SCAN: System for Convection Analysis and Nowcasting

Guide for Users

version **OB8.3**

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Introduction ↵

The System for Convection Analysis and Nowcasting (SCAN) is an integrated suite of multi-sensor applications which detects, analyzes, and monitors convection and generates short-term probabilistic forecast and warning guidance for severe weather automatically within AWIPS. SCAN will provide forecasters with accurate, timely, and consistent severe weather guidance and supplement forecaster event monitoring with multi-sensor, automated event monitoring. The intended benefits are:

- ☼ Longer lead times on warned events
- ☼ Fewer missed events
- ☼ Increased forecaster situational awareness
- ☼ Reduced forecaster fatigue during warning situations

Service Backup

SCAN was initially designed to conduct its analyses using data from only those radars defined as dedicated in AWIPS (ie: had a dedicated hard-line to the radar). Now, SCAN is designed to attempt to conduct its analyses using data from those radars whose products get ingested into AWIPS via the SBN, as well as the dedicated radars. This will effectively cover Service Backup CWAs. You will see that the SCAN menu looks different, but the organization should be intuitive.

What's New ↵

- ▸ Nothing new in OB8.3.

Requesting the SCAN Suite ↵

On the D2D, there is a menu entitled "SCAN". Under the SCAN menu will be sections for each dedicated radar. Each of these radar sections has the available SCAN and FFMP (Flash Flood Monitoring and Prediction) products.

Selecting the SCAN Suite will load: the Storm Cell Identifications (white, yellow, and red), the Site Storm Threat, the SCAN Storm Track, and the Storm Cell Display, which is the cell table's link to the D2D. Also, the SCAN loading window will appear while the SCAN elements are loading. Figure 1 shows the SCAN Storm Cell Table.

The D2D ↵

Once the SCAN Suite is loaded, on the D2D you will see identified storm cells, local sites, and storm tracks. The Storm Cell Table will appear in front of the D2D. The storm cell

identification symbols are a hexagon, speed/direction arrow, and an alphanumeric identifier placed outside the upper left part of the hexagon.

The SCAN Storm Cell Table Constituents: ↩

See Figure 1.

The Menu/Information Bar ↩

Contains the File, Configurations, Rank, and Attributes menus, as well as information regarding alarms, the currently utilized configuration file name, and the valid time of the SCAN Storm Cell Table. The Menu/Information bar also contains the option buttons for Link to Frame (to link the table time with the D2D display time), CWA filter, Unwarned (see the Unwarned Alarm section below), Vert (to render the table vertically), and Tips (to provide helpful tips about table functions). See Figure 5 for an example of the vertical table.

The File Menu

The File Menu options are for controlling the configuration files. The current configuration file is displayed on the menu button. This file indicates which configuration file (also known as the Cell Display Parameters file or CDP file) was last used in the cell table and that is being used by the D2D Storm Cell ID Display. The File Menu options are:

Retrieve Default CELL Configuration	Retrieves and uses the default configuration file.
Retrieve CELL Configuration . . .	Retrieves and uses a specified configuration file.
Save All Configurations	Saves the current configuration files for all three types (cell, mesocyclone, and TVS).
Save CELL Configuration	Saves only the cell configuration file.
Save CELL Configuration As . . .	Saves the cell configuration file to a new file, defined by the user.

The Configurations Menu

The Configurations Menu choices are for setting up the D2D display, changing the alarm parameters, and controlling the Trend functions. The Configurations Menu options are:

D2D Display. . .	Produces the Storm Cell Identification Display (SCID) window (see Figure 2). The SCID window allows the user to control how the D2D displays the storm cell identifications.
Alarm Thresholds. . .	Produces the Alarm Thresholds window which allows the user to define the rate-of-change limit for each applicable storm cell attribute. If the attribute's value changes **more** than this defined limit from one volume scan to the next, an alarm will be issued. The user can also define absolute alarms for the storm cell attributes. If a storm cell attribute meets or exceeds this value, an

	alarm is issued. (See Figure 3.)
Trend Sets➤	Produces selections that allow the user to choose which of the defined trend sets will be used as the active trend set as well as create and edit other trend sets. The active trend set is that which is accessible by the D2D and by the body of the cell table (see the "Table Body" section).
Alarm Time Setup. . .	Produces the 'New' Alarm Time Setup window. Along with rate-of-change alarms, SCAN will also issue a "New" alarm if an event (cell, mesocyclone, or TVS) has been identified after a quiet period of no identifications. This window allows the user to define that quiet period in minutes.
Box Colors. . .	Produces the Attribute Color Threshold (ACT) window. The ACT window allows the user to define value ranges of each applicable storm cell attribute. These value ranges are intended to reflect the degree of strength of the storm cell, from white (weak) to yellow (moderate) to red (strong). These colors will be used when rendering the data on the D2D, in the table body, and in the time trends. Note: The SCID window also provides this ability (see "D2D Display..." above).

The Rank Menu
Allows the user to choose the storm cell attribute by which the data in the table body will be sorted. The attribute that is currently being used for ranking is displayed on this button. Refer to Appendix A to see which attributes can be used for ranking.

The Attributes Menu
Allows the user to choose which of the available storm cell attributes will appear in the storm cell table. Refer to Appendix A for information about all available attributes.

◙ Link to Frame
Indicates whether the valid time in the SCAN Storm Cell Table will always match the time in the D2D frame. If this button is activated and the user changes the frame in the D2D, the cell table will update to match the data shown on the D2D. If this is off, the data in the cell table will represent the *most recent available inventory time*.

◙ CWA Filter
A toggle that allows you to turn CWA filtering on/off. When on, the storm cell listing in the table will exclude any storm cells that have been identified outside your CWA. This will also exclude such storm cells from rate-of-change and absolute alarm consideration.

◙ Unwarned
When you click this on, you will be presented with another GUI, which allows you to define several attribute thresholds. (See Figure 6.) If these thresholds are met or exceeded by a storm

cell in a certain county, and that county does **not** have an active warning of the type specified, you will be notified by a change in the appearance of the county cell attribute in the Storm Cell Table. The background of the county attribute will turn black and the text will turn either yellow (for Severe Weather warnings) or magenta (for Tornado warnings). By default, this monitoring is turned off, as its usefulness is still being evaluated. Please see the Unwarned section in the Sub-GUIs in Detail, below.

Vert

Indicates whether or not the table is vertically rendered. If this button is activated, the table orientation will change from horizontal (default) to vertical. (See Figure 5).

Tips

Indicates whether or not the Tips functionality is turned on. When this button is activated and the mouse cursor is focused over "clickable" widgets in the table, a pop-up text box will appear next to the cursor containing useful information on the available features of that particular widget.

Alarm Button

If a Rate-of-Change Alarm Threshold is surpassed for an applicable attribute from one volume scan to the next or if the Absolute Alarm value is met or exceeded, an alarm is issued. When an alarm is issued, a blinking alarm button will appear. The appropriate grid box in the table body will also blink and an audible alarm will sound. Button-3 clicking on the Alarm button will toggle the audible alarm. Clicking on the Alarm button will produce the Alarm Information window (see Figure 1), which presents a listing of all alarms and differentiates between rate-of-change and absolute. ("ROC" = Rate-of-Change and "Abs" = Absolute.)

Valid Time

This displays the UTC time for which the data in the cell table is valid.

The Attribute Title Row ↩

Shows what attributes are currently selected for viewing. These represent the attributes selected from the Attributes menu described above.

Ranking By Attribute

Clicking on applicable attribute titles will sort the table data according to that attribute and change the color fo the background of the attribute title to light purple, signifying that it is currently being used for ranking. Refer to Appendix A to see for which attributes the table can be ranked.

Changing the Attribute Color Thresholds

Button-3 clicking on applicable attribute titles will bring up the Attribute Color Threshold (ACT) window, as described in the "Configurations Menu" section above. Refer to Appendix A to see which attributes can be multi-colored.

Launching the TVS and Mesocyclone Tables

Button-3 clicking on the 'tvs' or 'meso' attribute titles will produce the SCAN Tornado Vortex Signature (TVS) Table and the SCAN Mesocyclone (MESO) Table, respectively. As of OB6, SCAN uses the output from the MDA algorithm (and not the older meso algorithm), and thus provides numeric strength ranks for the meso circulations. The result is, the meso columns is now called mdaSR and can be ranked vie color thresholds. Normally, a Button-3 click on the column title will provide the ACT window, but this has been overridden with the MESO Table launch for the mdaSR column.

The Table Body ↩

Displays the storm cell information, including such attributes as: alphanumeric identifier, location (azm/range, lat/lon, state/county), circulation, and various severe weather probabilities and physical storm characteristics. If no storm cells have been identified, the message "NO CELL DETECTIONS" will appear in place of the table. The values for the various storm cell attributes are displayed in the table body and color coded (when applicable) according to the attribute color thresholds defined in the ACT or SCID windows. Refer to Appendix A for a list of all storm cell attributes available through SCAN.

Producing a Time Trend

Clicking on any applicable grid box will produce a single time trend of a particular attribute of a particular identified storm cell. Refer to Appendix A to see for which attributes time trends are available. See Figure 1 for an example of a single time trend.

Producing a Trend Set

Button-3 clicking on a storm identifier in the 'ident' column will produce an 'active' trend set for that particular storm cell. The 'active' trend set can be defined by selecting the Trend Set option under the Configurations menu (see the section on trend sets in "SCAN Storm Cell Table Sub-GUIs in Detail" below).

Inspecting a Storm Cell

Clicking on an identifier in the 'ident' column will cause the D2D to zoom-and-recenter on that particular storm cell. This also fills the Inspection Row with data and highlights the identifier in the 'ident' column. The Inspection Row can be seen in Figure 1.

The Inspection Row ↩

Duplicates the row in the table body for the storm cell that was last inspected (see the section on storm inspection under the "Table Body" topic for instructions on how to inspect a storm cell). This row emphasizes the data for the identified storm cell last inspected via the zoom-and-recenter method. The individual grid boxes in the Inspection Row have the same capabilities as the grid boxes in the table body, except clicking on the identifier box will zoom the D2D back out to the zoom level defined on the D2D menu bar. See Figure 1.

Producing a Time Trend

See information under the Table Body section above.

Producing a Trend Set
See information under the Table Body section above.

Zooming Back Out
Clicking on the identifier in the 'ident' column will cause the D2D to zoom back out.

SCAN Storm Cell Table Sub-GUIs in Detail ↩

Storm Cell Identification Display (SCID)
Launched from the Configurations menu. The Storm Cell Identification Display (SCID) window allows the user to control the appearance of the storm cell identifiers on the D2D and define the zoom factor. See Figure 2.

The Zoom Factor:	This number represents the magnitude of the zoom used when zooming and re-centering is done *from the table* (see the section on storm inspection in the Table Body section). Clicking the desired radio button will change the zoom factor. A larger number represents greater magnification. Either the "OK" or "Apply" button must be pressed for a change in Zoom Factor to take effect. Note: this Zoom Factor does **not** affect the D2D's zooming abilities. Only the zoom-and-recenter functionality of the SCAN table when zooming and re-centering on a specific cell can be affected by this Zoom Factor.
Symbols:	This portion of the window contains the available options for representing a cell identification on the D2D. These are not mutually exclusive choices. They can be chosen in any combination
Hexagons:	are used to identify the location of a cell AND give a graphical indication of the strength of a chosen attribute of the cell. The available attributes can be viewed and selected by clicking on the menu button with the attribute name on it. This attribute's column title button will have a dark green background in the Storm Cell table to indicate its status as the current Radius Interpolation variable. The Radius Range slider control allows the user to choose the size of the hexagon. The low slider bar value corresponds to the low slider bar value on the Radius Interpolation slider control. The high slider bar value corresponds to the high slider bar value on the Radius Interpolation slider control. Values in-between these low and high values will be interpolated and the hexagon size adjusted accordingly.

Arrows:	are used to represent the speed and direction of a cell. The length of the arrow is proportional to the speed of the cell. If the Full Shaft option is on, the entire length of the arrow represents the speed of the cell. If the Full Shaft option is off, only the portion of the arrow *outside* the hexagon (if the Hexagon identifier is being used) represents the speed of the cell. This is done to avoid the illusion of greater cell speed for cells with small hexagon identifiers compared to cells with large hexagon identifiers. If the hexagon identifier is turned off, it is recommended that the Full Shaft option is turned on.
Cell Identifier Clutter Control:	In the event that there are enough identified cells to clutter the screen, the user can adjust the attribute color thresholds to eliminate some of the less significant cell identifications from the D2D display. By adjusting the slider control bars, the user can choose the attribute thresholds which will determine what color the cell identifiers will be on the D2D display and in the Table Body (white, yellow, and red). The particular attribute used for controlling clutter is chosen by clicking the menu button with an attribute name on it. The attribute's column title button will have bright green text to indicate its status as the current Clutter Control variable. Note: If the storm cells do not reach the lowest threshold for the Clutter Control Variable, the cell will be rendered as a small white 'x' on the D2D.
"OK"	Accept the changes made and close the window.
"Apply"	Accept the changes made.
"Cancel"	Discard changes and close the window.

Trend Window ↵

See the "Table Body" section above for instructions to produce a time trend window. See Figure 1 and Figure 3 for examples. Whether the trend is one of several or the only trend in the Trend window, each time trend graph will have the same appearance. The x-axis represents time, labeled with hhmm UTC time. The y-axis represents the attribute, with pre-defined labels. The name of the attribute and its units are above the y-axis labels. (Note: If the value of the attribute for any plot point exceeds the pre-defined maximum axis value, the y-axis will be automatically re-defined and the y-axis labels will be highlighted in pink.) The plot points will be colored according to the defined attribute color threshold values for the selected attribute.

Changing To a Different	Clicking on the 2-digit alphanumeric identifier above the graph

Storm Cell:	will bring up a menu of all selectable cells. Choosing a different cell will cause the trend window to render the new cell's trend information.
Changing To a Different Attribute:	Clicking on the attribute button above the graph will bring up a menu of all selectable attributes. Choosing a different attribute will cause the trend window to render the cell's trend information for that attribute.
"Close"	Clicking will close the trend window.

Attribute Color Threshold (ACT) Window ↵

Launched from the Configurations menu or the Attribute Title Row. The user can edit the color-coded strength values for any of the storm cell attributes displayed in the Attribute Title Row. (See Figure 1.)

"Attribute:"	The user can switch to a different storm cell attribute. The units of the attribute will also appear on this button.
"Upper:", "Mid:", "Lower:"	The strength thresholds, corresponding to the attribute values that meet or exceed these threshold values.
"OK"	The user accepts the changes just made and closes the window.
"Cancel"	The user can discard the changes just made.

New Alarm Time Setup ↵

Launched from the Configurations menu. This window allows the user to set the time thresholds for determining when SCAN New Alarms are issued. "New" SCAN alarms are issued with the occurrence of activity after a quiet period equal to this user-defined value of minutes. This value must not exceed 999999999.

"Cell:"	The user can enter the time period (in minutes) that represents the amount of quiet time needed (no cell activity) before which a 'new' alarm is issued with the onset of cell activity.
"Meso:"	The user can enter the time period (in minutes) that represents the amount of quiet time needed (no mesocyclone activity) before which a 'new' alarm is issued with the onset of mesocyclone activity.
"TVS:"	The user can enter the time period (in minutes) that represents the amount of quiet time needed (no TVS activity) before which a

	'new' alarm is issued with the onset of TVS activity.
"DMD"	The user can enter the time period (in minutes) that represents the amount of quiet time needed (no DMD activity of sufficient strength) before which a 'new' alarm is issued with the onset of DMD activity. Sufficient strength means of Strength Rank 4 or greater.
"OK"	The user accepts the alarm time thresholds.
"Cancel"	The user can discard the changes just made.

Rate-of-change and Absolute Alarm Threshold Window ↩

Launched from the Configurations menu. This window allows the user to set the thresholds for determining when SCAN rate-of-change and absolute alarms are issued. (See Figure 3.)

"Attribute:"	The user can select any applicable storm cell attribute.
"Alarm Choice"	The user can choose to set the threshold for either the Rate-of-Change or Absolute Alarms. The text to the left of the entry box will depend on this choice.
"Rate of Change:" or "Absolute Value"	The user can define the number of units the value of a storm cell's attribute must increase from one volume scan to the next in order to trigger an alarm or simply the absolute value of a storm cell's attribute must meet or exceed in order to trigger an alarm. The units are also displayed here. Note for Rate-of-Change Alarms: the value of the attribute must increase at least *one unit more* than the value entered here in order for an alarm to be issued.
"OK"	The user accepts the alarm conditions.
"Bell"	The user can toggle the audible alarm.

Alarm Information Window ↩

Launched by clicking on the Alarm button. See Figure 1 for an example. The buttons in the window are labeled with the storm cell alphanumeric identifier and the storm cell attribute for which the alarm has been issued, differentiating between Rate-of-Change and Absolute Alarms with "ROC" and "Abs", respectively.

Investigating Alarms:	Clicking on an individual alarm button in the Alarm Information window will bring up a trend window for that cell and attribute that caused the alarm, cause the D2D display to zoom and re-

	center on that cell, and display the cell's table data in the Inspection Row. Once all alarms have been investigated, the Alarm Information window will close.
"Clear All Alarms"	Clear all active alarms without inspection.

Edit/Create Trend Set Window ↵

Launched from the Configurations menu/Trend Sets selection. See Figure 3. The user can edit an existing trend set's defined attributes, create a new trend set, or delete an unwanted trend set by following the directions in this window. The Active Trend Set, which is the trend set created from the D2D (see below) and the table body (see the "Table Body" section above), can also be defined.

"Add Attribute"	Allows the user to add an attribute to an existing trend set.
"Remove Attribute"	Allows the user to remove an attribute from an existing trend set.
"Select Trend"	Allows the user to select a defined trend set he/she wishes to edit/delete.
"Remove Trend"	Allows the user to delete a defined trend set.
"OK"	The user accepts the changes just made and closes the window.
"Cancel"	The user can discard the changes just made and close the window.

UnWarned Alarm Control GUI ↵

Launched from the "Unwarned" toggle button. See Figure 6. In this GUI you can choose to monitor Severe Weather and/or Tornado warnings and choose what storm cell attributes and thresholds to use for monitoring. When these warnings are monitored, SCAN will identify those storm cells whose attributes have met or exceeded the values the user has chosen. SCAN will then obtain a listing of all active Severe Weather and Tornado warnings in the CWA and see if any of the storm cells that have met or exceeded the user-defined thresholds exist in a county that does **not** currently have an active warning. If no warning is found, the colors of the storm cell identifier for that storm cell in the Storm Cell Table will change. The background will become black and the letters will become yellow and magenta, for Severe Weather and Tornado warnings, respectively. Note that if more than one attribute is chosen for a given warning type, meeting/exceeding either of the attributes will trigger this alert.

The SCAN Mesocyclone Table Constituents: ↵

The Menu/Information Bar

Contains the File, Configurations, Rank, and Attributes menus, as well as information regarding alarms, the currently utilized configuration file name, and the valid time of the SCAN

Mesocyclone Table. The Menu/Information bar also contains the option buttons for Vert (to render the table vertically) and Tips (to provide helpful tips about table functions).

The File Menu

The File Menu options are for controlling the configuration files. The current configuration file is displayed on the menu button. This file indicates which configuration file (also known as the Mesocyclone Display Parameters file or MDP file) was last used in the meso table. The File Menu options are:

Retrieve Default MESO Configuration	Retrieves and uses the default configuration file.
Retrieve MESO Configuration...	Retrieves and uses a specified configuration file.
Save MESO Configuration	Saves only the mesocyclone configuration file.
Save MESO Configuration As...	Saves the mesocyclone configuration file to a new file, defined by the user.
Close MESO Table	Closes the mesocyclone table until it is activated again from the SCAN Storm Cell Table.

The Configurations Menu

The Configurations Menu choices are for changing the alarm parameters and controlling the display of the Mesocyclone table. The Configurations Menu options are:

Alarm Time Setup. . .	Produces the Alarm Time Setup window. SCAN will issue a "New" alarm if an event (cell, mesocyclone, or TVS) has been identified after a quiet period of no identifications. This window allows the user to define that quiet period in minutes.
Box Colors. . .	Produces the Attribute Color Threshold (ACT) window. The ACT window allows the user to define value ranges of each applicable mesocyclone attribute. These value ranges are intended to reflect the degree of strength of the mesocyclone, from white (weak) to yellow (moderate) to red (strong). These colors will be used when rendering the data on the D2D, in the table body, and in the time trends.

The Rank Menu

Allows the user to choose the mesocyclone attribute by which the data in the table body will be sorted. The attribute that is currently being used for ranking will be displayed on this button. Refer to Appendix B to see which attributes can be used for ranking.

The Attributes Menu

Allows the user to choose which of the available mesocyclone attributes will appear in the

mesocyclone table. Refer to Appendix B for information about all available attributes.

Vert
Indicates whether or not the table is vertically rendered. If this button is activated, the table orientation will change from horizontal (default) to vertical.

Tips
Indicates whether or not the Tips functionality is turned on. When this button is activated and the mouse cursor is focused over "clickable" widgets in the table, a pop-up box will appear next to the cursor containing useful information on the available features of that particular widget.

Valid Time
This displays the UTC time for which the data in the mesocyclone table is valid.

The Attribute Title Row ↩

Shows (in black) what attributes are currently selected for viewing. These represent the attributes selected from the Attributes menu described above.

Ranking By Attribute
Clicking on applicable attribute titles will sort the table data according to that attribute. Refer to Appendix B to see for which attributes the mesocyclone table can be ranked.

Changing the Attribute Color Thresholds
Button-3 clicking on applicable attribute titles will bring up the Attribute Color Threshold (ACT) window, as described in the Configurations menu section above. Refer to Appendix B to see which attributes can be multi-colored in the mesocyclone table.

The Table Body ↩

Displays the mesocyclone information, including such attributes as: storm cell ID, mesocyclone ID, location (azm/range, lat/lon, state/county), and various physical characteristics of the mesocyclone. If no mesocyclones have been identified, the message "NO MESO DETECTIONS" will appear in place of the table. The values for the various mesocyclone attributes are displayed in the table body. Refer to Appendix B for a list of all mesocyclone attributes available through SCAN.

Inspecting a Mesocyclone
Clicking on an identifier in the 'ident' column will cause the D2D to zoom-and-recenter on that particular mesocyclone. This also fills the Inspection Row with data and highlights the identifier in the 'ident' column.

The Inspection Row ↩

Duplicates the row in the table body for the mesocyclone that was last inspected (see the "Table

Body" section above for instructions on how to inspect a mesocyclone). This row emphasizes the data for the identified mesocyclone last inspected via the zoom-and-recenter method. The individual grid boxes in the Inspection Row have the same capabilities as the grid boxes in the table body, except clicking on the identifier box will zoom the D2D back out to the zoom level defined on the D2D menu bar.

Zooming Back Out
Clicking on the identifier in the 'ident' column will cause the D2D to zoom back out.

SCAN Mesocyclone Table Sub-GUIs in Detail

New Alarm Time Setup Window
Same as for the cell table (see above).

Attribute Color Threshold (ACT) Window
Same as for the cell table (see above).

The SCAN TVS Table Constituents: ↩

The Menu/Information Bar

Contains the File, Configurations, Rank, and Attributes menus, as well as information regarding alarms, the currently utilized configuration file name, and the valid time of the SCAN TVS Table. The Menu/Information bar also contains the option buttons for Vert (to render the table vertically) and Tips (to provide helpful tips about table functions).

The File Menu
The File Menu options are for controlling the configuration files. The current configuration file is displayed on the menu button. This file indicates which configuration file (also known as the TVS Display Parameters file or TDP file) was last used in the TVS table. The File Menu options are:

Retrieve Default TVS Configuration	Retrieves and uses the default configuration file.
Retrieve TVS Configuration...	Retrieves and uses a specified configuration file.
Save TVS Configuration	Saves only the TVS configuration file.
Save TVS Configuration As...	Saves the TVS configuration file to a new file, defined by the user.
Close TVS Table	Closes the TVS table until it is activated again from the SCAN Storm Cell Table.

The Configurations Menu

The Configurations Menu choices are for changing the alarm parameters and controlling the display of the TVS table. The Configurations Menu options are:

Alarm Time Setup. . .	Produces the Alarm Time Setup window. SCAN will issue a 'New' alarm if an event (cell, mesocyclone, or TVS) has been identified after a quiet period of no identifications. This window allows the user to define that quiet period in minutes.
Box Colors. . .	Produces the Attribute Color Threshold (ACT) window. The ACT window allows the user to define value ranges of each applicable TVS attribute. These value ranges are intended to reflect the degree of strength of the TVS, from white (weak) to yellow (moderate) to red (strong). These colors will be used when rendering the data on the D2D, in the table body, and in the time trends.

The Rank Menu
Allows the user to choose the TVS attribute by which the data in the table body will be sorted. The attribute that is currently being used for ranking will be displayed on this button. Refer to Appendix C to see which attributes can be used for ranking.

The Attributes Menu
Allows the user to choose which of the available TVS attributes will appear in the TVS table. Refer to Appendix C for information about all available attributes.

Vert
Indicates whether or not the table is vertically rendered. If this button is activated, the table orientation will change from horizontal (default) to vertical.

Tips
Indicates whether or not the Tips functionality is turned on. When this button is activated and the mouse cursor is focused over "clickable" widgets in the table, a pop-up box will appear next to the cursor containing useful information on the available features of that particular widget.

Valid Time
This displays the UTC time for which the data in the TVS table is valid.

The Attribute Title Row ↵

Shows (in black) what attributes are currently selected for viewing. These represent the attributes selected from the Attributes menu described above.

Ranking By Attribute
Clicking on applicable attribute titles will sort the table data according to that attribute. Refer to Appendix C to see for which attributes the TVS table can be ranked.

Changing the Attribute Color Thresholds
Button-3 clicking on applicable attribute titles will bring up the Attribute Color Threshold (ACT) window, as described in the Configurations menu section above. Refer to Appendix C to see which attributes can be multi-colored in the TVS table.

The Table Body ↩

Displays the TVS information, including such attributes as: storm cell ID, TVS ID, location (azm/range, lat/lon, state/county), and various physical characteristics of the TVS. If no TVSs have been identified, the message "NO TVS DETECTIONS" will appear in place of the table. The values for the various TVS attributes are displayed in the table body. Refer to Appendix C for a list of all TVS attributes available through SCAN.

Inspecting a TVS
Clicking on an identifier in the 'ident' column will cause the D2D to zoom-and-recenter on that particular TVS. This also fills the Inspection Row with data and highlights the identifier in the 'ident' column.

The Inspection Row ↩

Duplicates the row in the table body for the TVS that was last inspected (see the "Table Body" section above for instructions on how to inspect a TVS). This row emphasizes the data for the identified TVS last inspected via the zoom-and-recenter method. The individual grid boxes in the Inspection Row have the same capabilities as the grid boxes in the table body, except clicking on the identifier box will zoom the D2D back out to the zoom level defined on the D2D menu bar. See Figure 1.

Zooming Back Out
Clicking on the identifier in the 'ident' column will cause the D2D to zoom back out.

SCAN TVS Table Sub-GUIs in Detail

New Alarm Time Setup Window
Same as for the cell table (see above).

Attribute Color Threshold (ACT) Window
Same as for the cell table (see above).

SCAN Hail Diagnostics ↩

SCAN now produces new hail diagnostic grids for display in the D2D. For OB6, these grids include several VIL Density products. Beyond OB6, additional multiple-sensor hail diagnostic grids will be made available. Warning decision making guidance will be made available from

the WDTB as these new products are released to the field. The currently available products are:

- VIL Density
  VIL Density is simply the VIL divided by the Echo Top, as described by Amburn and Wolf (1997). This is a 4 km Cartesian grid that is computed by dividing the 4km VIL product by the 4km ET product.

- Digital VIL Density
  This is computed similar to the above product, but using the higher resolution "digital" DVL and EET products. The DVL and EET polar grids are resampled to 1 km Cartesian grids prior to the VIL Density computation. The resulting Enhanced VIL Density products is a 1 km Cartesian grid.

- Enhanced Digital VIL Density
  As mentioned by Amburn and Wolf (1997) and others, occasionally the grid containing the largest Echo Top value is not the same as the grid containing the largest VIL value. This is due to the fact that storm cores can be tilted due to strong deep layer shear or, can be "apparently" tilted due to fast storm motion. The latter condition is the result of successive sampling of the storm at higher elevations as the storm moves rapidly through the grid.

  One way to rectify this condition is to apply morphological dilation to the EET grid prior to the calculation of VIL Density. Dilation essentially increases the size of grid maxima, isotropically "spreading" out the maximum several grid cells surrounding the original maximum. This increases the likelihood of superimposing the highest DVL and EET values on the same grid location. One limitation to this technique is that with multi-cell clusters, the echo tops of nearby cells might be superimposed over a different core.

SCAN CWA Threat Index (SCTI) ↵

A communication application called Guardian (General User Alert Display Panel) was delivered in OB7.2, with SCAN defined as a monitor. With Guardian's default configuration, the SCAN Monitor is represented by the Severe Weather SCTI button. The color of this button will reflect the general threat of severe weather over the County Warning Area (CWA).

The **default** colors, the Guardian Priorities, and what they represent are:

Color	Priority	Description
White	4	Indicates little or no activity in the CWA.
Green	3	Indicates general thunderstorms with low severe weather probabilities in the CWA.
Yellow	2	Indicates thunderstorms with moderate severe weather probabilities or a mesocyclone or TVS detected in the

		CWA.
Red	1	Indicates thunderstorms with high severe weather probabilities and a mesocyclone and/or TVS detected in the CWA.
Gray	5	Indicates the SCAN processor is not behaving properly or not running at all.

Note that Guardian allows considerable flexibility in its configuration, thus it is possible for users to change these colors, if they desire.

If the cursor is focused over this colored button, a small text tip widget will appear, providing the maximum value of the SCTI over the CWA and what it represents.

The actual grid of SCTI values over the CWA can be viewed as an image in the D2D, selectable from the SCAN menus. See the SCAN homepage (http://www.nws.noaa.gov/mdl/scan) for more information regarding the SCTI.

SCAN "New" Alarms ↩

A 'new' alarm will be issued if an event (cell, mesocyclone, or TVS) has been identified after a defined quiet period. In this case, WHETHER SCAN IS LOADED OR NOT, a message will be sent to the Guardian application (using a Priority of 0). How Guardian responds is configurable by the user in Guardian, but the delivered default behavior yields a pop-up with text message. The text specifies which type of event (cell, meso, TVS) has just been identified. These new alarms can be turned off completely by editing the file px1:/awips/fxa/data/evaluateNewAlarms.txt. 1 = on, 0 = off. Check the New Alarm Time Setup section to see how to define your quiet period.
NOTE: For the new use of the MDA (instead of meso) algorithm, a Strength Rank of 4 is used here. If a mesocyclone has a Strength Rank less than 4,a New Alarm will not be evaluated.

SCAN QPF ↩

The SCAN processor also produces one-hour Quantitative Precipitation Forecasts (QPFs), based on algorithms developed by David Kitzmiller (former NWS-MDL). The algorithms use pattern recognition in conjunction with motion vectors and radar products to produce probabilities that a specified amount of precipitation will fall in one hour's time at a given location. The algorithms also forecast categorical amounts. Each can be displayed as a D2D graphic, selectable from the SCAN section of the radar menus on the D2D. See the SCAN homepage (http://www.nws.noaa.gov/mdl/scan) for links to more information.

Data Monitoring System (DMS) ↩

The SCAN Data Monitoring System (DMS) is a web browser-based, automated system for

monitoring the status of the vital components of SCAN. It consists of a suite of HTML files, a Tcl/Tk Common Gateway Interface (CGI) script, and various supporting procedure, data, and image files. The system is housed on a web server, accessed through any browser that supports frames, and is updated using the CGI script. The following information is intended to give an overall description of the system display, defining the layout and components, and provide instructions for using the system.

DMS Display

See Figure 4.
The SCAN DMS display is divided into two frames. A small, static frame at the top of the page holds the title information and the button for updating the table information. The main frame below houses the data monitoring graphical elements.

For the SCAN processor to run optimally, AWIPS must receive the following products:

Name	Identifier	Product Number	Importance to the SCAN processor
Composite Reflectivity: 1 km	CZ	37	Vital!!
VIL	VIL	57	Vital
Base Reflectivity: 1 km	Z	19	Vital
Storm Track and Identification	STI	58	Suggested
Mesocyclone Detection	MD	141	Strongly Suggested
Tornado Vortex Signature	TVS	61	Strongly Suggested

Radar Products Information Table
The Radar Products Information table monitors the status of radar products for each dedicated radar (see the Glossary for a definition of the products). For each product, and for each dedicated radar, the monitor reports whether or not the product is on the Routine Products Set (RPS) list (Y for Yes, N for No), and gives the most recent data file's date and GMT time. If the product is absent from the RPS list, the background of the table cell containing the letter "N" will be colored red. If the product is not available, meaning there is no data file in the directory where it is stored, the monitor reports "None" and colors the background of the table cell red. Similarly, if a data file time is old, the background of the cell is colored red. A file is determined to be old according to a formula derived from the VCP mode (twice the length of the volume

scan plus 2 minutes). If the VCP mode is not available, the default threshold value of 22 minutes is used. Directly under the radar identification letters (e.g., KLWX, KSHV, and KAKQ in Figure 4), there are two spaces per radar for reporting the current radar VCP mode, and the SCAN processor mode. The VCP mode is indicated with the pattern number (11,12, 21, 31,32, or 121). If the VCP space contains the phrase "VCP not available," it means the reported VCP number in the data file is not one of the possible pattern numbers, or the data file containing the VCP number is old. The SCAN processor mode is indicated by either an icon of a radar (meaning SCAN is using radar information), or a lightning bolt (meaning SCAN is running only on lightning information). If the SCAN mode space contains the phrase "Mode not available," it means the data file containing the mode identifier is old and there is probably an urgent problem with the SCAN processor.
Note: The SCAN processor is triggered by the 1km Composite Reflectivity product. It is preferable for the QPF to have the STI product available, but it must have several current, consecutive volume scans of both VIL and Base Z.

CG Lightning Table
The top right table in the main frame is the CG Lightning Data table. This table monitors the status of the data file containing the latest cloud-to-ground lightning information. The most recent file date and time are given, along with the number of strikes since the top of the hour. The lightning data file is continuously updated, so the strike number may be different every time the page is loaded or updated. As with the previous table, a red background indicates an old file (in this case, older than 65 minutes). If the file is old, it either suggests a problem with the AWIPS acquisition of lightning data, or that there are no cloud-to-ground lightning strikes within the National Lightning Detection Network in the Continental U.S.

Model Data Table
The bottom right table in the main frame is the Model Data table. This table monitors the status of the data file containing the latest model information that is used by the SCAN processor. The name of the model is given, along with the most recent data file date and time. As with the other tables, a red background indicates an old file. A file is determined to be old by a threshold that depends on the update interval of the model.
Remember, SCAN can still run without model data, but the *quality* of some of the derived attributes, such as percent chance of heavy precipitation, percent chance of severe weather, and (more indirectly) the severe weather SCAN CWA Threat Index (SCTI), may be slightly decreased.
The Probabilistic QPF (PQPF) algorithm also is enhanced by model data, but does not require it. The PQPF will use environmental winds to determine the motion vector of the reflectivity patterns. If the environmental data is not available, the algorithms will attempt to determine the motion vectors by pattern recognition from one radar image to another.

Using the DMS

Loading the DMS
Each time the web page is loaded in the browser window, the CGI script is run on the web server, and the information is sent to the screen. Thus, every time the "Reload" button is hit, the information will be updated. However, this is not the recommended method for updating the

data. Reloading the entire page forces the browser to re-render information that does not need to be, and performance is diminished.

Updating the Information

In the static frame at the top of the display, there is a blue button labeled “UPDATE INFO.” Clicking this button will run the CGI script, retrieve the new information, and display it on the screen. Although they have the same end result, this method of updating the information is more efficient than hitting the “Reload” button on the browser toolbar.

Automatic Update Feature

For convenience, the DMS is equipped with an automatic update feature. This feature allows the user “hands-free” monitoring, updating the information automatically every two minutes. The user can also choose to update the information manually, using the “UPDATE INFO” button in the static frame at the top of the page.

Figures ↵

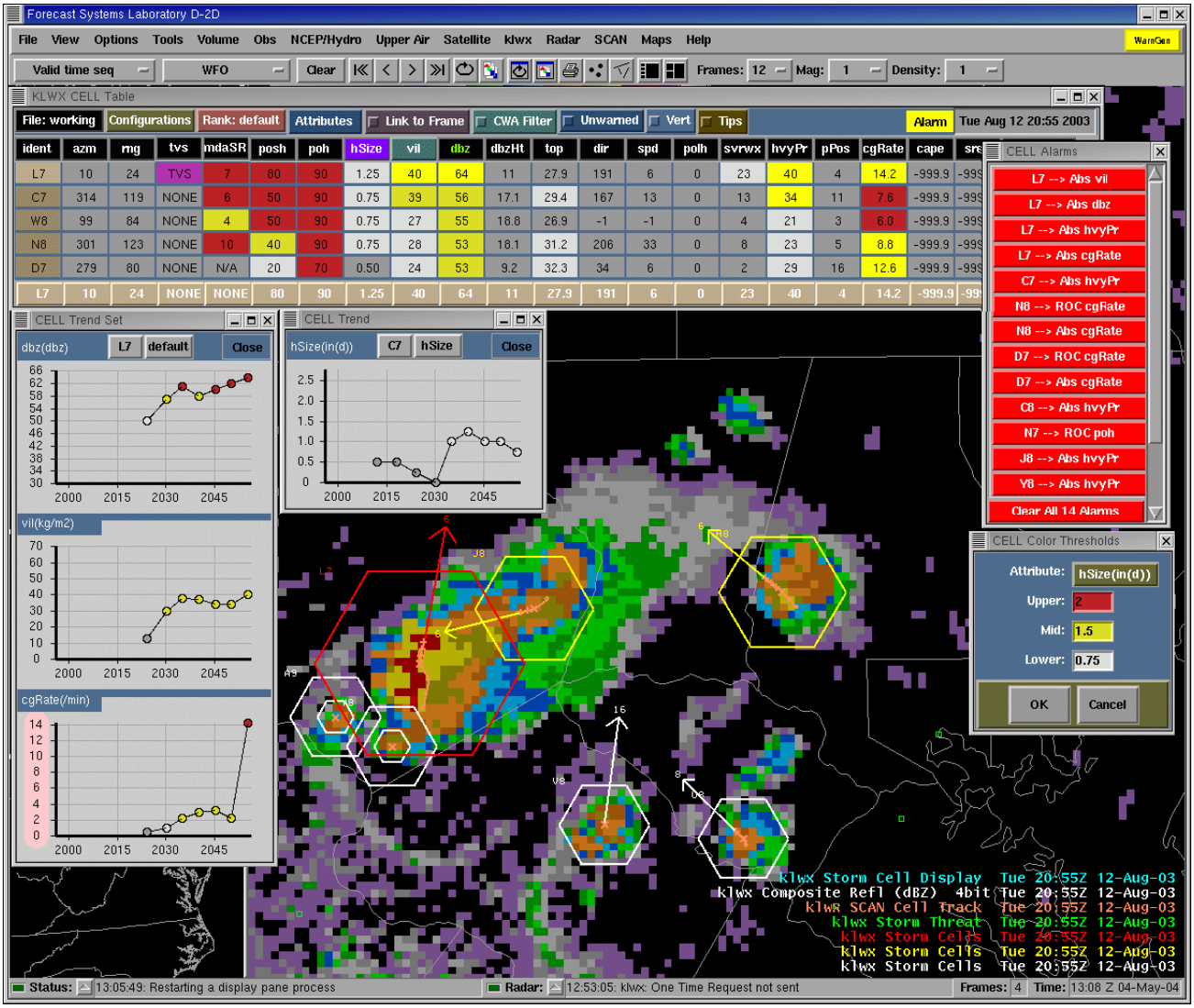

Figure 1 This figure includes the D2D, SCAN Storm Cell Table, single trend, trend set, and the Attribute Color Threshold (ACT) and Alarm Information windows.

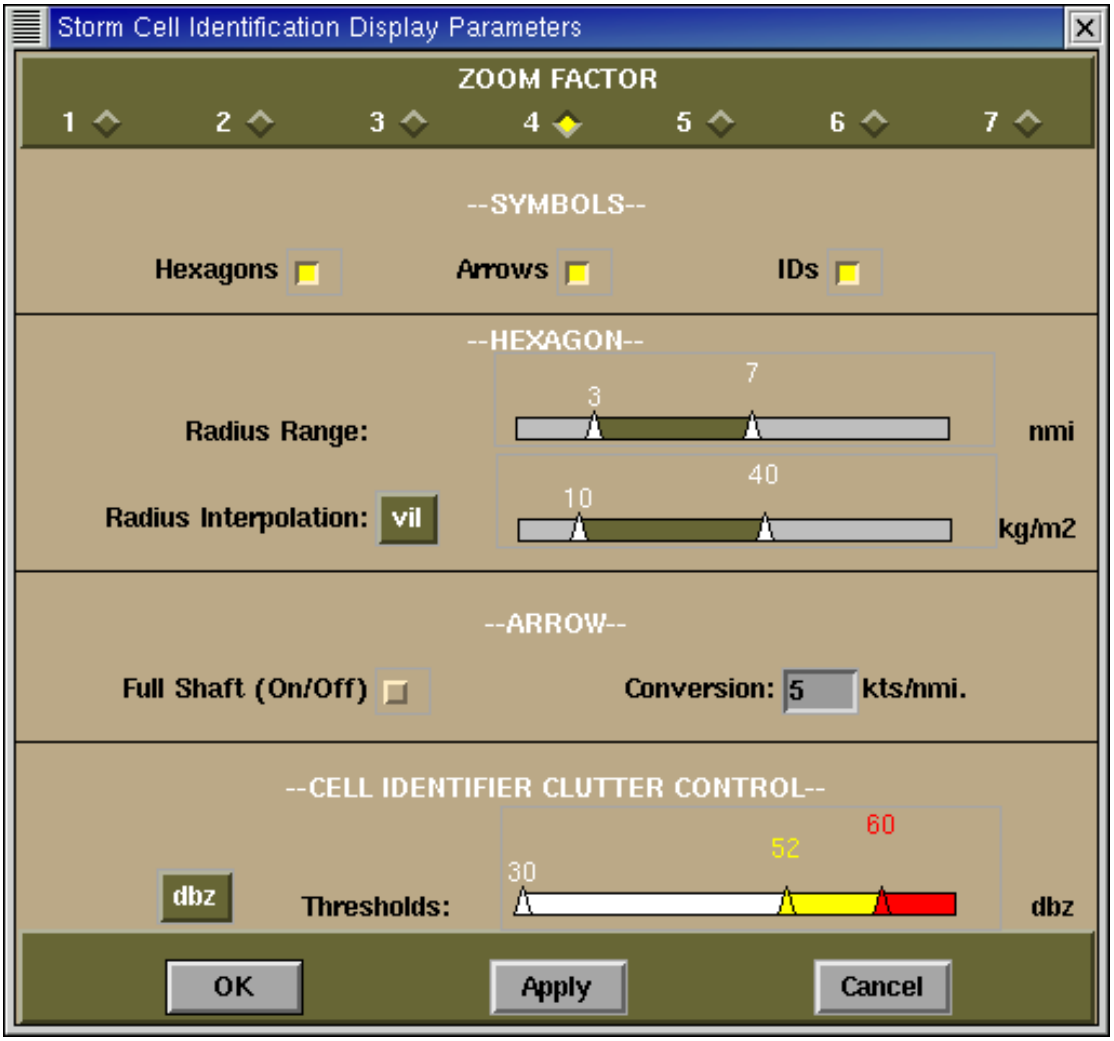

Figure 2 The Storm Cell Identification Display (SCID) window.

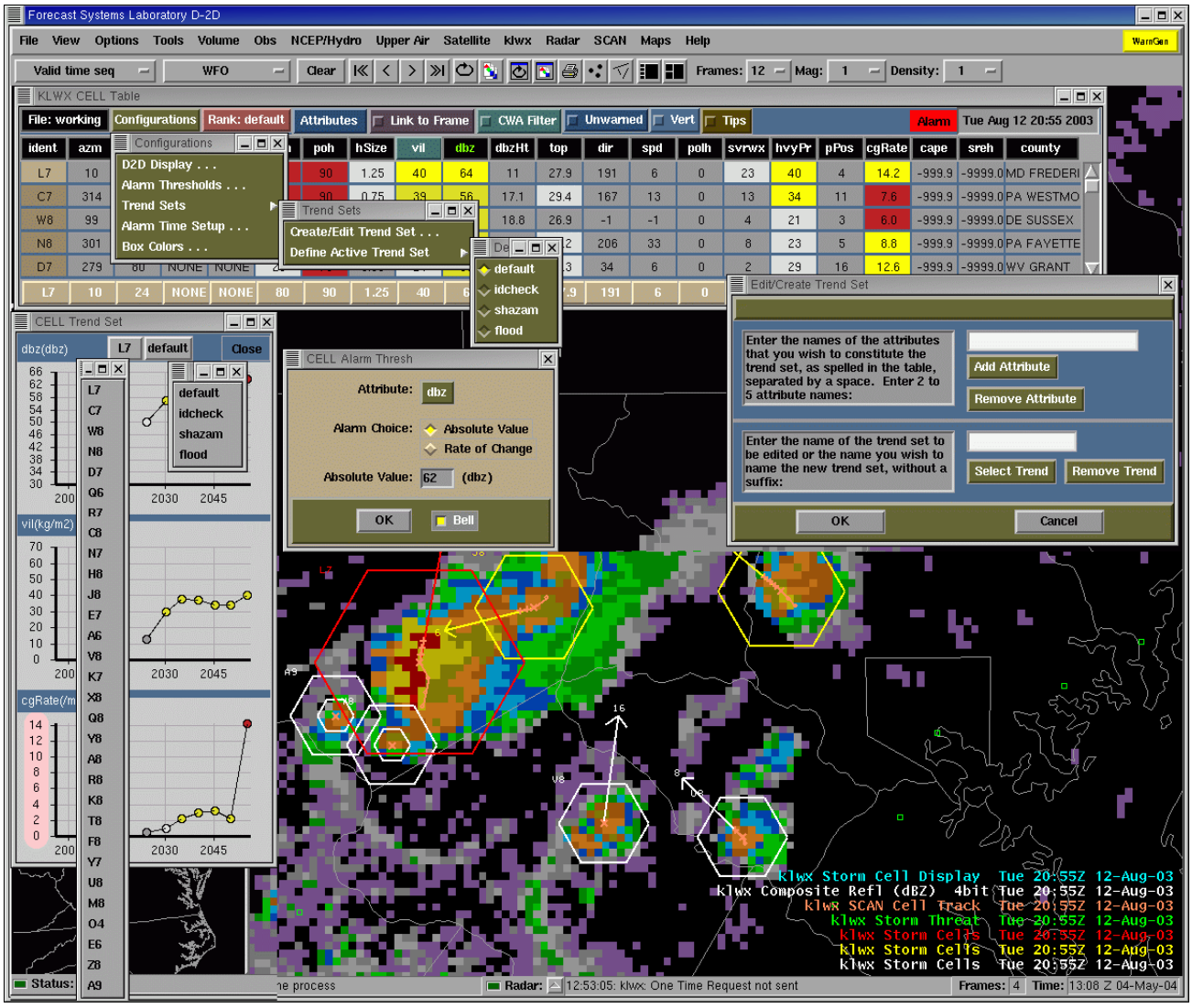

Figure 3 This figure includes the D2D, SCAN Storm Cell Table, Configuration menu, Trend Set cascading menu, active trend set menu, Edit/Create Trend Set window, and a trend set example.

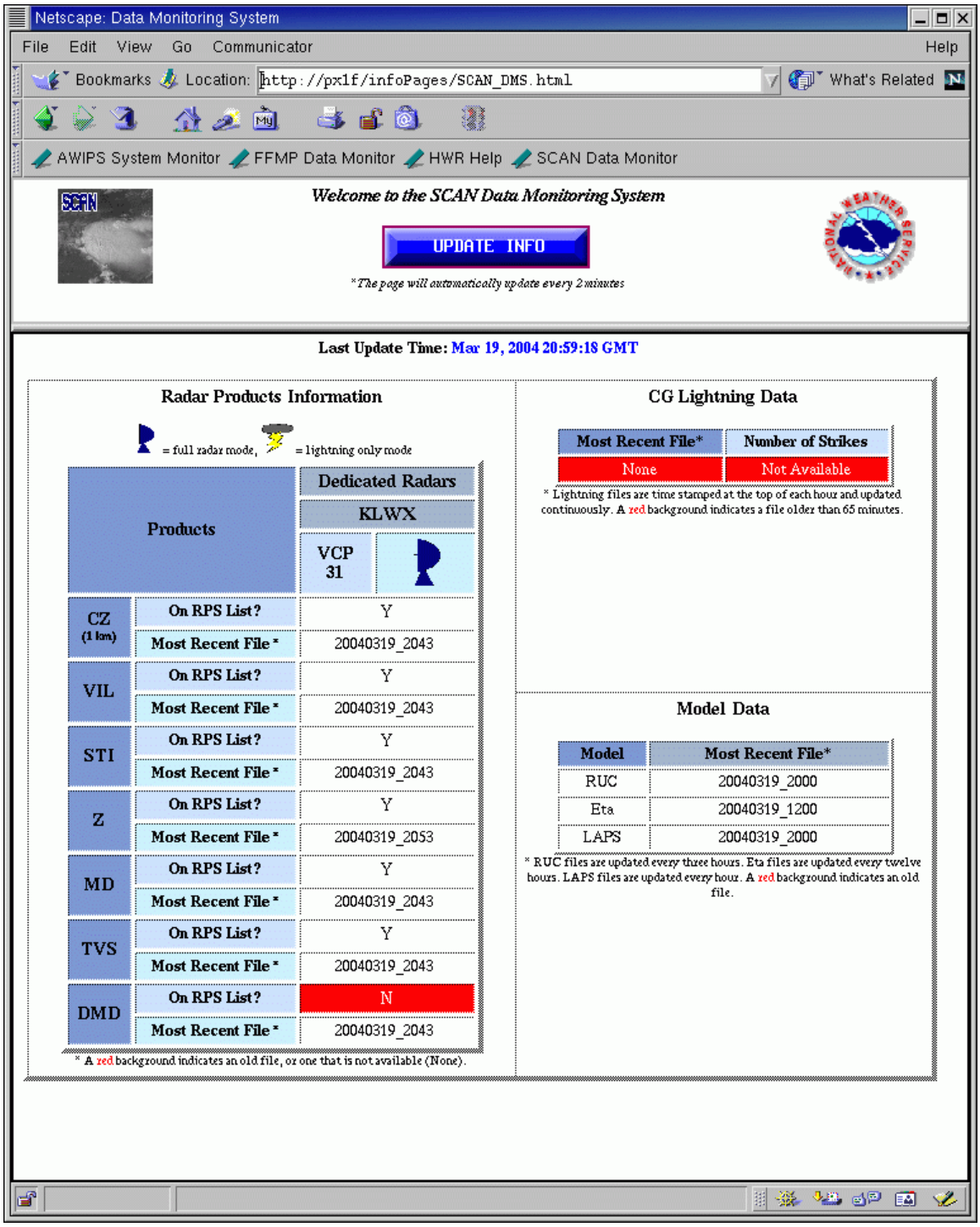

Figure4 This SCAN Data Monitoring System display.

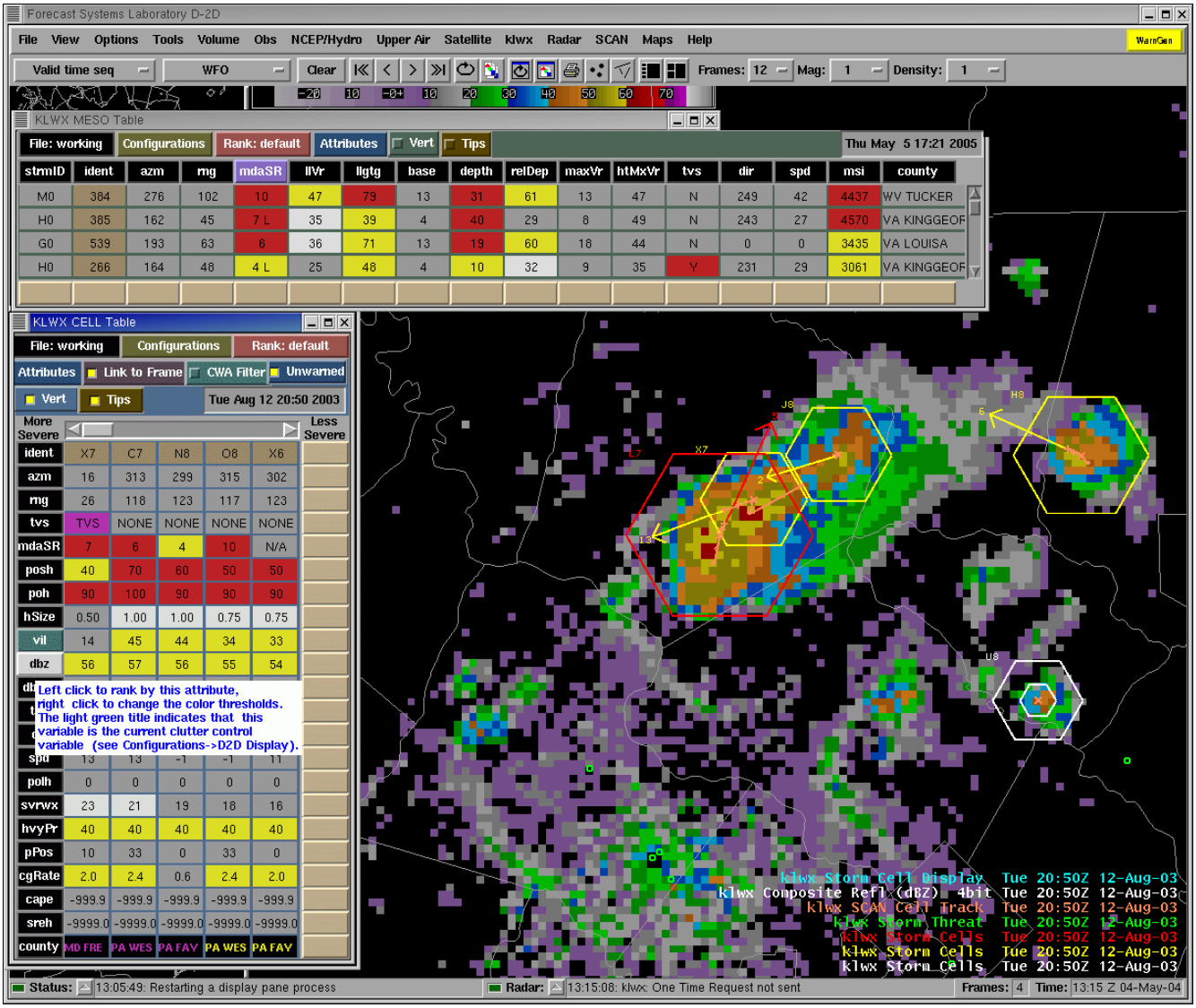

Figure 5 This is an example of the Mesocyclone Table and the vertical format of the Storm Cell table, with tip visible.

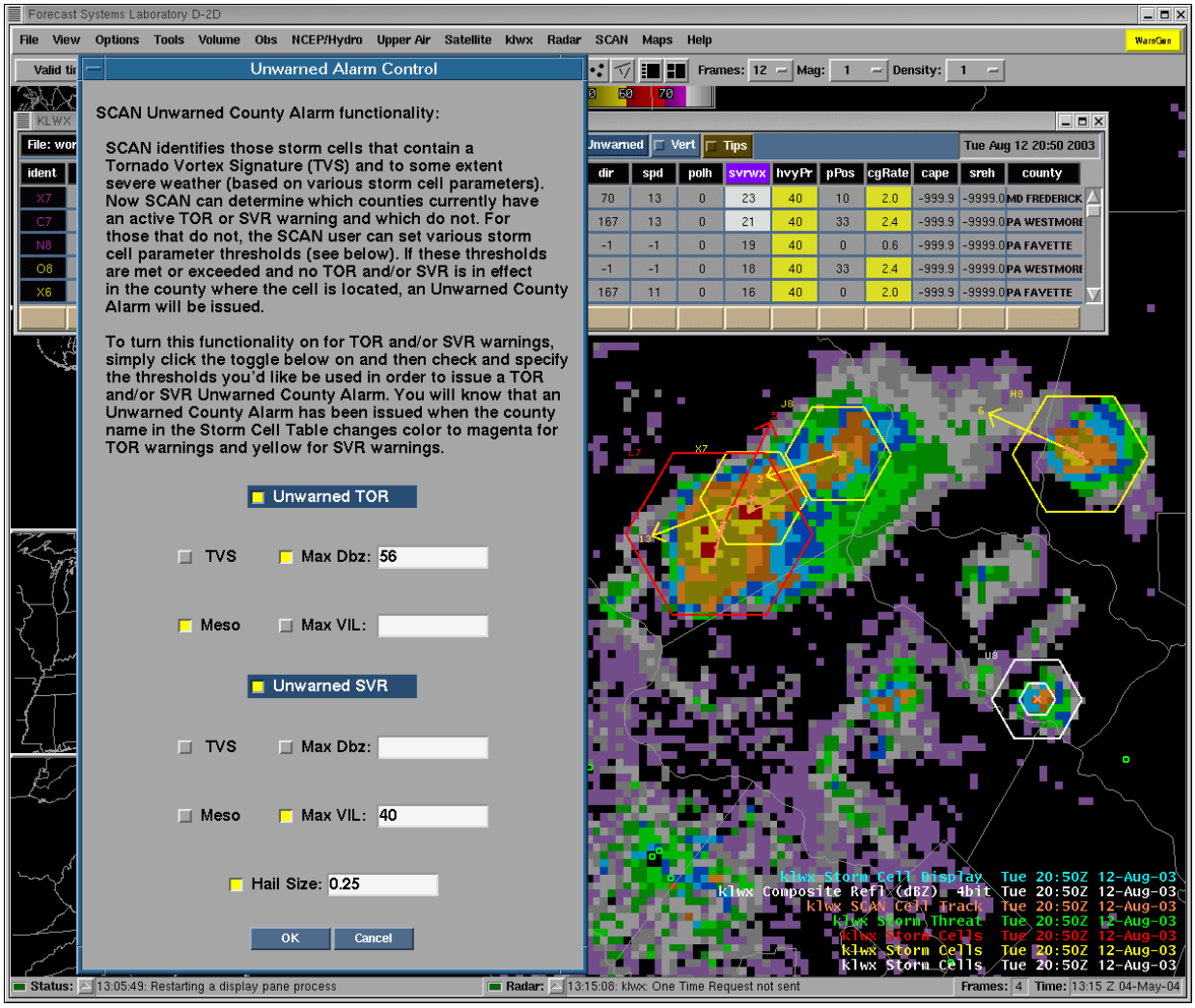

Figure 6 This shows the Unwarned Alarm Control window. It allows you to choose which type of alarm you want to monitor, which attributes to use, and what the thresholds should be. Note the change in color of the cell identifies in the Storm Cell Table.

Help ↵

To report problems or ask questions concerning the operation of SCAN in general, please use the SCAN list server (awips-scan@infolist.nws.noaa.gov). Please check the SCAN homepage at http://www.nws.noaa.gov/mdl/scan for more information, including the latest troubleshooting tips, version release information, and testing results.

Glossary ↵

ACT - Attribute Color Threshold
CG - Cloud-to-ground
CGI - Common Gateway Interface
CWA - County Warning Area
CZ - Composite Reflectivity - 1km (**a radar product**)
D2D - Display 2 Dimensions
DMD- Digital Mesocyclone Display
DMS - Data Monitoring System
GUI - Graphical User Interface
M - Mesocyclone (a radar product)
MDA - Mesocyclone Detection Algorithm
MDL - Meteorological Development Laboratory
RoCAT - Rate-of-change Alarm Threshold
RPS - Routine Products Set
RUC - Rapid Update Cycle
SBN - Satellite Broadcast Network
SCAN - System for Convection Analysis and Nowcasting
SCID - Storm Cell Identification Display
SCTI - SCAN CWA Threat Index
STI - Storm Tracking Information (**a radar product**)
TVS - Tornado Vortex Signature (**a radar product**)
VCP - Volume Coverage Pattern
VIL - Vertically Integrated Liquid (**a radar product**)
WDSS- Warning Decision Support System
Z - Base Reflectivity - 1km (**radar product**)

Appendix A SCAN Storm Cell Table Attributes ↵

Attribute	Definition	Units	Can be used for ranking?	Can be multi-colored?	Trend available?
ident	Storm Cell ID	Alphanumeric (A0-Z9)	Yes	No	No
azm	Current Azimuthal Position	Degrees	Yes	No	Yes
rng	Current Radial Position	nmi	Yes	No	Yes
rank	Storm Cell Rank	none	Yes	No	No
tvs	TVS Characteristics	Alphanumeric (NONE, TVS or ETVS)	No	Yes	No
mdaSR	Mesocyclone Strength Rank (if any)	Integer (Strength Rank)	Yes	Yes	No
posh	Probability of Severe Hail	%	Yes	Yes	Yes
poh	Probability of Hail	%	Yes	Yes	Yes
hSize	Maximum Expected Hail Size	inches (diameter)	Yes	Yes	Yes
vil	Cell-Based VIL	kg/m^2	Yes	Yes	Yes
dbz	Maximum Reflectivity	dBZ	Yes	Yes	Yes
dbzHt	Height of Maximum Reflectivity	kft	Yes	No	Yes
top	Storm Top	kft	Yes	Yes	Yes
dir	Forecast Movement, Direction	Degrees	Yes	No	Yes

Attribute	Definition	Units	Can be used for ranking?	Can be multi-colored?	Trend available?
spd	Forecast Movement, Speed	kts	Yes	No	Yes
azm15	Forecast Azimuthal Position (15 min)	Degrees	No	No	No
rng15	Forecast Radial Position (15 min)	nmi	No	No	No
azm30	Forecast Azimuthal Position (30 min)	Degrees	No	No	No
rng30	Forecast Radial Position (30 min)	nmi	No	No	No
azm45	Forecast Azimuthal Position (45 min)	Degrees	No	No	No
rng45	Forecast Radial Position (45 min)	nmi	No	No	No
azm60	Forecast Azimuthal Position (60 min)	Degrees	No	No	No
rng60	Forecast Radial Position (60 min)	nmi	No	No	No
mvtErr	Forecast Movement Error, Error	nmi	No	No	No
mvtMn	Forecast Movement Error, Mean	nmi	No	No	No
lat	Latitude	Degrees	No	No	No
lon	Longitude	Degrees	No	No	No
polh	Probability of Large Hail	%	Yes	Yes	Yes
svrwx	Probability of Severe Weather	%	Yes	Yes	Yes
hvyPr	Probability of Heavy Precipitation	%	Yes	Yes	Yes
pPos	Percent Positive Lightning Strikes	%	Yes	Yes	Yes

Attribute	Definition	Units	Can be used for ranking?	Can be multi-colored?	Trend available?
cgRate	Cloud-to-Ground Lightning Rate	/min	Yes	Yes	Yes
vcp	Volume Coverage Pattern	none	No	No	No
cape	Storm CAPE	J/kg	Yes	Yes	Yes
sreh	Storm Relative Helicity	m^2/s^2	Yes	Yes	Yes
county	County Location	none	Yes	No	No

Appendix B SCAN Mesocyclone Table Attributes ↩

Attribute	Definition	Units	Used for ranking?	Multi-colored?	Trend available?
strmID	Storm Cell ID	Alphanumeric (A0-Z9)	Yes	No	No
ident	Feature ID	Numeric (01-25)	Yes	No	No
azm	Azimuthal Position	Degrees	Yes	No	No
rng	Radial Position	nmi	Yes	No	No
mdaSR	Circulation Strength with Class Identifier: L = Low Top/Core, S = Shallow	integer	Yes	Yes	No
llVr	Low Level Rotational Velocity	kts	Yes	Yes	Yes
llgtg	Low Level gate-to-gate	kts	Yes	Yes	Yes
base	Base of Circulation	kft	Yes	No	Yes
depth	Depth of Circulation	kft	Yes	Yes	Yes
relDep	Relative Depth	%	Yes	Yes	Yes
maxVr	Maximum Rotational Velocity	kts	Yes	Yes	Yes
htMxVr	Height of Maximum Rotational Velocity	kft	Yes	No	Yes
tvs	Tornado Vortex Signature	none	No	Yes	No
dir	Direction of Motion	Degrees	Yes	No	Yes

Attribute	Definition	Units	Used for ranking?	Multi-colored?	Trend available?
spd	Speed of Motion	kts	Yes	No	Yes
msi	Mean Strength Index	integer	Yes	Yes	Yes
lat	Latitude	Degrees	No	No	No
lon	Longitude	Degrees	No	No	No
county	County Location	none	Yes	No	No

Appendix C SCAN TVS Table Attributes ↩

Attribute	Definition	Units	Used for ranking?	Multi-colored?	Trend available?
strmID	Storm Cell ID	Alphanumeric (A0-Z9)	Yes	No	No
ident	Feature ID	Numeric (01-25)	Yes	No	No
type	Feature type	Alphanumeric (TVS or ETVS)	No	Yes	No
azm	Azimuthal Position	Degrees	Yes	No	No
rng	Radial Position	nmi	Yes	No	No
avgDv	Average Delta Velocity	kts	Yes	Yes	No
llDv	Low-level Delta Velocity	kts	Yes	Yes	No
maxDv	Maximum Delta Velocity	kts	Yes	Yes	No
mxDvHt	Maximum Delta Velocity Height	kft	Yes	Yes	No
base	Base Value	kft	Yes	Yes	No
depth	Depth Value	kft	Yes	Yes	No
top	Top Value	kft	Yes	Yes	No
shear	Maximum Shear	m/s/km (or E-3/sec)	Yes	Yes	No
shrHt	Height of the Maximum Shear	kft	Yes	Yes	No

Attribute	Definition	Units	Used for ranking?	Multi-colored?	Trend available?
lat	Latitude	Degrees	No	No	No
lon	Longitude	Degrees	No	No	No
county	County Location	none	Yes	No	No