RiverSonde(TM) Web Interface User's Guide
Version 1.1

CODAR Ocean Sensors, Ltd.
http://www.codar.com/

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Chapter 1

Introduction

The CODAR Ocean Sensors RiverSonde(TM) non-contact river monitor is a system that measures water flow in rivers, streams and channels. It measures and records mean surface velocities and from these can generate velocity profiles. These data can be used in conjunction with additional relevant data to calculate total water volume flow, called discharge. The basic operation of the RiverSonde is explained in detail in [1], which describes the configuration and control provided by a program called *RSCommander*, running on an attached Macintosh computer or laptop. This document describes an alternative web interface for the control, configuration, and data transfer functions, which can be accessed through a modern web browser running on any platform.

The web interface requires an internet connection of some sort to the RiverSonde hardware. This connection can be a local ethernet, WiFi or FireWire link, a wide-area Internet connection through a DSL connection or cable modem, a mobile phone modem, or any other TCP/IP connection which allows access through port 3000. The browser must have JavaScript and cookies enabled, as both of these are essential for proper operation of the web interface. A modern browser such as FireFox[1], Safari[2], Opera[3], Chrome[4], etc. is preferred. Internet Explorer[5] 7 or later should work, although there may be some formatting issues. Internet Explorer 6 (or earlier) is not supported.

[1] http://www.mozilla.com/en-US/
[2] http://www.apple.com/safari/
[3] http://www.opera.com/
[4] http://www.google.com/chrome
[5] http://www.microsoft.com/windows/Internet-explorer/default.aspx

Chapter 2

Connection and Login

To start the web interface, enter the URL of the RiverSonde controller in the address field of the browser. The figure below (Figure 2.1) shows an example of connecting to a controller on the local network. The RiverSonde web interface uses port 3000, so include ":3000" at the end of the URL.

Figure 2.1: URL for a controller on the local network, including the port specifier.

When the connection is made, a banner (Figure 2.2) and menu bar are displayed. Click the **LOGIN** button to begin logging in.

Figure 2.2: Login button and inactive menu bar.

A familiar login pane (Figure 2.3) will appear with fields for username and password. If desired, a new password can be set here by clicking on the **Change Password** link. There are two categories of users: *ordinary* users, who can examine data and display the current operating configuration, and *administrative* users, who can

display data and operating configuration and can additionally modify the operating parameters.

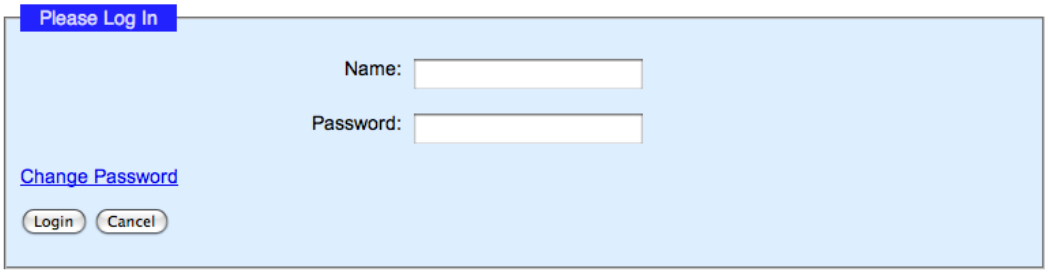

Figure 2.3: Username and password pane, with optional new password link.

After logging in, the menu bar (Figure 2.4) changes to indicate which menu items are available. The **LOGIN** button changes to **LOGOUT**, and the currently-logged-in user is indicated at the top of the banner. Menu items which are available for the currently-logged-in user are enabled. The menu items include entries for displaying and downloading data, administration of the RiverSonde, and online help. Data are displayed directly below the menu bar. Use the menu items, rather than the browser's forward and back buttons, for navigation; the browser's back button will simply reload the menu bar with an empty display area below the menus.

Figure 2.4: Active menu bar and banner with Logout button and username.

Chapter 3

Data Display and Download

The first five menus, at the left of the menu bar, are concerned with data display. Some menu entries also allow downloading of selected data. The files which are downloaded generally are compressed using PKZIP[1], and should be compatible with both Apple and Microsoft operating systems. Some compressed files are intended to be used with Google Earth[2], and should automatically open that program when double-clicked in the computer's file navigation window. The format used for generation of some of the data products depends on several parameters set by the user, and each user has a separate set of preferences. Additionally, parameters for the latest radials, profile and time series are set by an administrative user, as those plots are accessed by all users.

3.1 Overview

The Overview menu (Figure 3.1) displays very basic summary information or data plots generated the last time that the data were processed. Items under this menu can be displayed without logging in, so it is easy to quickly check that the system is operating normally. Items accessed through all other menus require logging in first.

[1] http://en.wikipedia.org/wiki/PKZIP
[2] http://earth.google.com/

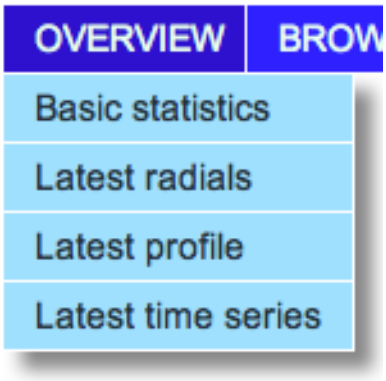

Figure 3.1: Overview menu.

Basic statistics

Basic statistics (Figure 3.2) include the times of the first and last data records, the number of records in the database, the amount of free space left on the system disk, and the time that the system has been running since the last restart. This summary is intended to indicate very quickly if the system is running normally.

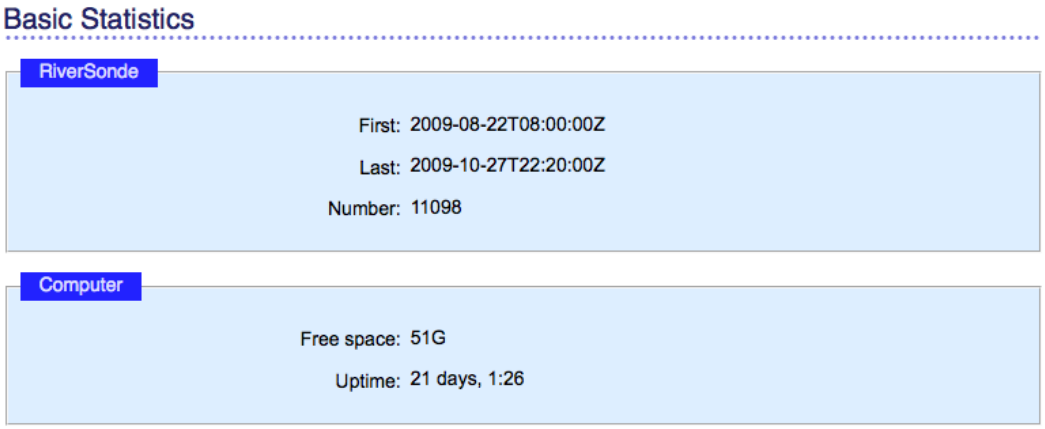

Figure 3.2: Basic statistics.

Latest radials

As the system processes data, plots for the latest radials, profiles, and time series are generated automatically. These plots are updated at each processing time (typically every 5 minutes). An example of a plot of radials (Figure 3.3) is shown below.

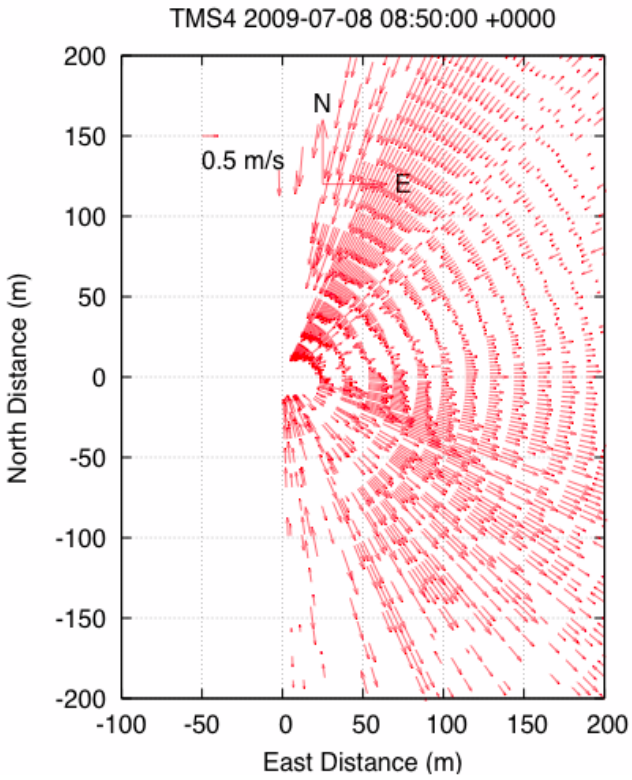

Figure 3.3: Latest radials.

Latest profile

Similarly, the latest profile plot is generated each time that the data are processed. An example of a plot of the latest profile (Figure 3.4) is shown below.

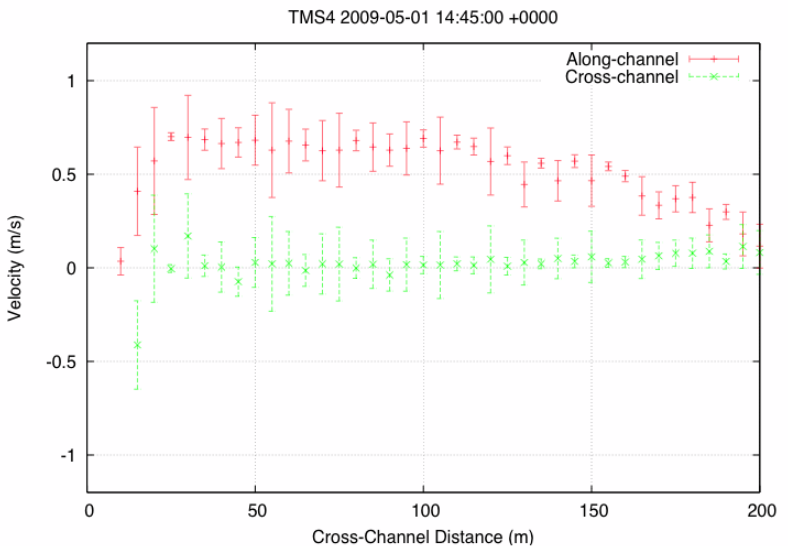

Figure 3.4: Latest profile.

Latest time series

A plot of the latest time series is also generated each time that the data are processed, but it represents a time history, rather than an individual snapshot, as the above plots do. The time interval covered by the time series plot, as well as other parameters such as scale factor, items plotted, etc. can be updated by an administrative user. An example of a time series (Figure 3.5) plot is shown below.

3.2 Browser

The overall RiverSonde processing is controlled by a program called *RSCoordinator*, described in [1]. Each time *RSCoordinator* runs, typically every 5 minutes, it calculates a set of radial velocity vectors. From the radial vectors, assuming reasonably homogeneous water flow in the data analysis region, an estimate is made of the profile of the along- and cross-channel velocity components as a function of distance across the channel, and a portion of the velocity profile is averaged to estimate a mean along- and cross-channel velocity. The radial vectors and profile estimate are saved in individual *radials* and *profile* files, along with error estimates for each point, and the mean velocity estimates with their error estimates and the

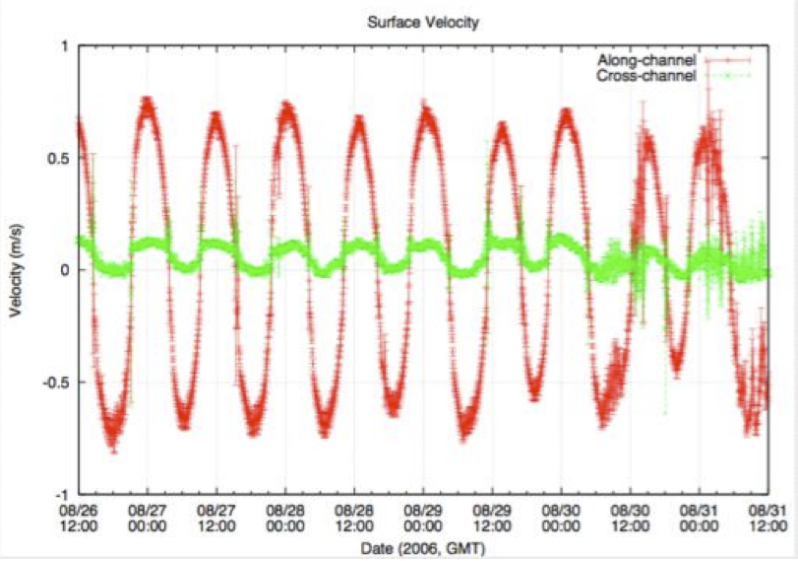

Figure 3.5: Latest time series.

measurement time are added to a single *database* file. If available from external sensors or programs, values for *stage*, *wind speed and direction*, and *discharge* can also be added to the database, along with their time tags (usually at the same times as the radar observations).

The database stores the summary information and acts as an index to the radials and profile files. A browser allows examination of the database through the browser menu (Figure 3.6). Summary information can be displayed in a table, individual radials or profiles can be displayed as text or plotted, the columns of information in the table can be selected for display or hidden, plotting preferences can be changed, and a waveform can be plotted interactively in order to zoom in on times of interest through this menu.

Dataset display

The basic summary information for each record can be displayed in a table using the data browser display (Figure 3.7). Data records can be sorted by clicking on individual column headers, and the sort direction can be reversed by clicking on the header a second time. The columns to be displayed can be selected, but typically include the mean along- and cross-channel velocities (*Ur* and *Vr*, the *r* denoting

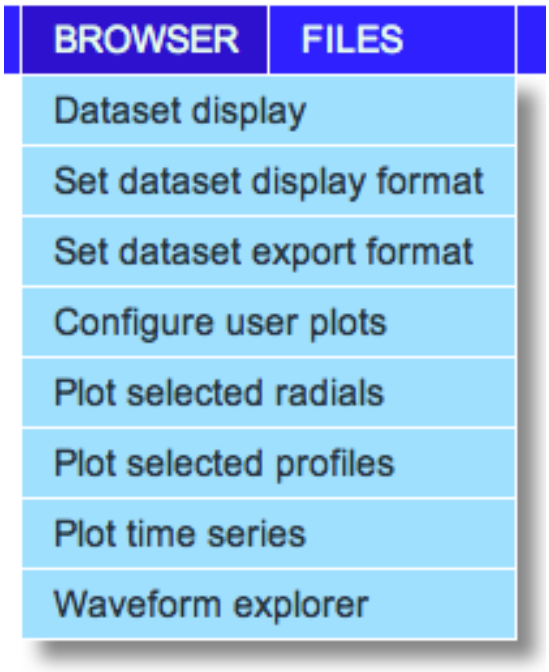

Figure 3.6: Browser menu.

directions *relative* to the direction of the stream coordinate system) and their associated standard deviations, and the number of vectors contributing to the solution.

Because the database can contain many thousands of records, only a portion of the available data is visible at any time. Records are automatically fetched from the RiverSonde computer as the position of the vertical scroll bar on the right of the display is updated.

The navigation bar (Figure 3.8) at the bottom of the table displays the record numbers currently downloaded from the computer (on the right side of the navigation bar), and controls for filtering, displaying and plotting records (on the left). The total number of *filtered* records (described below) is displayed in the last field of the navigation bar.

The second button (Figure 3.9) in the navigation bar brings up a filter dialog (Figure 3.10) which allows data selection by a variety of criteria. Records can be selected based on their time and numerical values of different variables. The dialog starts with a single condition, but other conditions can be added by using the **Add** button at the bottom of the dialog. Conditions specified on successive rows must all

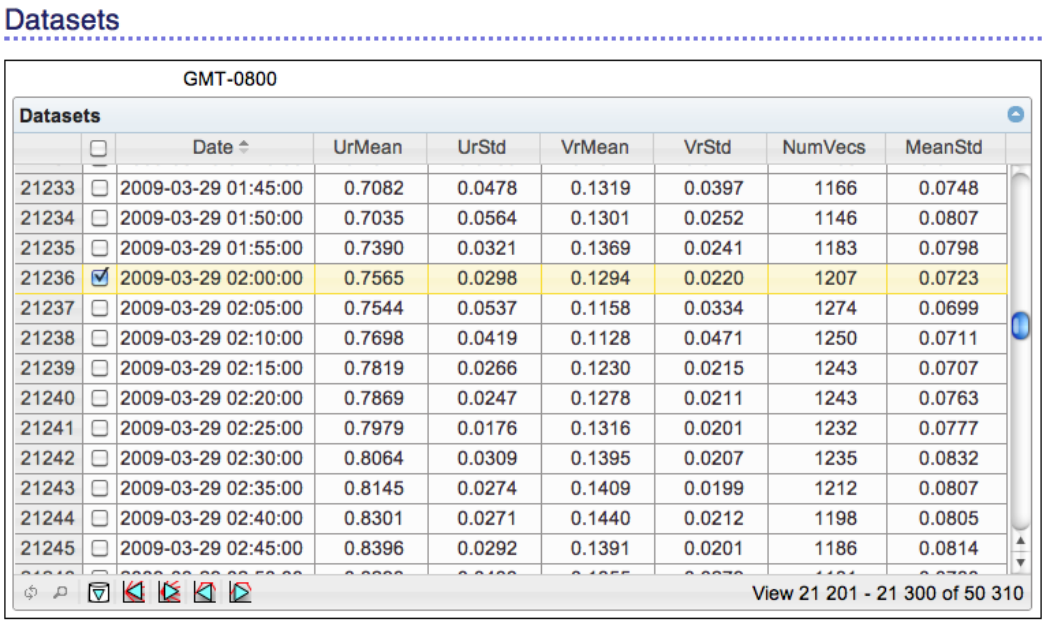

Figure 3.7: Data browser.

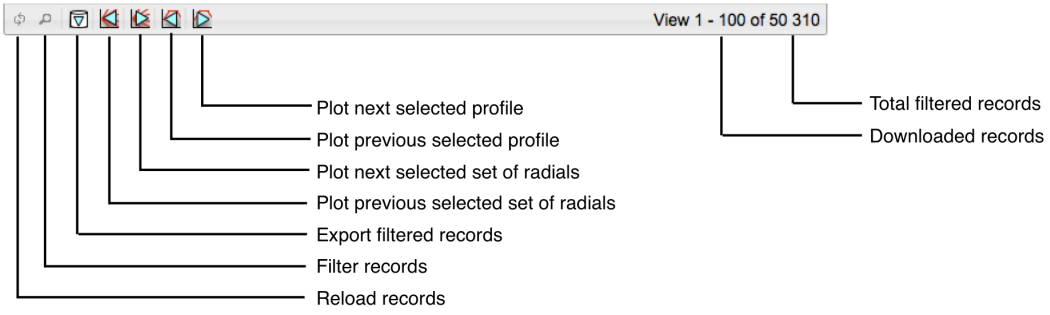

Figure 3.8: Data browser navigation bar.

Figure 3.9: Data browser filter button.

be true (logical *and*) in order to select the data. For instance, in the example (Figure 3.10) below, only records at or after 2000-01-14 at 02:00 *and* having at least 1200 vectors *and* a mean standard deviation less than 0.25 m/s would be selected. The filter is applied using the **Select** button, and the **Close** button removes the dialog window while leaving the filter active. The **Reset** button removes the filter completely and removes all but one row from the dialog. A comparison function with a blank condition in the text box is ignored, so if you want to remove a single comparison from a complicated set of conditions without recreating the conditions from the beginning, you can simply clear the value from a single condition.

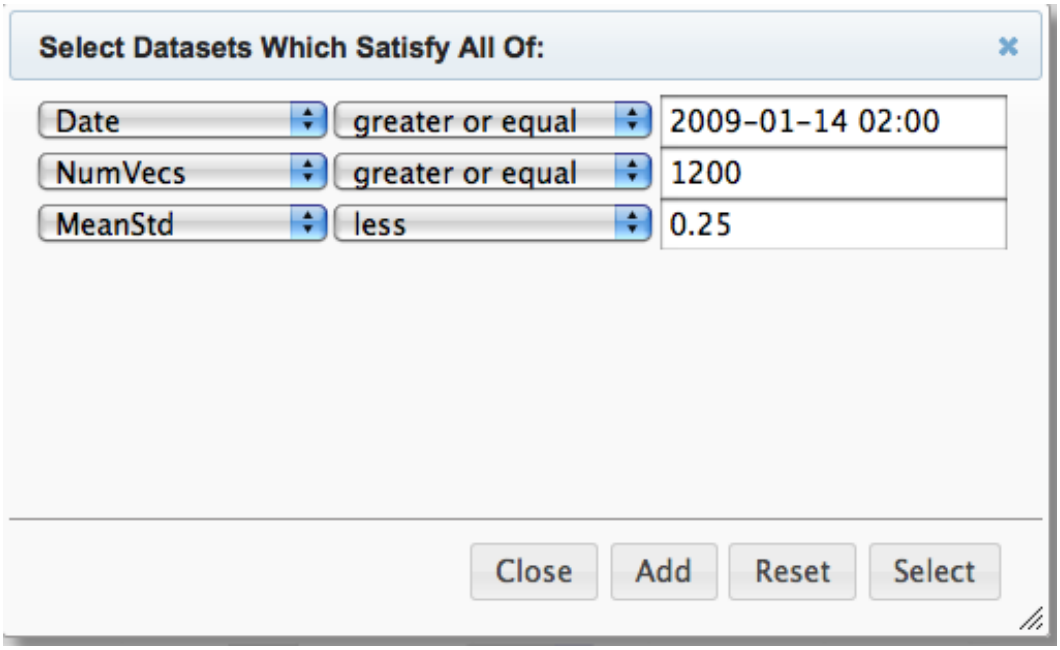

Figure 3.10: Data browser filter.

While a filter is active, the filter button (Figure 3.11) changes to include an orange outline and a yellow background to provide a visual indication that a filter is in use.

Figure 3.11: Data browser active filter indicator.

Records can be selected for further manipulation by clicking on the check box for a particular row (or anywhere in the row). Selected rows are highlighted by a mark in the check box. If one or more rows are selected, buttons on the left side of the navigation bar (Figure 3.8) can be used to plot the next or previous set of radials or profiles for the selected record, one plot at a time (multiple plots can also be generated from the browser menu (Figure 3.6), described below). The check box in the header of the data browser display (Figure 3.7) (to the left of the "Date" label) can be used to quickly select or deselect every record displayed in the table. Scrolling to a new location in the database, such that new records are fetched from the processing computer, also deselects all records.

Independent of whether individual records are *selected*, filtered (Figure 3.10) records can be exported in text format using the third button in the navigation bar (Figure 3.8). If no filter is in use, then *all* records are exported (and the resulting file may be large). The format of the exported text, and the columns included, are selected as described below (3.2). When records are exported, a text file is created and then compressed using PKZIP[3] and the compressed file is downloaded to the browser. Depending on the browser in use, the user may have to confirm whether to accept the download or open the downloaded file with a particular program. The browser may allow the choice of a name or location to use for the downloaded file.

Set dataset display format

The format of the dataset display table can be set from the browser menu (Figure 3.6), which opens a dataset display configuration dialog (Figure 3.12). From this dialog, the time zone used for the table display and exported text data, and the columns to be included in the table display can be specified. In this example, the time zone is GMT-0800 (US Pacific Standard), and the basic along- and cross-channel velocities and their data qualities are included; wind, stage and discharge are not displayed. Note that wind, stage and discharge require data from an external source.

Set dataset export format

Similarly, the format used to export the database data to a text file can be set using the export data format dialog (Figure 3.13). The format for the time field is

[3] http://en.wikipedia.org/wiki/PKZIP

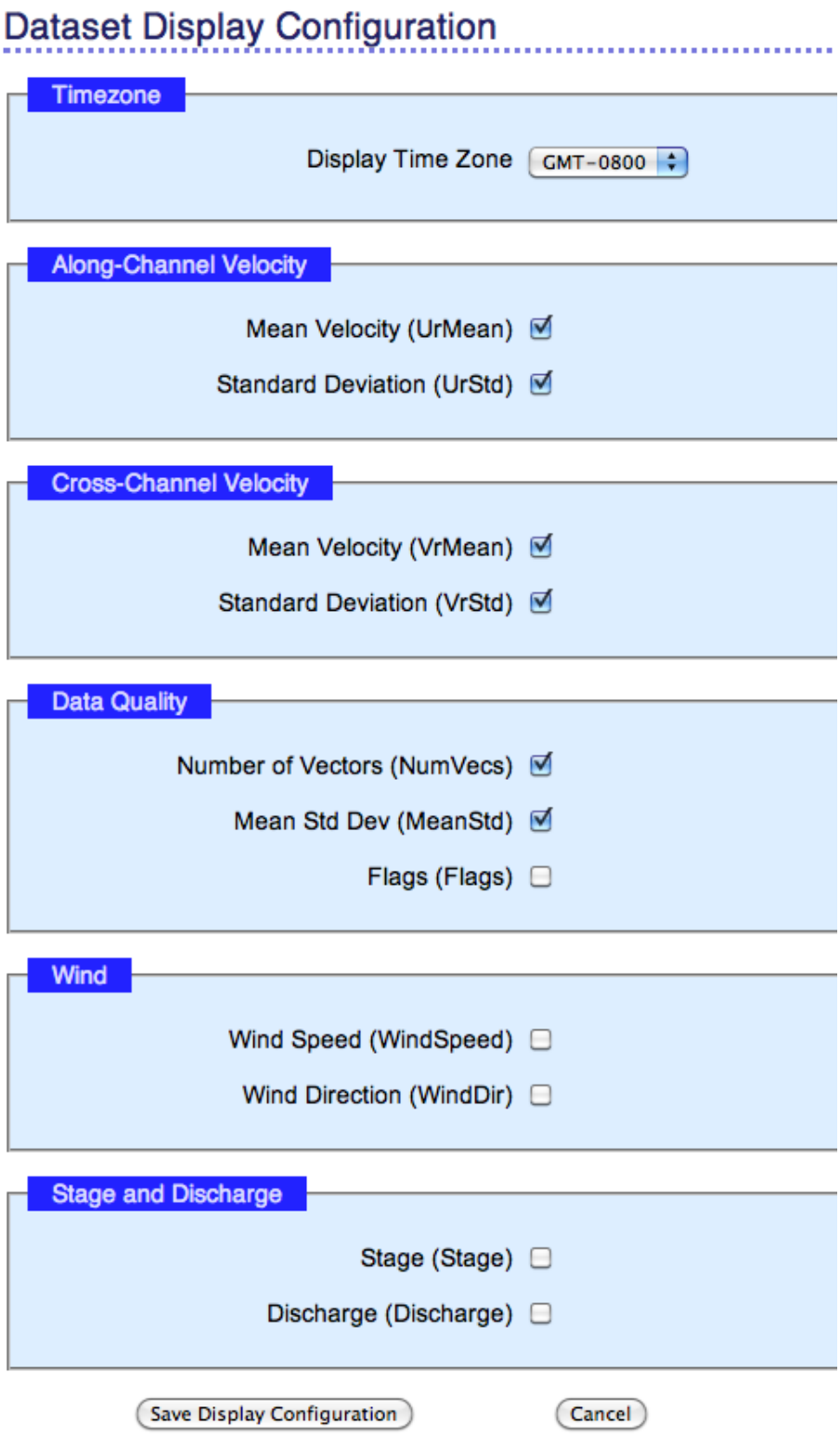

Figure 3.12: Data browser display configuration.

specified using the format of the unix strftime[4] function, which is quite general. The time zone specified by the dataset display configuration (Figure 3.12) dialog is also used for the exported text data. Data fields can be separated by either a tab or a comma, and the string for a missing value can be "NaN" or any user-specified string. Variables to be included in the text data file can be specified in the same way as for the table display. An example of a few lines of exported data is shown below (Figure 3.14).

Configure user plots

The format used for user-generated plots of radials, profiles and time series is specified using the user plots configuration dialog (Figure 3.15). The *frame scale* is a number between 1.0 and 3.0 which determines the overall size of the plot, and it applies to all of the radials, profile and time series plots. Some experimentation may be required to set an optimum value. The *time zone* used for the plot annotation can be specified separately from that used for the table display. The user plots configuration is specific to each user; different users may have different preferences for their plots.

For plots of *radials*, the limits of the *x* and *y* values, in meters, can be specified, as well as whether the x-axis of the plot is along the river in the RiverSonde coordinate system (*rotate vectors* unchecked) or towards true east (*rotate vectors* checked). The *minimum number of vectors* and *maximum mean standard deviation* values select which radial vectors are selected for plotting. A lower value for the minimum number or a higher value for the standard deviation selects more vectors to be plotted, but they may be noisy. A higher value for the minimum number or a lower value for the standard deviation selects better quality vectors, but there may be fewer vectors plotted. The *velocity scale* determines how big the vectors are when they are plotted. A value of 10, for example, means that a 1 m/s vector is displayed with a length of 10 m on the plot. Some experimentation with all of these values may be required to obtain an acceptable plot.

For plots of the *profile*, the limits for the cartesian plot are the distance, in meters, across the river channel and the minimum and maximum velocity, in m/s, for the profile plot. The along-channel and cross-channel velocities can be selected individually, and the standard deviations can be included as error bars.

For plots of the *time series*, the limits for the cartesian plot are the minimum and maximum times for the time series, and the minimum and maximum velocities, in

[4] http://developer.apple.com/mac/library/documentation/Darwin/Reference/ManPages/man3/strftime.3.html

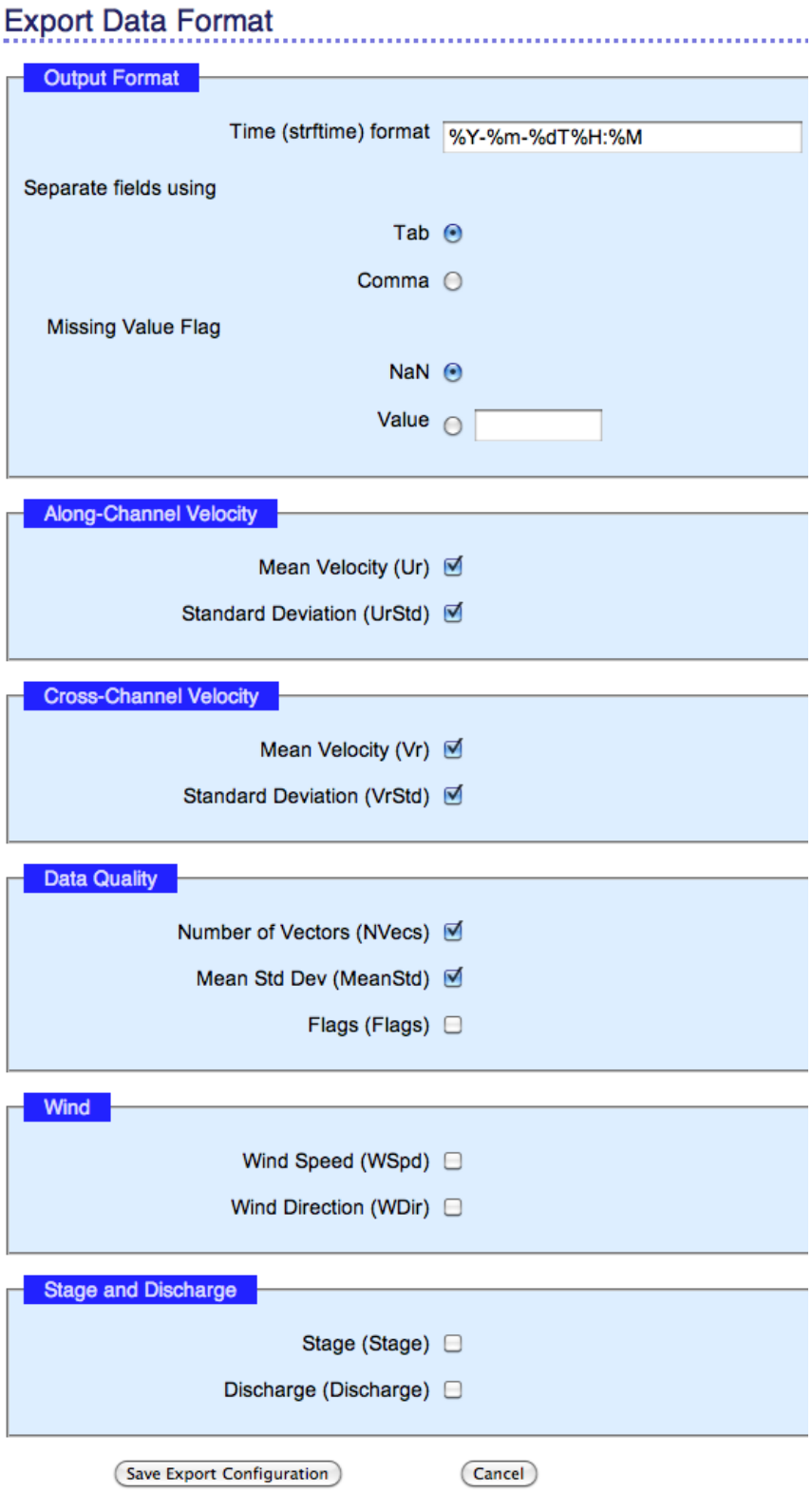

Figure 3.13: Data browser data export format.

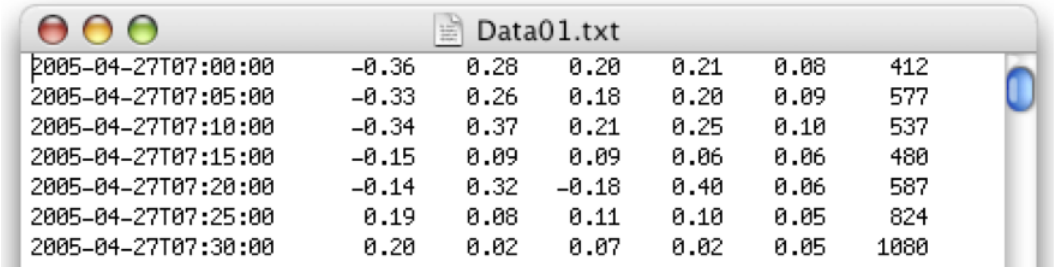

Figure 3.14: Data browser exported data fragment.

m/s. As with the profile plots, the along-channel and cross-channel velocities and their respective standard deviations can be individually selected.

Note that the plots of radials and profiles are generated from individual files of radials or profiles in the data archive (section 3.3), discussed below. Plots of the time series, however, are generated directly from data in the database and displayed in the data browser display (Figure 3.7).

Plot selected radials

When one or more data records (rows) in the dataset table (Figure 3.7) are selected, plots of radials for all of the selected records, up to a maximum of 10, can be generated with the *plot selected radials* entry of the browser menu (Figure 3.6).

Plot selected profiles

Similarly, when one or more data records (rows) in the dataset table (Figure 3.7) are selected, plots of profiles for all of the selected records, up to a maximum of 10, can be generated with the *plot selected profiles* entry of the browser menu (Figure 3.6).

Plot time series

A plot of the time series is generated by the *plot time series* entry of the browser menu (Figure 3.6). When invoked, a time series parameter dialog (Figure 3.16) is displayed, allowing the settings for the time series plot to be quickly changed. It is initialized from the settings in the user plots configuration dialog (Figure 3.15)

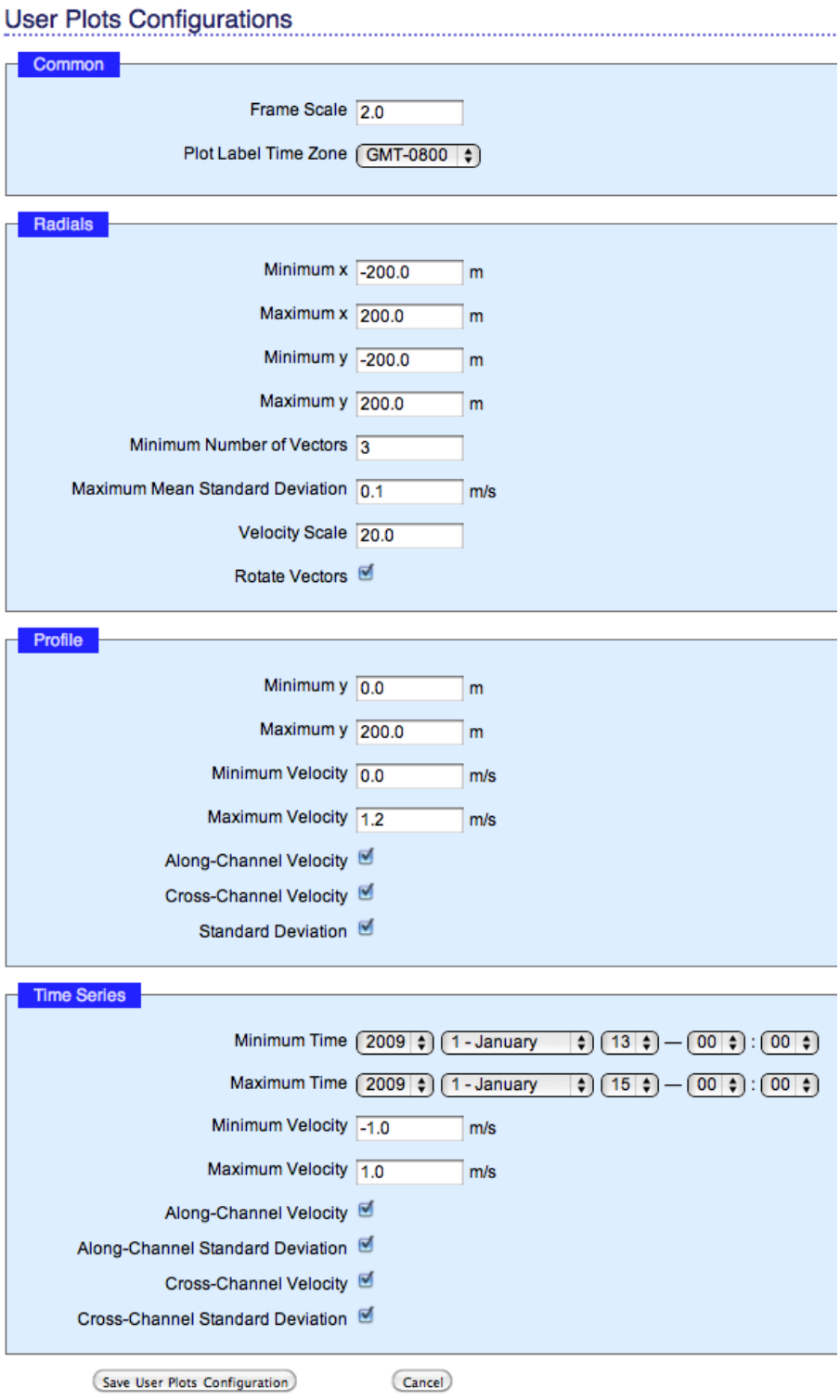

Figure 3.15: User plots configuration.

described above. New values for the time series plot can be saved, or the plot can be generated without saving the parameters. Note that the time zone setting is used in the radials and profile plots as well as the time series plot, so if that parameter is changed and saved, it will affect the annotation of all three plot types.

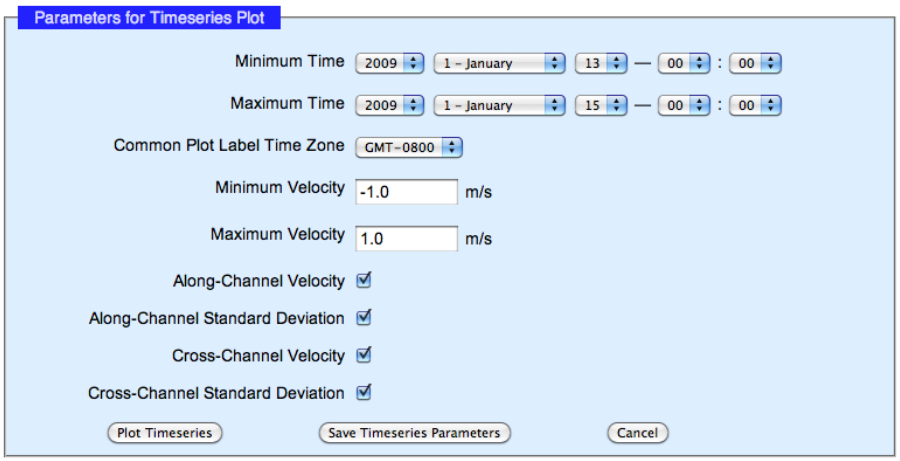

Figure 3.16: Plot time series parameters.

Waveform explorer

The waveform explorer (Figure 3.6) provides an alternative way of plotting a time series of a single variable and is intended to help find "interesting" features in the data. When invoked, a waveform configuration dialog (Figure 3.17) allows a simple selection of a variable to be plotted and a starting date and duration (specified in days). The vertical scale for the plot is selected automatically based on the data being displayed. The plot is generated directly in the browser, based on data sent from the server. Depending on the time interval plotted, adjacent data points may be averaged together to limit the number of data points in the plot to about 1500.

When the **Plot Waveform** button is pressed, a plot is displayed in the format of the example below (Figure 3.18). The configuration dialog remains visible with the plot below it, so that changes in the configuration can be made easily. The plot is displayed in two panels: the top panel is the main plot, and the bottom panel is the context. Clicking and dragging the mouse across a portion of the plot on either panel zooms in on the selected region. Clicking and dragging on the bottom panel, including dragging across the entire length of the panel, can be used to zoom

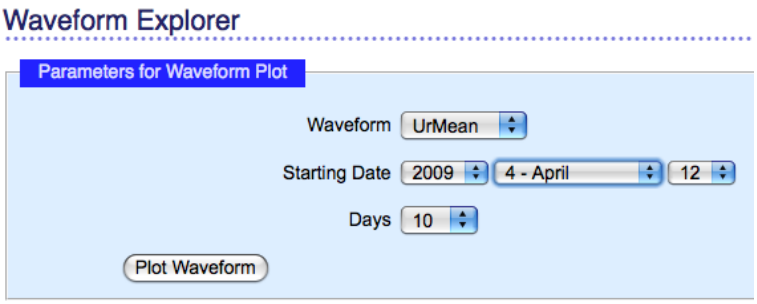

Figure 3.17: Waveform explorer configuration.

out. The starting and ending times of the zoomed plot, and the number of points averaged together, are noted in the annotation on the top panel. The portion of the zoomed data displayed in the top panel is highlighted in the bottom panel. Zooming in is limited to avoid intervals of less than two hours. Gaps in the data of 15 minutes or less are filled by linear interpolation, while gaps of longer duration are plotted with separate line segments. By starting with a long interval, up to 100 days, and then zooming in on a section with some unusual feature, it should be possible to quickly identify times for further study, either in the dataset table (Figure 3.7) or in the file archive (section 3.3), below.

3.3 Files

The Files menu (Figure 3.19) allows browsing and display of radials and profile files in the data archive. It is independent of the database, working directly with the directory structure of the archive.

The operation of the file browser is similar for radials and profile files, the main difference being the starting point for the top level of the directory tree. Directory and file listings are displayed in two related tables. The top table displays directories, initially organized by date, and when a directory is selected (only one can be selected at a time), the bottom table displays the files within the selected directory.

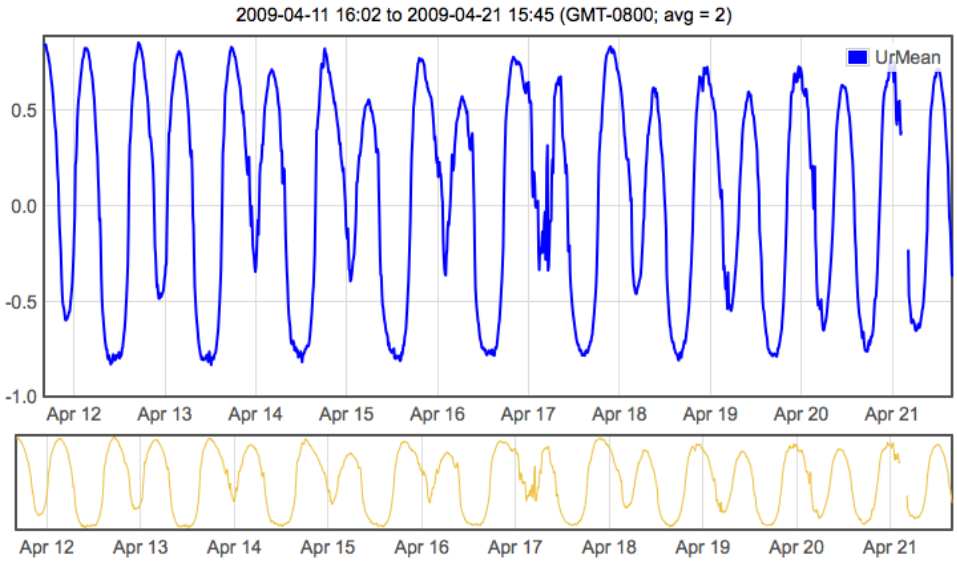

Figure 3.18: Waveform explorer example.

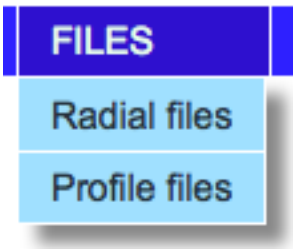

Figure 3.19: File browser menu.

Radial files

The file browser display for a set of radial files is shown in the radials file browser (Figure 3.20) below. A single directory is selected in the top table, and the files within that directory are displayed in the bottom table, with several files selected for display or downloading.

Each table has a navigation bar (Figure 3.21) indicating how many files are displayed in the table (on the right side of the navigation bar) and a set of buttons for filtering, displaying and downloading the selected files (on the left side of the navigation bar).

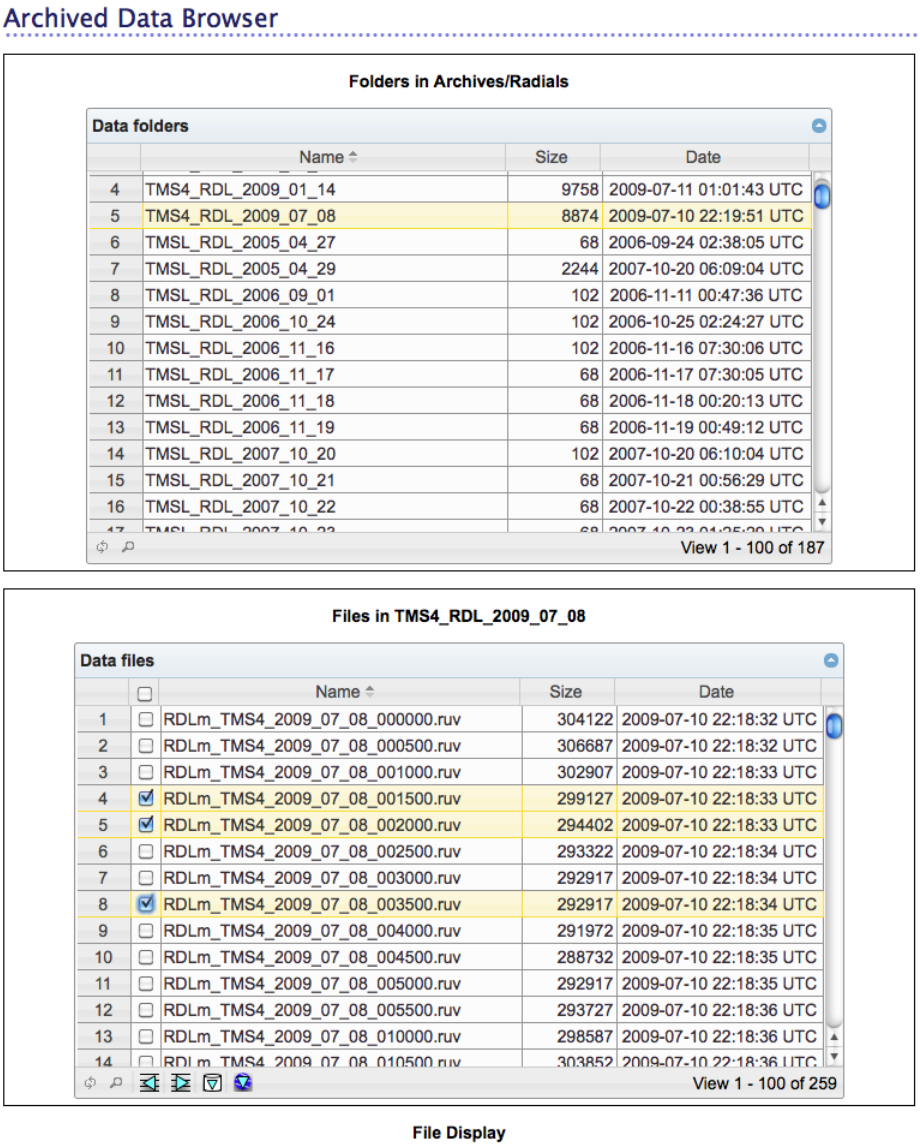

Figure 3.20: Radials file browser.

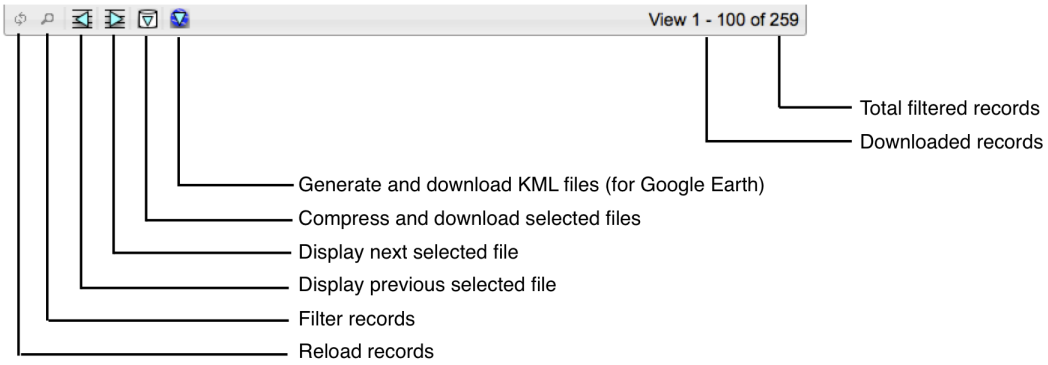

Figure 3.21: File browser navigation bar.

The buttons on the left of the file browser navigation bar (Figure 3.21) can be used to generate and download KML[5] files of radial vectors (and the associated profile) which can be displayed in Google Earth[6], compress and download the radial text files using PKZIP[7] compression, or display the selected files, one at a time.

It is also possible to filter the files and folders based on their name, size and date using the filter button and the file filter dialog (Figure 3.22). Operation of this filter is similar to the filter (Figure 3.10) for the dataset browser. The dialog starts with a single row for a single comparison. Additional constraints can be added using the **Add** button, the filter is applied using the **Select** button, the dialog is closed with the filter active using the **Close** button, and the filter is reset using the **Reset** button. The navigation bar for the folders in the top table includes only the reload and filter functions, along with the common page selection controls.

Profile files

The file browser for the profile files is very similar to that for the radials, with the directory tree listing starting at the top of the profile tree. The KML generation button is disabled for the profile files, as the KML files are generated from the radial files (although they do include information from the corresponding profile file).

[5] http://code.google.com/apis/kml/documentation/
[6] http://earth.google.com/
[7] http://en.wikipedia.org/wiki/PKZIP

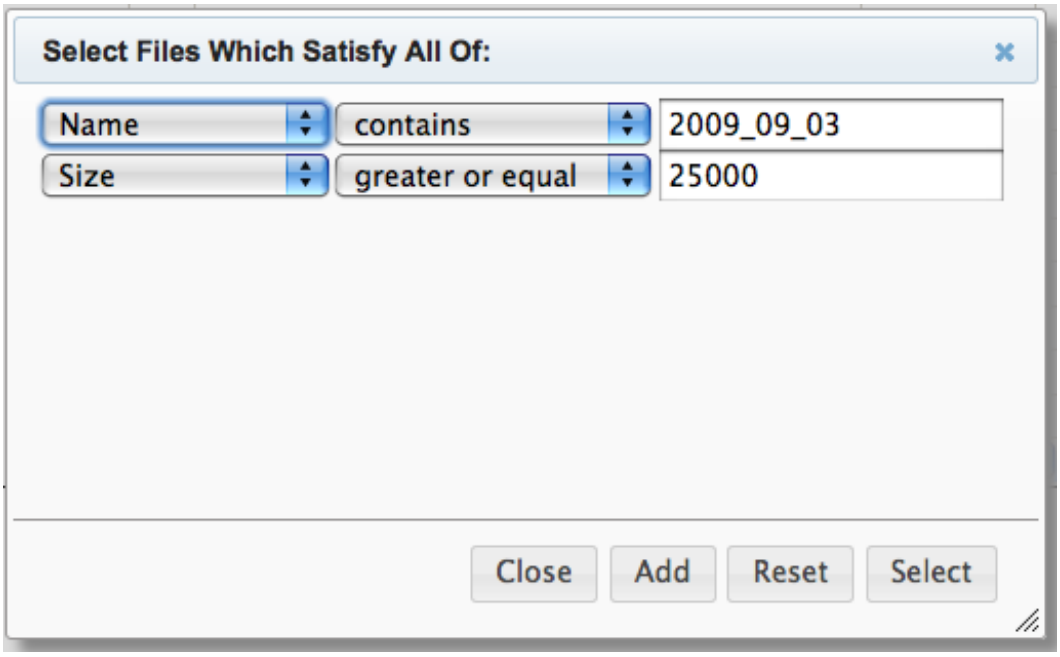

Figure 3.22: File browser filter.

3.4 Status

The Status menu is not yet implemented. Eventually it may show the status of the underlying SeaSonde data collection system.

3.5 Config

The config menu (Figure 3.23) is used to display the current values for the RiverSonde site-specific processing parameters and the data-processing system settings. These settings can be displayed by any user, but they can be changed only by an *administrative* user using the admin (section 4.1) menu.

Current RS configuration

Use the Current RS configuration entry (Figure 3.23) to display the site-specific data processing parameters currently in use. They are displayed in a table format

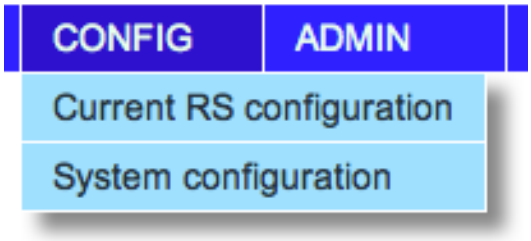

Figure 3.23: Config menu.

(Figure 3.24) which shows the current, typical, minimum and maximum values, and the units, if applicable, for each parameter. The table below shows only a portion of the entire set of parameters.

Current Configuration

Description	Current Value	Typical	Minimum	Maximum	Units
Site ID and Basic Processing Parameters					
Site name	Threemile Slough	Site name			
Site code	TMS4	XXXX			
Update interval	5	5	3	60	minutes
Averaging interval	15	15	3	60	minutes
External Stage Data					
Use stage data to update antenna height	0	0	0	1	Boolean
Reference river stage	1.32	0	-1000	1000	meters
Maximum age of trusted stage data	2.00	0	0	1000	hours
Maximum age of usable stage data	6.00	0	0	1000	hours
Basic Installation Parameters					
Direction of xr axis	178.00	90	0	360	degrees True
Direction of center antenna	76.00	0	0	360	degrees True

Figure 3.24: Current configuration fragment.

System configuration

Use the System configuration entry (Figure 3.23) to display the data-processing system settings (Figure 3.25). The *File Names* pane shows the (root) names of the database file, the site parameters file, and the system parameters file. If a single

RiverSonde is regularly moved between several sites, these files can be changed to quickly reconfigure the entire system for a different site. If the RiverSonde is normally used at a single site, it is best to leave these filenames fixed.

The *Reprocessing* pane shows the minimum and maximum times to be used for reprocessing data, and the real-time interval at which reprocessing occurs. *The Interval field should be left **blank** for normal processing; if it is **non-blank**, normal real-time processing is **disabled**. Do not change the Reprocessing fields without contacting CODAR for detailed instructions.*

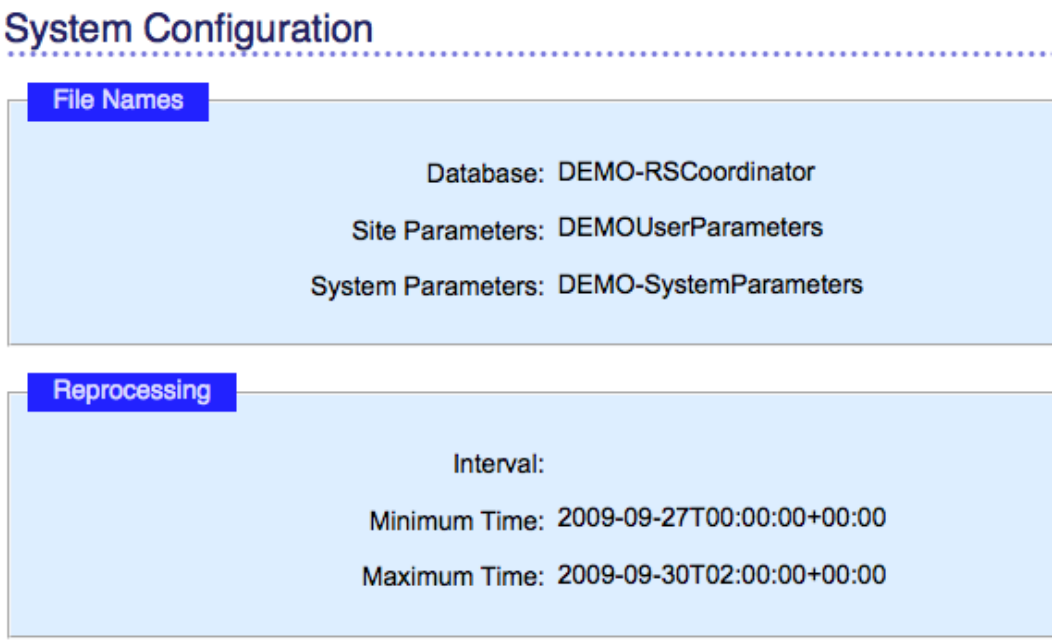

Figure 3.25: System configuration.

Chapter 4

RiverSonde Administration

4.1 Admin

Administration of the RiverSonde involves two main tasks: managing users and configuring the data processing and display parameters. Additionally, in some experimental situations, it may be desirable to reprocess previously-collected data using different processing parameters. Administrative functions are accessed via the Admin menu (Figure 4.1).

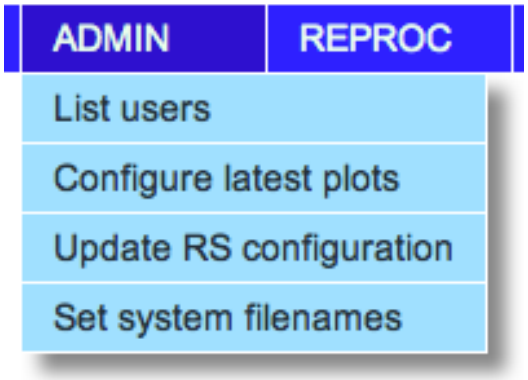

Figure 4.1: Admin menu.

List users

The List users entry (Figure 4.1), as its name implies, lists the current users in a table display (Figure 4.2) in a format similar to that for displaying data or files. Currently there are two classes of users: *user*, with access to display data and settings but not change settings, and *admin*, with full access to manage users and change settings.

RiverSonde Users

	Name	Privileges
1	DEMOAdmin	admin
2	DEMOUSER	user
3	bill	admin
4	dave	admin
5	ralph	admin
6	rsadmin	admin
7	xfer	user

View 1 - 7 of 7

Figure 4.2: Users listing.

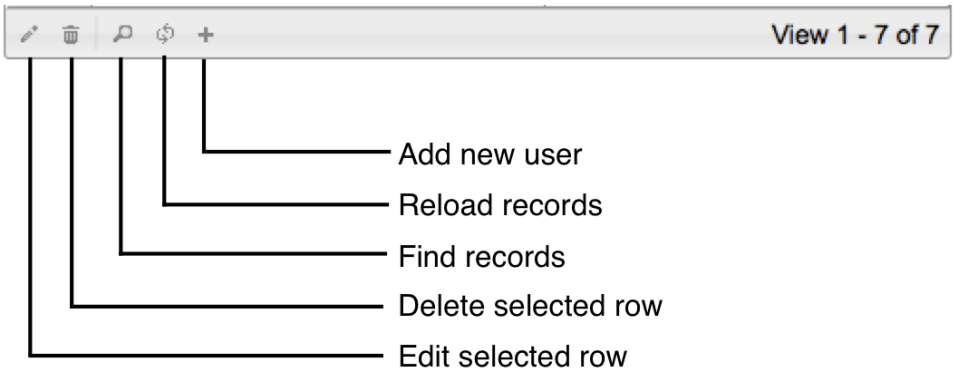

Figure 4.3: Users listing navigation bar.

The user listing displays the user names and privileges. At the bottom of the user listing is a navigation bar (Figure 4.3) with controls for editing an existing user, deleting a user, filtering users, and adding a new user.

To add a new user, click on the Add new user button (Figure 4.3). A Create new user dialog (Figure 4.4) will be displayed, with fields for the user name and password, and a popup menu for the user privileges (*user* or *admin*). Enter the appropriate values, choosing a user name that does not already exist. If the password and its verification match, the new user will be created when the **Create user account** button is pressed.

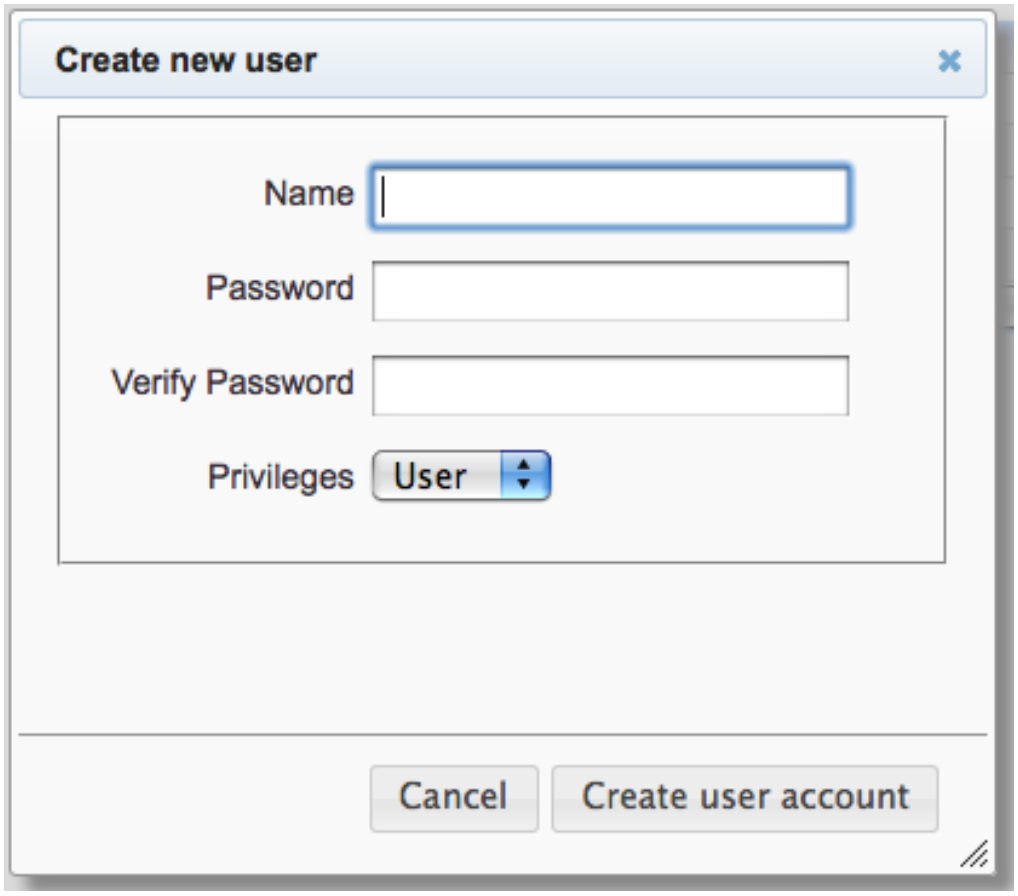

Figure 4.4: Create new user.

The privileges of an existing user can be changed by selecting one row of the user list and then clicking the Edit selected row button (Figure 4.3). An Edit Record

dialog (Figure 4.5) will appear, with a popup menu for the new privileges. Make the change and click **Submit** to save the change.

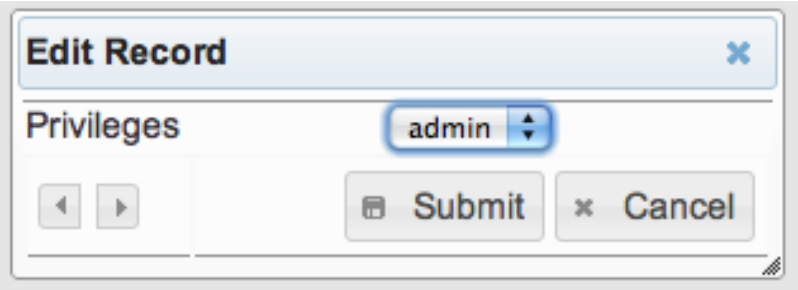

Figure 4.5: Edit a user record.

An existing user can be deleted by selecting one row of the user list and then clicking the Delete selected row button (Figure 4.3). The user will be deleted when the **Delete** button of the Delete user confirmation (Figure 4.6) is clicked. When deleting users, at least one administrative user must remain; the software will not allow all administrative users to be deleted.

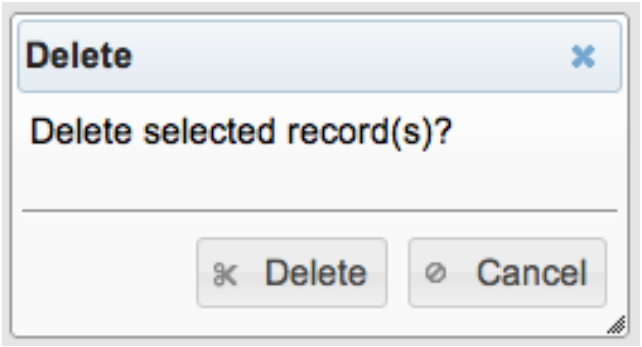

Figure 4.6: Delete user confirmation.

If the user list is large, the Find records button (Figure 4.3) can be used to display a simple Search dialog (Figure 4.7) which allows searching with a single criterion for user name or privileges. Normally the user database will be small enough that this function will not be needed.

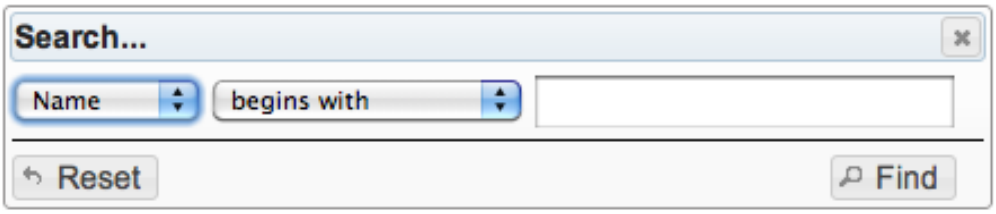

Figure 4.7: Find users.

Configure latest plots

The Config latest plots entry (Figure 4.1) opens a Latest Plot Configurations dialog (Figure 4.8) which is similar to the user plots configuration (Figure 3.15), except that it applies to the latest plots which are generated each time *RSCoordinator* runs, rather than to the plots generated by any individual user. The *Common*, *Radials* and *Profile* panes are similar to the corresponding panes for the user plots, while the time interval in the *Time Series* pane always covers a specified number of days prior to the present time. The latest plots settings also determine the format of the KML files automatically generated in the LatestData directory each time that *RSCoordinator* runs.

Update RS configuration

The Update RS configuration entry (Figure 4.1) allows the site-specific parameters to be set. It opens a large dialog with several panes, each of which will be described separately. Further details of the entries described below are described in [1].

The Site ID and Basic Processing pane (Figure 4.9) has fields for a descriptive name (*Site Name*) and a 4-character *Site Code* used to identify the site, and fields for the *Update Interval* and *Averaging Interval*, specified in minutes. It is helpful to use names and codes which uniquely identify the site, such as “Thirty Milestone Tract” and “30MT”, rather than “River Site 1” and “RIV1”. Entries for the update and averaging intervals should evenly divide 60, so appropriate values are 3, 5, 6, 10, 15, 20, etc.

The External Stage Data pane (Figure 4.10) selects whether to use external stage data to dynamically modify the effective antenna height when calculating the incidence angles of the radar and water surface. If external data are used, they must be supplied from an external source and periodically placed in the ExternalData direc-

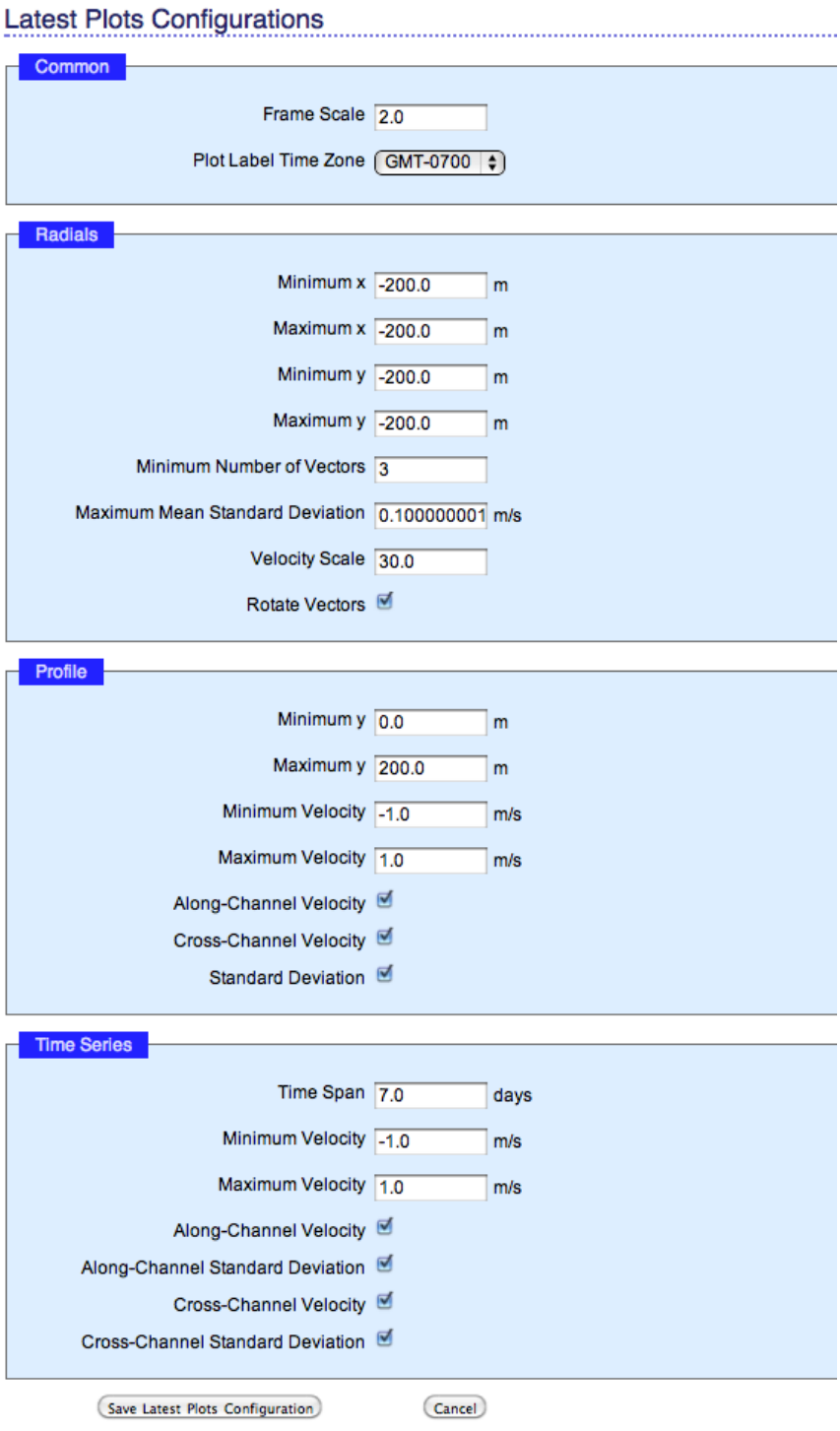

Figure 4.8: Configure latest plots.

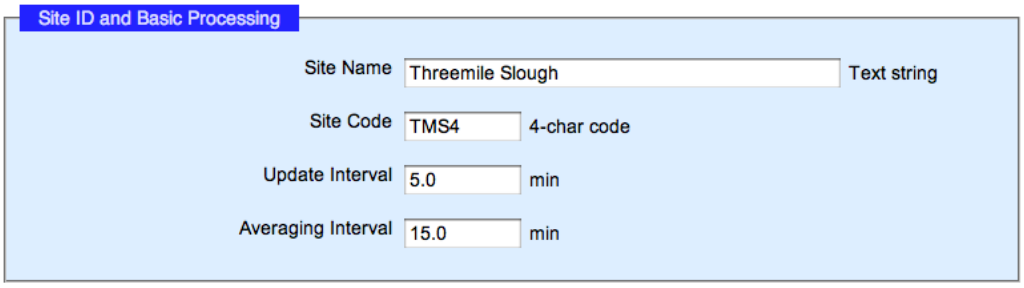

Figure 4.9: Configure site identification.

tory, as described in [1]. The RiverSonde does not require external stage data, and the remaining fields in this pane are ignored if the top check box is unchecked. If external stage data are supplied, the remain fields specify the stage reference level for the antenna height entry (in the Basic Installation Parameters pane below), and the age of trusted and stale stage data. Most installations will not use this pane at all.

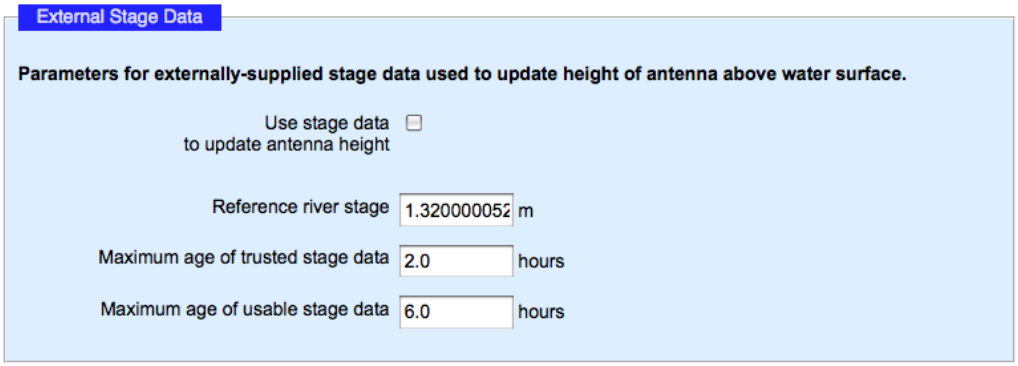

Figure 4.10: Configure external stage data.

The Basic Installation Parameters pane (Figure 4.11) is used to specify the orientation of the RiverSonde cartesian coordinate system in degrees True, the direction of the center antenna in degrees True, the height of the antenna above the water surface in meters, and the latitude and longitude, if available, of the antenna location. The RiverSonde coordinate system is a "right-handed" system with the positive x-axis along the river direction and the positive y-axis running from the RiverSonde across the river 90 degrees counter-clockwise from the x-axis, as illustrated in the figure in

the pane. Ideally, the antenna direction is along the y-axis, but it can differ by several degrees. The latitude and longitude are used for the origin of the radial vectors written to each radials file, and for georegistration of the KML files. Latitude and longitude can be entered as decimal degrees, degrees and decimal minutes (separated by a space), or degrees, minutes and seconds (separated by spaces). They will be converted to decimal degrees when the next text field is selected. Enter negative degrees for west longitude or south latitude. If the latitude and longitude are not available, they can be specified as zero, but the geographic locations of the radials in the radials files will be wrong (these files also contain offsets in meters from the antenna location), and the KML files will not be properly registered. If the directions are not available, they can be entered as 0 and 90 degrees True, but the directions of the radial vectors will only be relative to the x-axis, and again the KML files will not be properly registered.

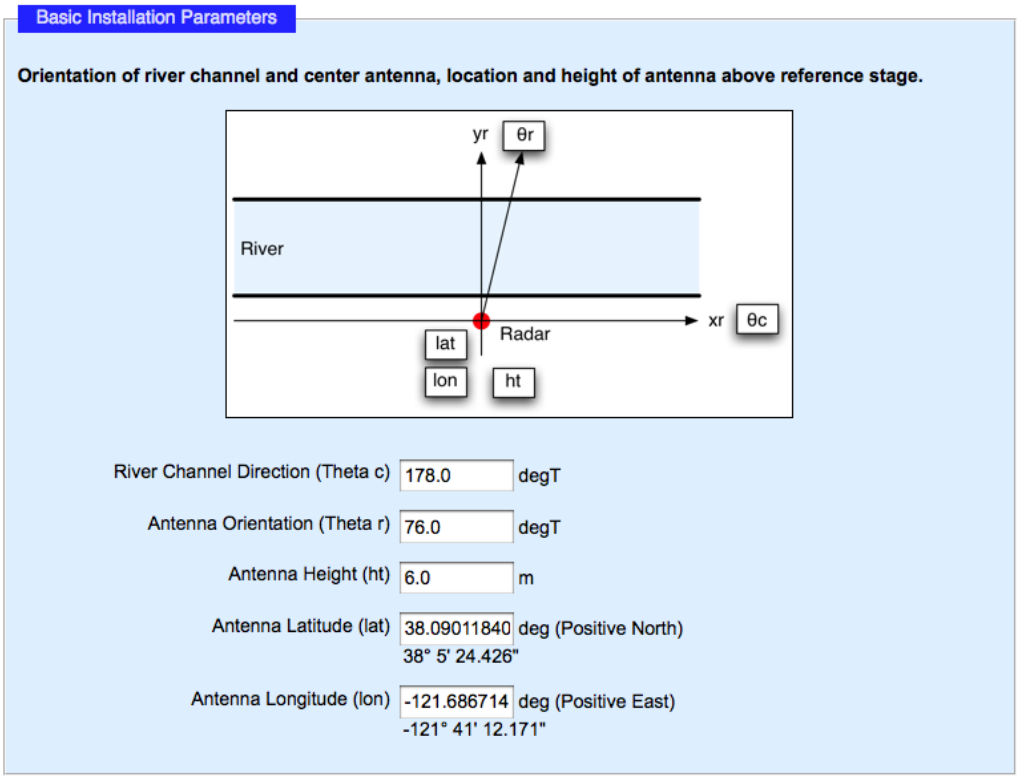

Figure 4.11: Configure basic installation parameters.

The Direction Finding Search Limits pane (Figure 4.12) sets the direction-finding limits for the direction search algorithm. Angles are measured from the direction

of the center antenna, with clockwise angles positive. Typically the limits will be -90 and 90 degrees, but they could be smaller to restrict signals from directions suspected to result in extraneous solutions, or larger if the antenna is over the water (perhaps on a pier extending out from the shore).

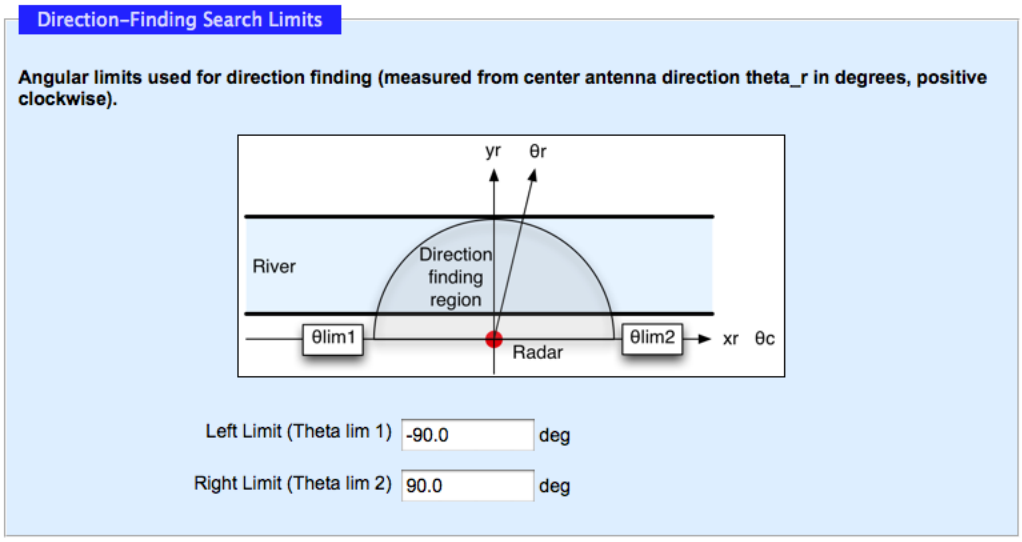

Figure 4.12: Configure direction finding limits.

The Data Processing Domain pane (Figure 4.13) is used to specify the rectangular area over which radial vectors are computed. It represents the area over which the water conditions, especially the surface roughness, are essentially uniform. If a bridge carrying automobile traffic is nearby, it may be desirable to set the data processing domain to exclude the bridge so that radar echoes from the traffic are less likely to be confused with echoes from the water waves. Distances in meters are measured from the location of the antenna, using the coordinate system specified in the basic installation parameters (Figure 4.11). The radials calculated using the direction-finding search limits and processing domain box are written to a radials file on each processing cycle.

The Velocity Profile Estimation pane (Figure 4.14) specifies the rectangular area within the data processing domain used to estimate the along-channel and cross-channel components of the velocity profile as a function of distance (in the direction of the y-axis) across the channel. The profile is estimated using a least-squares fit of all the radial vectors falling within a narrow strip parallel to the river direction as the strip is moved across the channel, as described in [1]. The width of the strip, typically 5 m, along with the distance across the channel, sets the number of

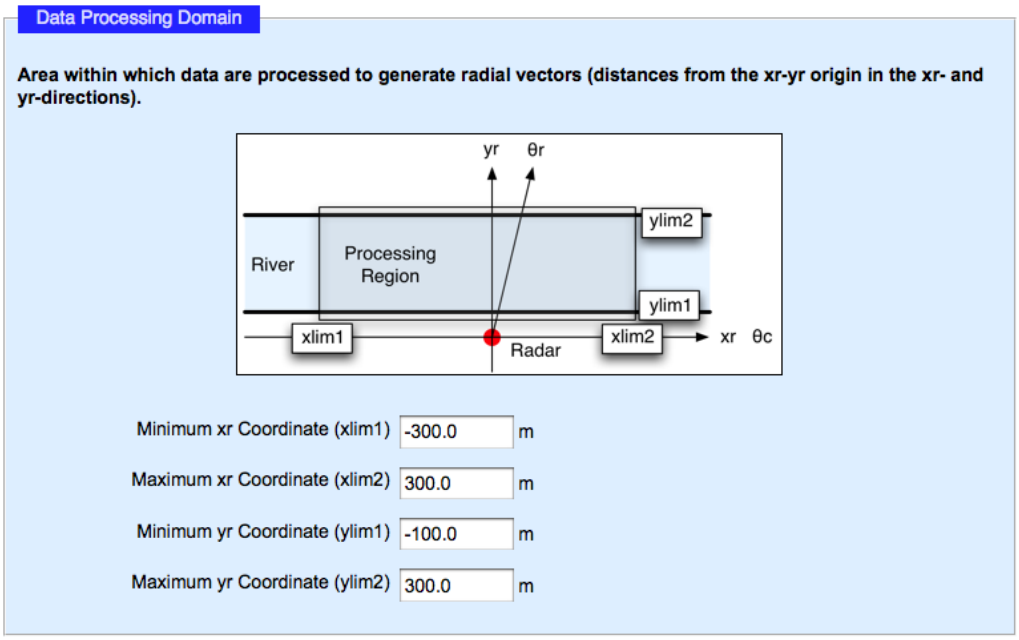

Figure 4.13: Configure data processing domain.

points used to estimate the velocity profile. The strip width should not be set much smaller than the basic range resolution of the radar, which is determined by the radar bandwidth. The profile estimate is written to a profile file on each processing cycle.

The mean velocity is calculated from a portion of the velocity profile. The Mean Velocity Estimation pane (Figure 4.15) determines the limits (distance across the channel, measured from the antenna locaton) over which the profile is averaged to calculate the mean along-channel and cross-channel components. The mean velocity estimate is added to the database on each processing cycle.

The Velocity Filtering and Transformation pane (Figure 4.16) is used to specify the maximum velocity accepted for both the radials and the profile calculations; it may help to reject spurious values resulting from signals from interfering targets, such as automobile traffic on a nearby bridge or ship traffic on the water. The two check boxes can be used to reverse the polarity of the along-channel or cross-channel velocity components when the velocity profile and mean velocity are recorded. The "native" polarity is positive in the $+x$ and $+y$ directions, but these may not be the predominant or downstream directions. The polarity reversal choices do not affect the radials written to the radials or KML files.

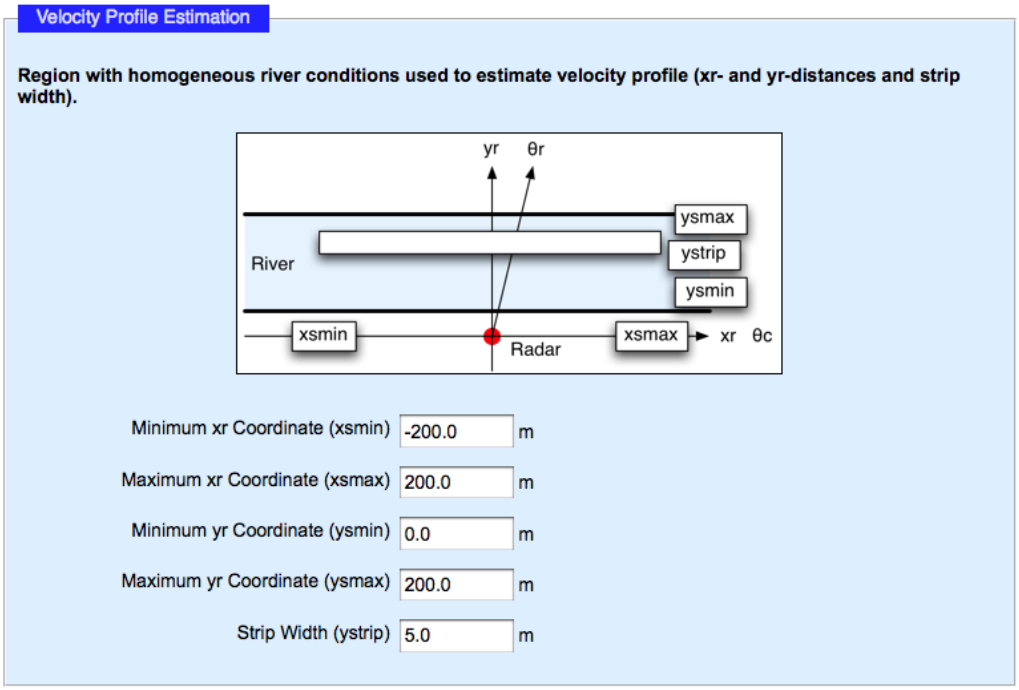

Figure 4.14: Configure velocity profile estimation.

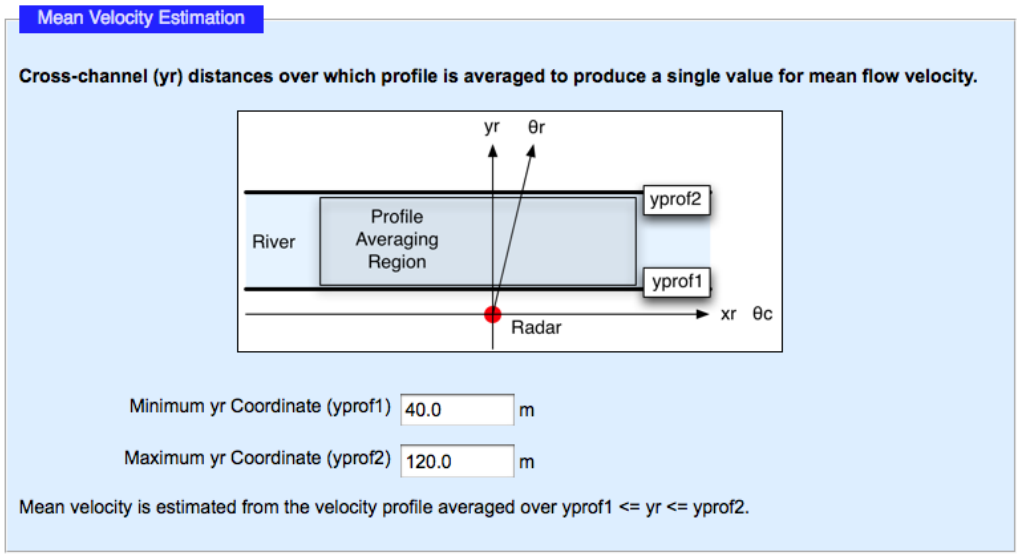

Figure 4.15: Configure mean velocity estimation.

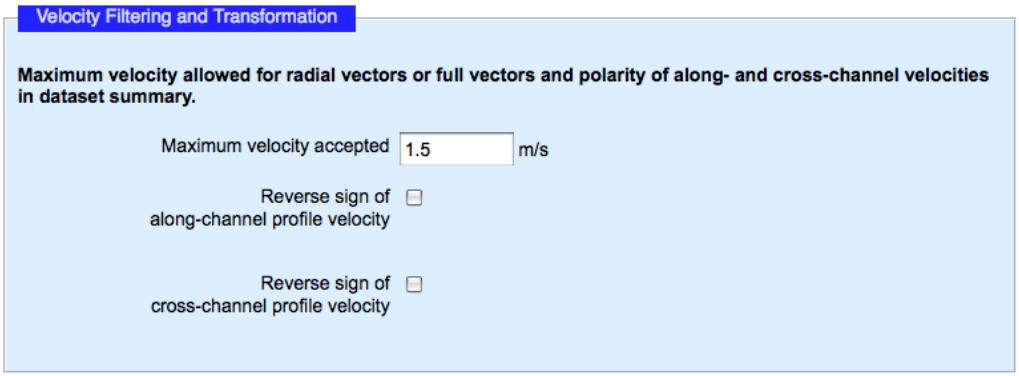

Figure 4.16: Configure velocity transformation.

When all of the configuration fields have been set, the changes can be saved using the Save Changes button (Figure 4.17) at the bottom of the dialog. If all of the values entered above are within their limits, the changes are written to the configuration file. If one or more values are outside their limits, the text boxes for those values are outlined in red and the reasons for rejecting the values are summarized at the top of the dialog. Once the values are correct, the entire set of parameters can be saved.

Figure 4.17: Save configuration changes.

Set system filenames

The Set system filenames entry (Figure 4.1) is used to quickly change the data-processing system settings and the site-specific configuration files using the System File Names dialog (Figure 4.18). It is intended for cases where a single RiverSonde may be moved among several different locations. In such situations, it may be desirable to use a separate database file for each location, and the system settings may be different for the different locations. If the RiverSonde is normally used at a single site, it is best to leave these filenames fixed.

The **Database** pane selects one of several existing database files, or a (root) name for a new file can be specified. The **Site Parameters** pane selects one of several

existing site parameter files (configured using the Update RS configuration (4.1) procedure above), or a (root) name for a new site parameters file can be specified. The **System Parameters** pane selects one of several existing system parameter files. Finally, the **Antenna Pattern** pane selects one of several existing antenna pattern files.

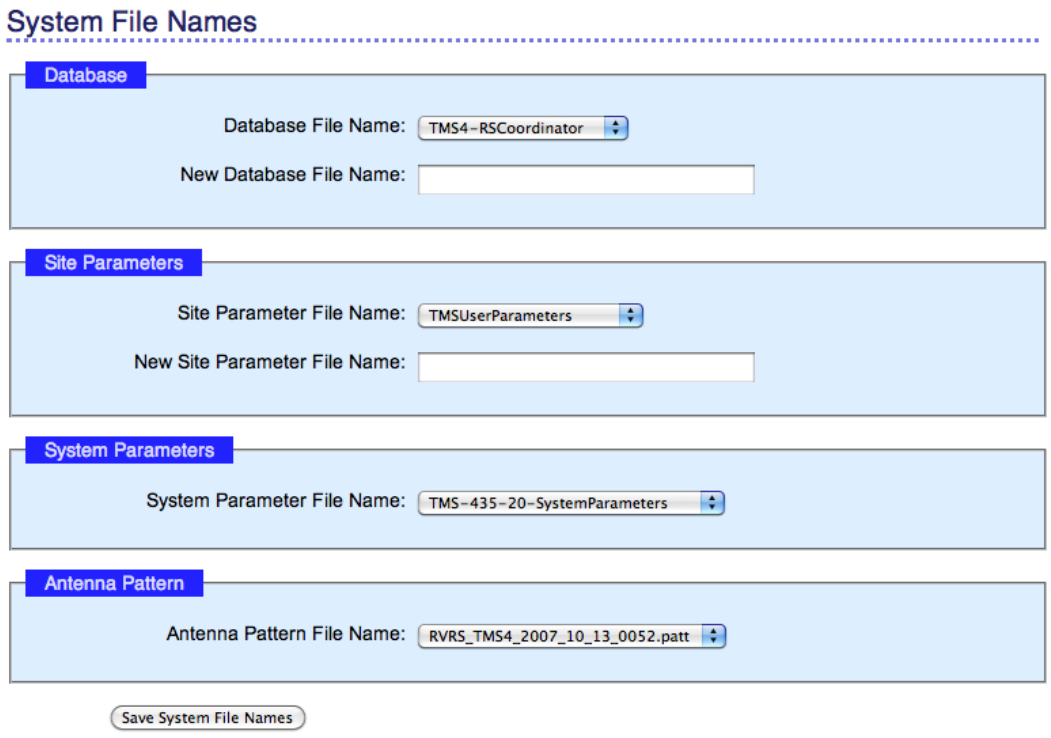

Figure 4.18: Set system filenames.

If any of the system filenames are changed, the *RSCoordinator* and web interface programs are automatically restarted when the **Save System File Names** button is activated. A new database file will be used automatically after the restart. If a new site parameters file was created, it should be updated as described in the Update RS configuration (4.1) procedure above and saved immediately after the restart is completed, as all of the entries in the newly-created site configuration file will be blank. Creating a new site parameters file or database file this way is useful when moving the RiverSonde to a new location.

The entries in the system parameters file must be set (and a new system parameters file should be created) using a property-list editor program (*Property List Editor*, *Pref Setter*, etc.), because the property list format must be followed exactly. There is

no graphical interface comparable to the RiverSonde configuration procedure (4.1) above, and discussion of the contents of the system parameters file is beyond the scope of this document. If it is necessary to change any of the system parameters, consult CODAR for detailed instructions. Similarly, the generation of an antenna pattern file is beyond the scope of this document. If the contents of an active system parameters file are changed, the *RSCoordinator* and web interface programs should be restarted using the Restart programs entry (Figure 4.19) described below.

4.2 Reproc

The Reproc menu (Figure 4.19) is used in unusual situations in order to reprocess data offline. Normally the RiverSonde processes data in real time and this function is not needed. However, in certain experimental situations, it may be desirable to reprocess some data using different site-specific or system parameters.

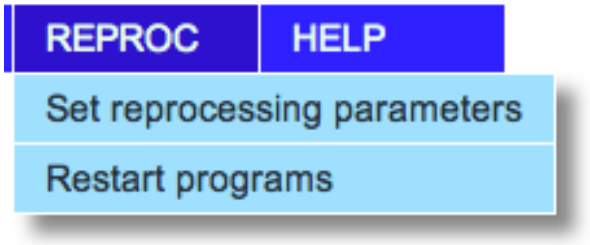

Figure 4.19: Reprocessing menu.

Set reprocessing parameters

The Set reprocessing parameters entry (Figure 4.19) displays the Reprocessing Parameters dialog (Figure 4.20). This dialog has entries for the starting and ending times of the block of data to be reprocessed, and an *Interval* field which determines the time interval, in minutes, between reprocessing each data block. Reprocessing a block of data usually takes less than a minute, so a typical value for this field, if it is used at all, is 0.5.

The entire reprocessing procedure is fairly complicated and is beyond the scope of this document. *The **Interval** field should be left **blank** for normal processing; if it is **non-blank**, normal real-time processing is **disabled**. Do not change the Reprocessing fields without contacting CODAR for detailed instructions.*

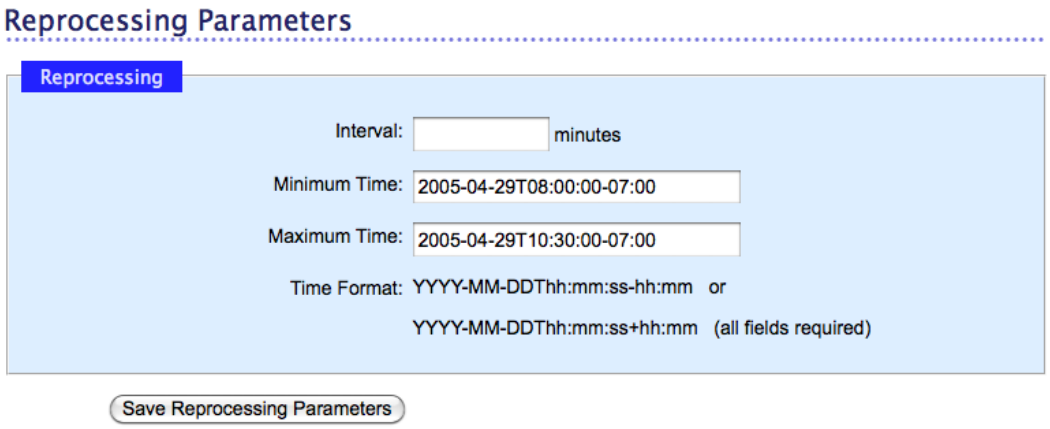

Figure 4.20: Reprocessing parameters.

Restart programs

The Restart programs entry (Figure 4.19) restarts both the *RSCoordinator* and web server programs. If any entries in the reprocessing parameters pane (Figure 4.20) are changed, or if the contents of any of the selected system files are changed, it is necessary to restart the processing programs, as these entries are read only when the processing programs are started.

Chapter 5

Help System

5.1 Help

The Help menu (Figure 5.1) allows viewing documentation online and downloading documentation in PDF format.

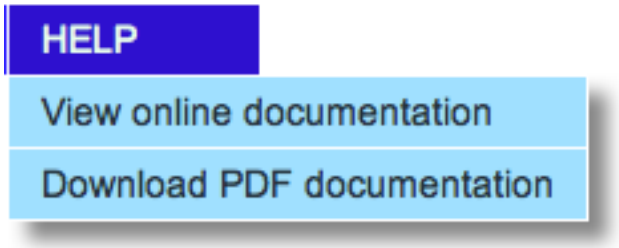

Figure 5.1: Help menu.

View online documentation

The *View online documentation* item opens an HTML version of this document in a new window. The documentation window can be positioned and resized so that both the documentation and the normal RiverSonde web interface are both visible.

Download PDF documentation

The *Download PDF documentation* item downloads a PDF version of this document. Most browsers will either download the file directly or ask whether the downloaded file should be saved, and possibly allow the location for the file to be specified.

Bibliography

[1] *RiverSonde(TM) Non-Contact River Monitor Model 100 Documentation.* CODAR Ocean Sensors, Ltd., 2006-10-02. 1, 7, 30, 32, 34