzip < revu-2.3.1-patch.tar.gz | tar -xf -
```

3. Or, download patched modules individually from our website:

<http://www.aster.com/revu-2.3.1/patch.shtml>

4. Replace the modules in your distribution with those new versions contained in the patch, noting that since the source comes with read only permissions, you will need to modify the permissions of the module in your rams root *src* directory before replacing it with the patch version. For example:

```
chmod u+w <rams root>/src/post/2.3.1/common/vplt.f90
mv src/post/2.3.1/common/vplt.f90 <rams root>/src/post/2.3.1/common
```

5. You may then wish to remove read permissions from the new module

```
chmod u-w <rams root>/src/post/2.3.1/common/vplt.f90
```

Preparing to Compile REVU

Before you compile the software:

1. Go to the bin directory:

```
cd bin
```

2. Move the *Makefile-std* to *Makefile* (unless you are already using a non-standard version of this file, i.e. *Makefile-hypact*):

```
mv Makefile-std Makefile
```

3. ***Either***, if this is your first time using this file, move the *include.mk-mrc* to *include.mk* and modify it (with *vi*, for example) to suit your system:

```
mv include.mk-mrc include.mk
vi include.mk
```

include.mk now contains all the make environment variables that a user might need to change in order to compile the code on their machine. It is included in all of the make files using the include command.

FIRST TIME USERS MUST CUSTOMIZE THIS FILE BEFORE THEY ATTEMPTING TO MAKE

By default, *include.mk-mrc* does not have the NCAR Graphics libraries, parallel options, or the compiler flags for any machine type switched on.

Or, if you already have a copy of *include.mk* that you have modified to suit your system, check your *include.mk* with the new *include.mk-mrc* for software system changes in *include.mk-mrc* and make those changes to your *include.mk* (with *vi*, for example):

```
diff include.mk include.mk-mrc
vi include.mk
```

dep_revu.mk contains all the dependencies of the code. This means that if a file such as *vcomm2.h* is updated, all those modules which use this file will be recompiled (noting that *vcomm2.h* is not itself compiled, but included in whatever modules require it when they are compiled). All include (.h) and module (.mod) files are treated in the same way.

If the include command does not appear to work on your machine, try replacing the include command line in each of the make files with the contents of the include file. Alternatively, you can download "gnu make" and use that instead of your platform version. "GNU Make" is available from the URL:

<http://www.gnu.org/software/make/make.html>

All readme, make and dependency files are now distributed a version number appended. You can optionally remove this from the make file names (do not remove them from the dependency file names). For brevity we do not include the version numbers in the following instructions.

Compiling REVU

- To compile the software, use either:

```
Make -f Make.revu
```

or to use the global make file *Makefile*, enter:

```
make revu
```

This should produce the **REVU** archive libraries *revu-2.3.1.a*, the **REVU** executable *revu-2.3.1*, and a link from *revu* to *revu-2.3.1*.

or the global make file *Makefile* to update all the executables in your *bin* directory (uses the file *Makefile* which in turn points to the above individual make files):

```
make
```

This will ensure that all the executables are up to date, noting that there are a number of source code cross dependencies in the software system.

- If you need the dummy NCAR Graphics routines, also enter:

```
make ncargd
```

This should produce the NCAR Graphics dummy archive library *libncarg-1.0.0.a*. Note that you need to select an alternative NCAR Graphics library set if you do not wish to use the dummies library. NCAR now distributes the NCAR Graphics libraries and utilities used by MRC/*ASTeR free of charge under the GNU general public license from the URL:

<http://ngwww.ucar.edu/ng4.2/download>

- To recompile **REVU** when any of the **REVU**, **RAMS** library or **UTILS** library modules are updated, repeat the make command:

```
make -f Make.revu
```

or

```
make revu
```

Note that all the make commands will also run the shell script *check* which outputs some advice if it finds a version mismatch (it does not stop the make command from completing, although you may then get compilation errors). *check* compares the versions indicated in the *include.mk* file with the list of compatible versions in the *versions* file and the versions installed under the rams root directory on your machine. If the check script fails on your machine you can remove the "check" dependency from the "all" target in each of the make files.

Installing REVU

- The *Make.revu* "install" target will install (as a symbolic link) the executable to the *run* and *test* directories:

```
make -f Make.revu install
```

You can modify *Make.revu* if you wish to install to alternative locations. You can also manually link to the executables (does the same as above):

```
ln -s ../bin/revu .
```

On some machines you may need to make a physical copy of the executable in your test directory:

```
cp ../bin/revu-2.3.1 revu
```

Don't forget to update these when you remake in the bin directory otherwise you changes will not appear in your runs.

Cleaning the REVU Installation

- The *Make.revu* "clean" target will remove built components (compiled libraries and executable):

```
make -f Make.revu clean
```

This should remove the **REVU** archive library *revu-2.3.1.a*, the **REVU** executable *revu-2.3.1* and the link from *revu* to *revu-2.3.1*.

- *Makefile* also contains a "clean_all" target. Entering the following will result in all libraries and executables being removed (not just the **REVU** components):

```
make clean_all
```

Running REVU

This section describes the running of REVU version 2.3.1 for the test run posted at the URL:

<http://www.aster.com/revu-2.3.1/revu-test-2.3.1.tar.gz>

The Unix gzipped tar file contains those files required to run the simulation, view the results with NCAR Graphics, Vis5D or GrADS and extract data from the analysis files. The results of each of these and the list files containing the run time screen output are post on our web site at:

<http://www.aster.com/revu-2.3.1/test>

Because of their size, these have not been made available for downloading in a single archive file. If you wish to compare you output with the output created here (on our SGI Origin 200) you can download the specific files.

Preparing the Test Run.

1. Download the Unix gzipped tar file from the above URL:

```
revu-test-2.3.1.tar.gz
```

2. Unpack the contents of the tar file in your rams root directory:

```
gunzip < revu-test-2.3.1.tar.gz | tar -xf -
```

3. Go to the test directory and check its contents:

```
cd test
ls -l
```

This should produce the following:

README_REVV_TEST	Latest release notes
LANDMARKS	locations file for NCAR Graphics plots
REVV_IN-space-sigma-A	REVV_IN for sigma level 2 surface NCAR Graphics plots from the standard analysis files
REVV_IN-space-sigma-L	REVV_IN for sigma level 2 surface NCAR Graphics plots from the 'lite' analysis files
REVV_IN-space-pressure-A	REVV_IN for 700 mb pressure surface NCAR Graphics plots from the standard analysis files
REVV_IN-space-vert-A	REVV_IN for vertical slice NCAR Graphics plots from the standard analysis files
REVV_IN-space-tile-A	REVV_IN for land-cover surface NCAR Graphics plots from the standard analysis files
REVV_IN-v5d-sigma	REVV_IN for Vis5D output of the sigma levels
REVV_IN-v5d-cartesian	REVV_IN for Vis5D output of the Cartesian levels
REVV_IN-v5d-pressure	REVV_IN for Vis5D output of the pressure levels

REVU_IN-grib-sigma	REVU_IN for GRIB output of the sigma levels
REVU_IN-grib-cartesian	REVU_IN for GRIB output of the Cartesian levels
REVU_IN-grib-pressure	REVU_IN for GRIB output of the pressure levels
REVU_IN-grads-sigma	REVU_IN for GrADS output of the sigma levels
REVU_IN-grads-cartesian	REVU_IN for GrADS output of the Cartesian levels
REVU_IN-grads-pressure	REVU_IN for GrADS output of the pressure levels
REVU_IN-dump-sigma	REVU_IN for sigma level data extraction
REVU_IN-dump-cartesian	REVU_IN for Cartesian level data extraction
REVU_IN-dump-pressure	REVU_IN for pressure level data extraction
grab_in	locations file for data extraction (grab)
REVU_IN-grab	REVU_IN for point data extraction
ralph_in	locations file for data extraction (ralph)
REVU_IN-ralph	REVU_IN for point extraction
revu-test	script containing the command for the REVU test

If you have not put your rams root bin directory in your path, go to your bin directory and install the executables in your test directory (see above), or use full or relative path references in the following commands.

Viewing with NCAR Graphics

Run REVU for the example input namelist files:

```
<rams path>/revu -f REVU_IN-space-sigma-A
<rams path>/revu -f REVU_IN-space-sigma-L
<rams path>/revu -f REVU_IN-space-pressure-A
<rams path>/revu -f REVU_IN-space-vert-A
<rams path>/revu -f REVU_IN-space-tile-A
```

Each should produce the NCAR Graphics *gmeta* files:

```
gmeta-space-sigma-A
gmeta-space-sigma-L
gmeta-space-pressure-A
gmeta-space-vert-A
gmeta-space-tile-A
```

Each time you run **REVU** you will overwrite the *gmeta* file. If you do not have NCAR Graphics, or compiled without it, the *gmeta* file would not be produced, even though **REVU** appears to run to a normal completion.

To view a "gmeta" file, run:

```
idt gmeta
```

NCAR now distributes the NCAR Graphics libraries and utilities used by MRC/*ASTeR free of charge under the GNU general public license from the URL:

<http://ngwww.ucar.edu/ng4.2/download>

The NCAR Graphics 'SPACE' runs will use the *LANDMARKS* file (if you have one) to chart locations on your horizontal slab plots.

If you wish to compare your output with ours, the *gmeta* files and output listings created here on our SGI Origin 200 are posted at:

<http://www.aster.com/revu-2.3.1/test>

Viewing with Vis5D

Run REVU for the example input namelist files:

```
<rams path>/revu -f REVU_IN-v5d-sigma
<rams path>/revu -f REVU_IN-v5d-cartesian
<rams path>/revu -f REVU_IN-v5d-pressure
```

This should produce the Vis5D files from the standard analysis files:

```
a-AS-2000-07-30-120000-g1.v5d
a-AS-2000-07-30-120000-g2.v5d
a-AC-2000-07-30-120000-g1.v5d
a-AC-2000-07-30-120000-g2.v5d
a-AP-2000-07-30-120000-g1.v5d
a-AP-2000-07-30-120000-g2.v5d
```

Note the following filename conventions:

```
a-A  is the file name prefix of the analysis files (excluding path)
S    indicates that the file is on sigma surfaces
C    indicates that the file is on Cartesian surfaces
P    indicates that the file is on pressure surfaces
```

and the date indicates the beginning of the RAMS simulation.

To view the Vis5D files, run (for example):

```
<Vis5D path>/vis5d <options> v5d-c_2000-07-30-1200.g1
```

To do this you need to download and install Vis5D (free):

<http://www.ssec.wisc.edu/~billh/vis5d.html>

If you wish to compare your output with ours, the Vis5D files and output listings created here on our SGI Origin 200 are posted at:

<http://www.aster.com/revu-2.3.1/test>

Viewing with GrADS

Run REVU for the example input namelist files:

```
<rams path>/revu -f REVU_IN-grads-sigma  
<rams path>/revu -f REVU_IN-grads-cartesian  
<rams path>/revu -f REVU_IN-grads-pressure
```

This should produce the GrADS files from the standard analysis files:

```
a-AS-2000-07-30-120000-g1.ctl  
a-AS-2000-07-30-120000-g1.gra  
a-AS-2000-07-30-120000-g2.ctl  
a-AS-2000-07-30-120000-g2.gra  
a-AC-2000-07-30-120000-g1.ctl  
a-AC-2000-07-30-120000-g1.gra  
a-AC-2000-07-30-120000-g2.ctl  
a-AC-2000-07-30-120000-g2.gra  
a-AP-2000-07-30-120000-g1.ctl  
a-AP-2000-07-30-120000-g1.gra  
a-AP-2000-07-30-120000-g2.ctl  
a-AP-2000-07-30-120000-g2.gra
```

To view the files you need to download and install GrADS (free):

<http://grads.iqes.org/grads>

If you wish to compare your output with ours, the GrADS files and output listings created here on our SGI Origin 200 are posted at:

<http://www.aster.com/revu-2.3.1/test>

Output to GRIB

Run REVU for the example input namelist files:

```
<rams path>/revu -f REVU_IN-grib-sigma  
<rams path>/revu -f REVU_IN-grib-cartesian  
<rams path>/revu -f REVU_IN-grib-pressure
```

This should produce the GRIB files from the standard analysis files:

```
a-AC-2000-07-30-120000-g1.grb  
a-AC-2000-07-30-120000-g2.grb  
a-AP-2000-07-30-120000-g1.grb  
a-AP-2000-07-30-120000-g2.grb  
a-AS-2000-07-30-120000-g1.grb  
a-AS-2000-07-30-120000-g2.grb
```

If you wish to compare your output with ours, the GRIB files and output listings created here on our SGI Origin 200 are posted at:

<http://www.aster.com/revu-2.3.1/test>

Dumping 2 and 3-D Fields

Extracting data from the analysis file with the DUMP option writes full 2 and 3-D analysis file fields to an ASCII file.

Run REVU for the example input namelist files:

```
<rams path>/revu -f REVU_IN-dump-sigma
<rams path>/revu -f REVU_IN-dump-cartesian
<rams path>/revu -f REVU_IN-dump-pressure
```

This should produce the dumped file from the standard analysis files:

```
a-AS-2000-07-30-120000-g1.dmp
a-AS-2000-07-30-120000-g2.dmp
a-AC-2000-07-30-120000-g1.dmp
a-AC-2000-07-30-120000-g2.dmp
a-AP-2000-07-30-120000-g1.dmp
a-AP-2000-07-30-120000-g2.dmp
```

If you wish to compare your output with ours, the dump files and output listings created here on our SGI Origin 200 are posted at:

<http://www.aster.com/revu-2.3.1/test>

Note that the user can modify the format of the output by modifying the code in:

```
./src/post/2.3.1/common/dumpout.f90
```

Grabbing Point Data

Extracting data from the analysis file with the GRAB option interpolates the analysis file data to the locations indicated by the *grab_in* file.

Run REVU for the example input namelist files:

```
<rams path>/revu -f REVU_IN-grab
<rams path>/revu -f REVU_IN-ralph
```

The GRAB run obtains the locations to get data for from the *grab_in* file described above (*ralph_in* for the RALPH2 output option).

This should produce the grab files from the standard analysis files:

```
a-AS-2000-07-30-120000-g0.gbr
dp-s-a-AS-2000-07-30-1200 (RALPH2)
```

If you wish to compare your output with ours, the grab files and output listings created here on our SGI Origin 200 are posted at:

<http://www.aster.com/revu-2.3.1/test>

Known REVU Bugs

The following are know problems with running *REVV*:

1. Streamlines do not work for more than one frame. This is a long-time bug for which we cannot find an easy solution.
2. Soil parameters are not output correctly. This problem is slated for attention in the near future.
3. Turbulence with vectors and relative vorticity as **CFRAME_B** options are not currently working. This problem is slated for attention in the near future.
4. NCAR's freely distributed utility "idt" does not work. If you have an old version "idt", keep and use it when and if you install the free version.

Reporting Bugs in REVU

Before you seek help:

1. Ensure that you have the latest version of the software. Check for patches at:

<http://www.aster.com/rams-4.3.0/update.shtml> (RAMS)
<http://www.aster.com/revu-2.3.1/update.shtml> (REVV)
<http://www.aster.com/utils-1.0.0/update.shtml> (UTILS)

Notification of new patches will be sent to the rams-users mailing list and are available for viewing on the Announce archive:

<http://www.aster.com/lists/announce>

You can apply to join the rams-users mailing list at...

<http://www.aster.com/lists/index.shtml>

2. If you are still having problems:

- Note your machine type, operating system (and version), compiler (and version if possible).
- Copy the screen output to a file. Try using the script command:

```
script -a <file> (to start the script shell and direct the output)
rams           (run programs)
exit           (exit script shell)
```

Or redirect both standard output and error to a file. For example, running rams:

```
rams 1>&2 <file> (Korn and Bash shells)
rams >>& <file> (C shell)
```

- Note what configuration or make files were used.
- Send to all of this plus any other supporting information to:

rams-support@aster.com

Future REVU Development

Future upgrades may include:

- Splitting of *REVU* into its two main components – graphics and data reformatting / extraction.
- Ability to open and operate on more than one list of files (e.g. view different runs or compute difference fields).
- Reorganization of the memory structure and addition of a buffer that that (within the buffer size), the analysis files are not re-read for information that has already been read.
- Color for *HYPACT* particles by age, source and species, elevation or any other input parameter.
- Inclusion of a *HYPACT* concentration grid for more detailed viewing of inferred Lagrangian particle concentrations.
- Completion and distribution of the *REVU* GUI, *RINGI*.

Further development ideas and collaborative development are welcome and can be directed to Marty at bell@aster.com.