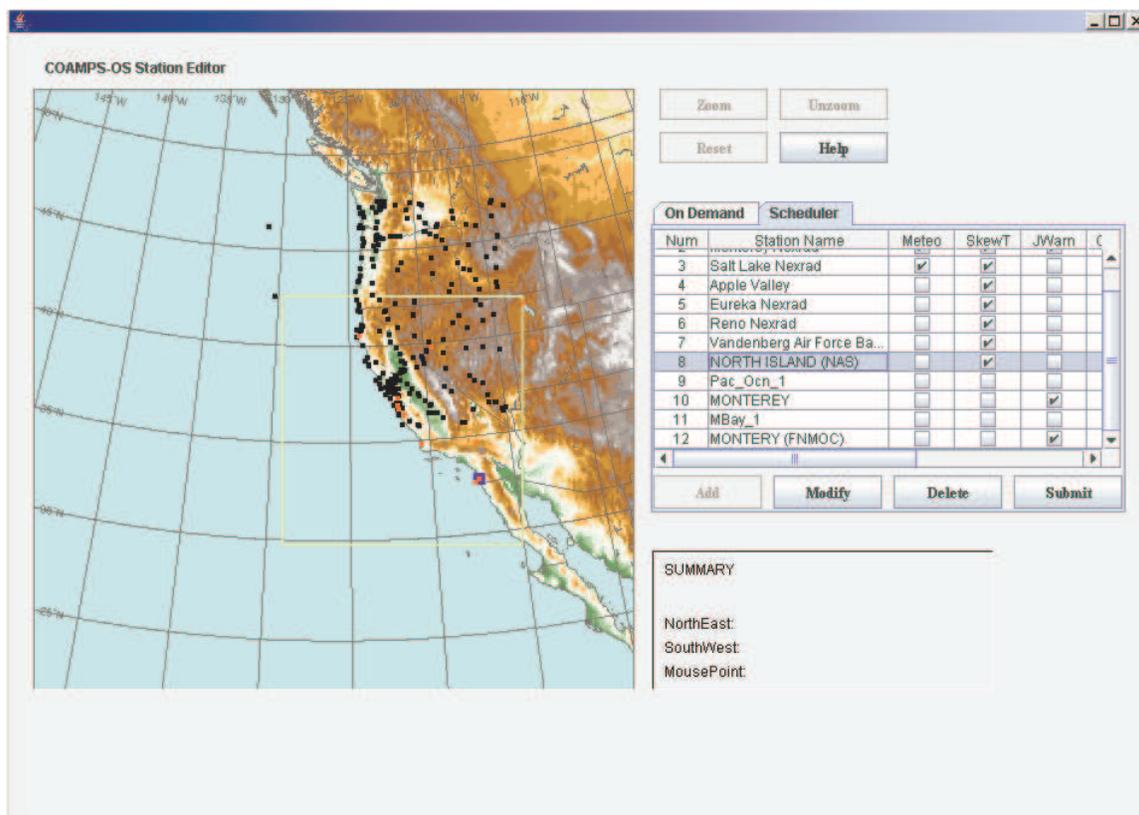


The Station Editor Graphical User Interface (GUI) for COAMPS-OS™* version 1.3

User's Guide

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Prepared by:

Mr. Daniel Martinez
Computer Sciences Corporation (CSC)
Monterey, CA

Mr. Daniel Geiszler
Science Applications International Corporation (SAIC)
Monterey, CA

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I. SYSTEM OVERVIEW

1.1 COAMPS-OS™

COAMPS-OS™ is a fully functional automated, portable, atmospheric nowcast/forecast/data assimilation system. COAMPS-OS™ allows the forward deployed user to make use of the growing volume of perishable atmospheric data available on-scene. COAMPS-OS™ utilizes either large-scale model or mesoscale model gridded data fields as a first guess. The data fields can be augmented with local observations, satellite data, and other fields provided by a central or regional center.

COAMPS-OS™ maintains an organic data assimilation capability consisting of automated quality control (QC) software, a multivariate optimum interpolation (MVOI) atmospheric analysis, the COAMPS™ Ocean Data Assimilation System (CODA), and the COAMPS™ model. These components are controlled through the COAMPS-OS™ graphical user interface (GUI), which allows the user to select and visualize customized output. The output data field products from COAMPS™ are stored in the Tactical Environmental Data Server (TEDS). The COAMPS™ output fields may be accessed to produce custom visualization products, such as meteograms. For more information on COAMPS-OS™, refer to the COAMPS-OS™ User Manual listed in Section 6 of this document. To obtain the COAMPS-OS™ software and a list of hardware requirements, contact the Naval Research Laboratory at:

Naval Research Laboratory
7 Grace Hopper Avenue, Stop 2
Monterey, CA 93943

1.2 METEOGRAMS

A meteogram is a graphical representation of the meteorological state of the atmosphere over time at a single geographical point. The visualization component of COAMPS-OS™ generates meteograms as part of the automated post-processing of COAMPS™ data.

1.3 SKEW-Ts

A skew-t is a vertical profile of temperature, dewpoint, wind speed, and wind direction at a single geographical point and a single point in time. The visualization component of COAMPS-OS™ creates skew-t graphics at frequencies determined by the “Frequency of Sigma Output” selection in the COAMPS-OS™ Forecast Panel.

1.4 THE STATION EDITOR GUI

The Station Editor GUI is a user-friendly, web-enabled interface to add or remove stations from a COAMPS-OS™ project's meteogram/skew-t configuration file. Output selections for each COAMPS-OS™ project determine the COAMPS™ data available to generate meteograms and/or skew-t products. Skew-T products are created during each model forecast hour. Meteograms are created following each COAMPS™ forecast. COAMPS-OS™ version 1.3 introduces a new feature called 'Products on Demand', to interactively run the meteogram/skew-t processes on the server and view output products once the process completes.

The Station Editor GUI allows the user to select WMO stations extracted from TEDS or create user-defined stations for a COAMPS-OS™ project. The GUI gives the user the ability to select the graphical product type: meteogram and/or skew-t.

In addition to the meteogram and skew-t functionality described above, the Station Editor GUI contains additional configuration tools for a new COAMPS-OS™ 1.3 capability called JWARN. JWARN is described in Section VI.

A unique feature of the Station Editor GUI is the ability to operate on any computer platform capable of running Java Web Start including Windows and Linux. Requirements and capabilities of the Station Editor GUI are described in the following sections.

II. LAUNCHING THE STATION EDITOR GUI

2.1 SYSTEM AND SOFTWARE REQUIREMENTS

The Station Editor GUI will run on any computer platform with a web browser and Java Web Start. Recommended browsers include: **Internet Explorer 5.0** (or higher) or **Netscape 6** (or higher). Recommended versions of Java include the **Java Runtime Environment (JRE) 1.4** (or higher) and **Java Web Start 1.4** (or higher). Documentation about Java and the latest JRE and Java Web Start can be found at:

<http://java.sun.com>

2.2 INSTALLING THE STATION EDITOR GUI

The Station Editor GUI is a Java Web Start application that must first be downloaded and installed on the user's PC before it can be run. The GUI consists of a Java jar file that is downloaded from the COAMPS-OS™ web server with a configuration (.jnlp) file.

To download and install the Station Editor GUI, first open the COAMPS-OS™ homepage by opening a web browser and typing in the web address (URL) of the COAMPS-OS™ homepage. Under the **Applications** column, select **Station Interface** (Fig. 1).

After selecting ‘**Station Interface**’, the browser will automatically invoke the Java Web Start application after downloading the “.jnlp” file. Java Web Start will assist the user with the process of downloading and installing the application. Java Web Start will give the user the option of creating a link to the Station Editor GUI on the user’s desktop. After the application has been downloaded and installed, the system will not download the application again unless either the jar file or the “.jnlp” file are updated on the COAMPS-OS™ web server.

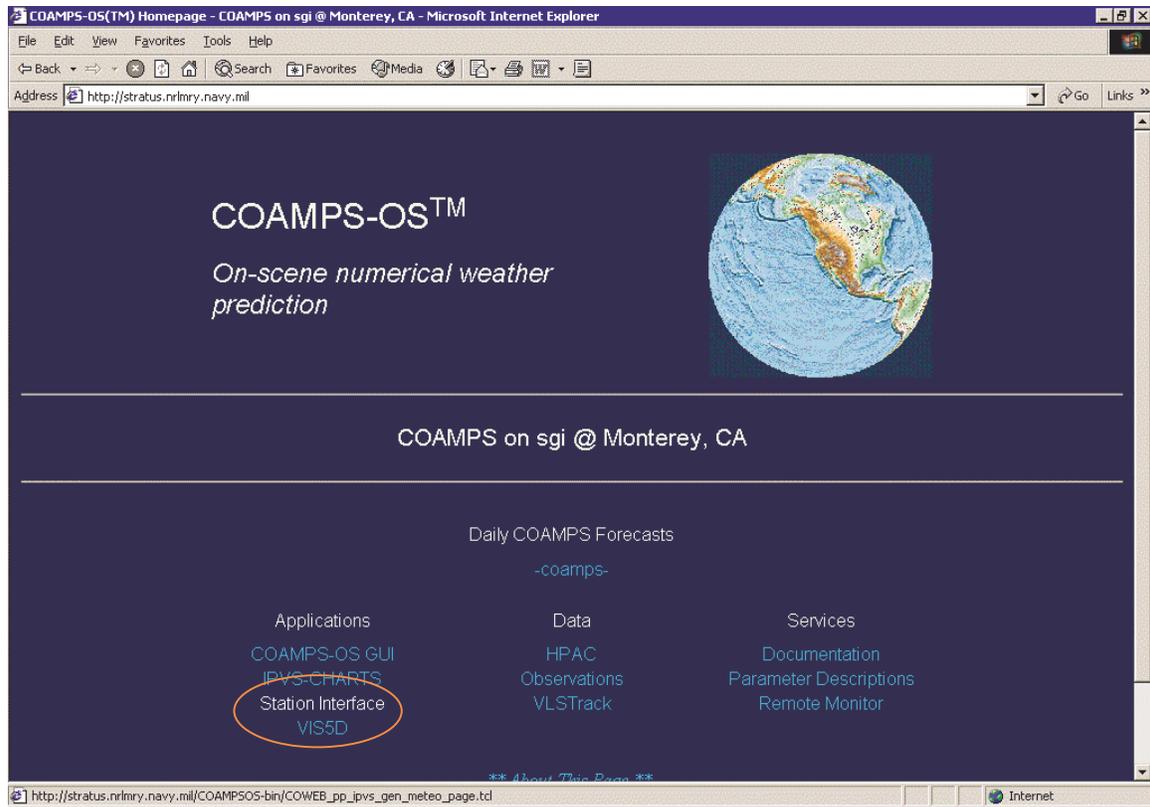


Figure 1. The Station Editor GUI can be accessed from the COAMPS-OS™ Homepage by selecting the **Station Interface** link. The link is circled in **RED** in Figure 1.

2.3 AVAILABLE REGIONS

After running the Station Editor GUI, the user will be prompted for a username and password. A username and password can be obtained from the COAMPS-OS™ Administrator. After entering a valid username and password, the GUI will display a new window containing two frames (Fig. 2). Each image in the left frame represents an area defined as a COAMPS-OS™ project. The project name is displayed beneath each image. If the area of interest is not available from the images shown in the left frame, contact the local COAMPS-OS™ administrator to set up a new COAMPS™ project. To select an image to load into the Station Editor GUI, click on the image.

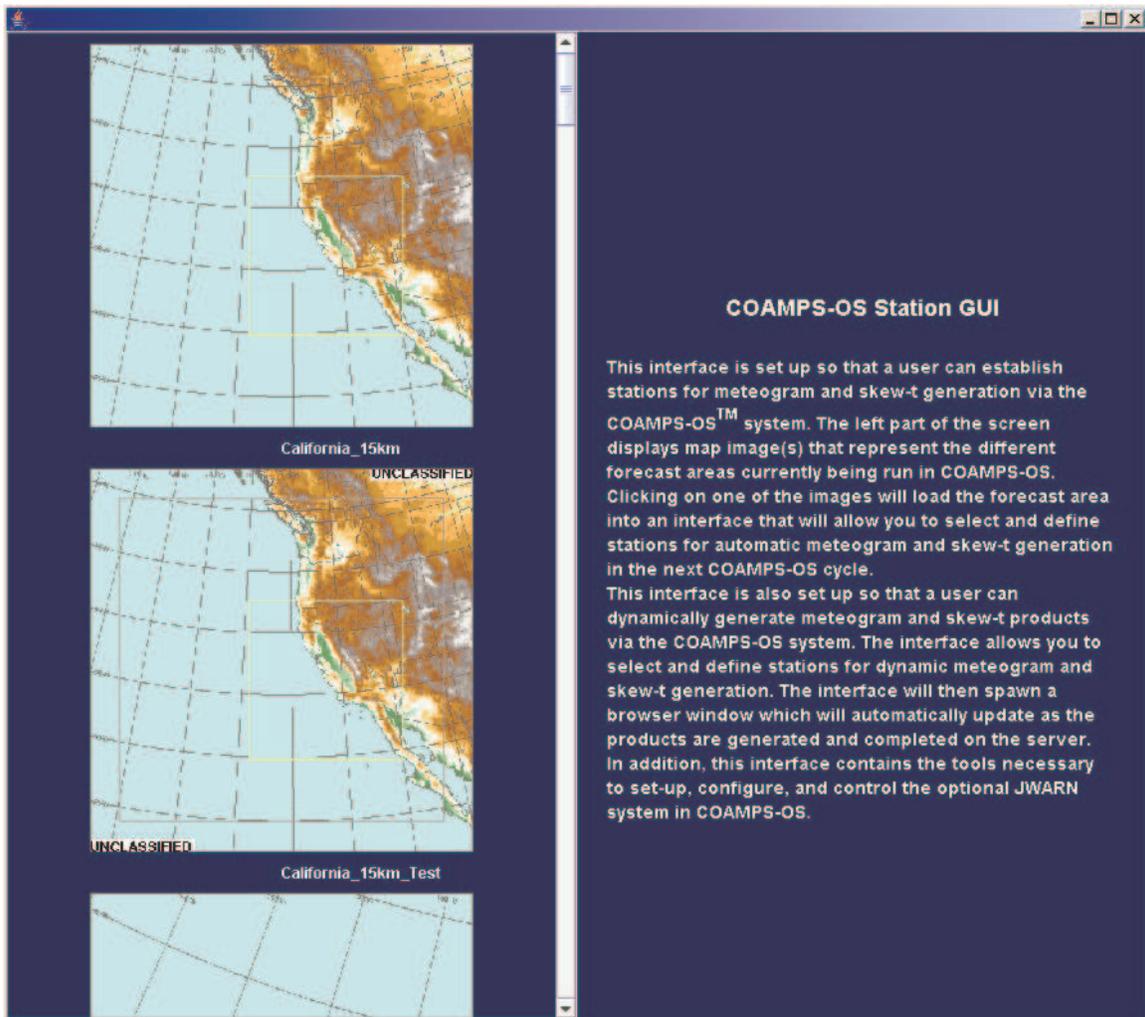


Figure 2. Clicking on an image shown in the left frame loads a project into the Station Editor GUI.

2.4 THE STATION EDITOR GUI MAIN SCREEN

After selecting a COAMPS™ area (Section 2.3), the application will load the selected area (project) into the main Station Editor GUI screen.

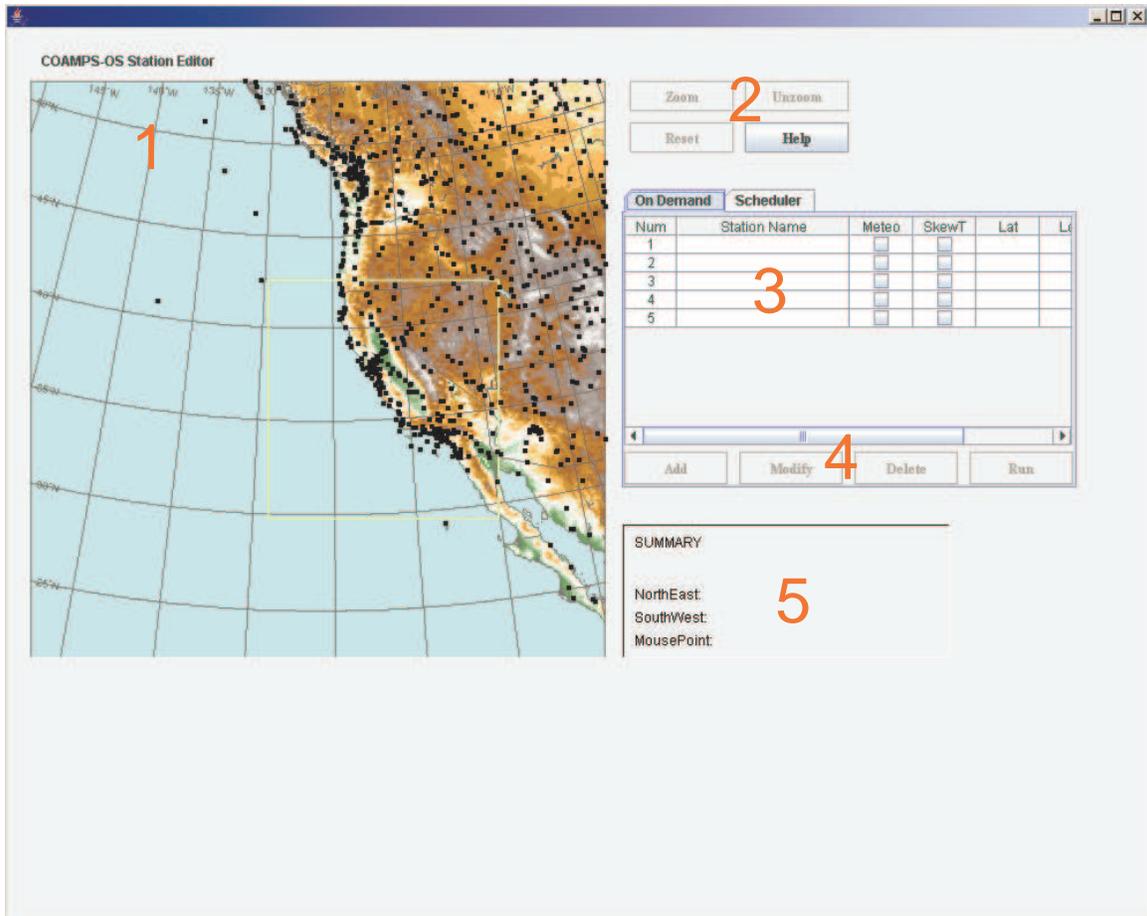


Figure 3. The Station Editor GUI is loaded with a project after the user selects an image from the left frame shown in Figure 2. The **RED** numbers shown in Figure 3 correspond to descriptions included with Section 2.5.

The Station Editor GUI includes the following components highlighted in Figure 3:

1. A map image is shown in the left panel of the Station Editor GUI. The Station Editor GUI will modify the configuration file for the selected COAMPS™ area.
2. Zoom, Unzoom, Reset, and Help buttons are available in the upper right panel.
3. A table of stations is available in the middle section of the right panel. The table has been divided into two separate tabs, “On Demand” and “Scheduler”. The first tab, “On Demand”, is used to select stations to send to the server to create meteogram and/or skew-t graphics interactively. The second tab contains a list of stations to be saved to a configuration file on the COAMPS-OS™ server. The attributes of each station include the latitude, longitude, station id, call sign, and checkbox options for producing meteograms or skew-t products automatically with each COAMPS™ model run. The table is scrollable to view the contents of each column.

4. The Add, Modify, Delete, and either the Run or Save buttons are available below the table of stations. The Run button will be shown under the “On-Demand” tab, and the Save button will be shown under the “Scheduler” tab. The buttons are used to modify the contents of the stations table, run a meteogram/skew-t process, and/or save information to the configuration file.
5. A summary information box is available in the lower right corner of the Station Editor GUI. The summary box contains information describing the map display including the latitude/longitude of the cursor position and corner points of selected regions on the map.

III. USING THE MAP DISPLAY

The Station Editor GUI contains a fully interactive map display to select stations for a COAMPS™ project.

3.1 STATION LOCATIONS

The Station Editor GUI may require a few seconds to load as the GUI retrieves station names and locations from TEDS. Following the station retrieval, the GUI will show two sets of stations on the map:

1. Stations currently defined in the configuration file (**RED** dots)
2. WMO stations extracted from TEDS (**BLACK** dots)

To view information for a station shown on the map, double-click over a station location. A new window will appear containing information for the selected station.

For some areas, station locations may be clustered too tightly to select the station location of interest. To reduce the clustering of stations, the user may magnify (Zoom-In) the station map as described in Section 3.2. Zooming into a map allows the user to reduce the station density and make station selection easier.

* Note: If the station of interest cannot be found on the map, the user can use a feature in the Station Editor GUI to highlight the station location on the map. See **Highlighting Stations On The Map** in Section 4.5 for more information.

3.2 SELECTING AN AREA

To select an area for adding stations into the station configuration file, press the left mouse button over the map and move the mouse to create a box bounded by a dashed line (Fig. 4). To modify the size of the box, release the mouse button and move the cursor over the dashed lines so the cursor changes from an arrow with a single point to a double arrow. After the cursor has changed to the double arrow, hold the left mouse

button and move the mouse to expand or contract to box. After completing any modifications to the size of the box, release the left mouse button.

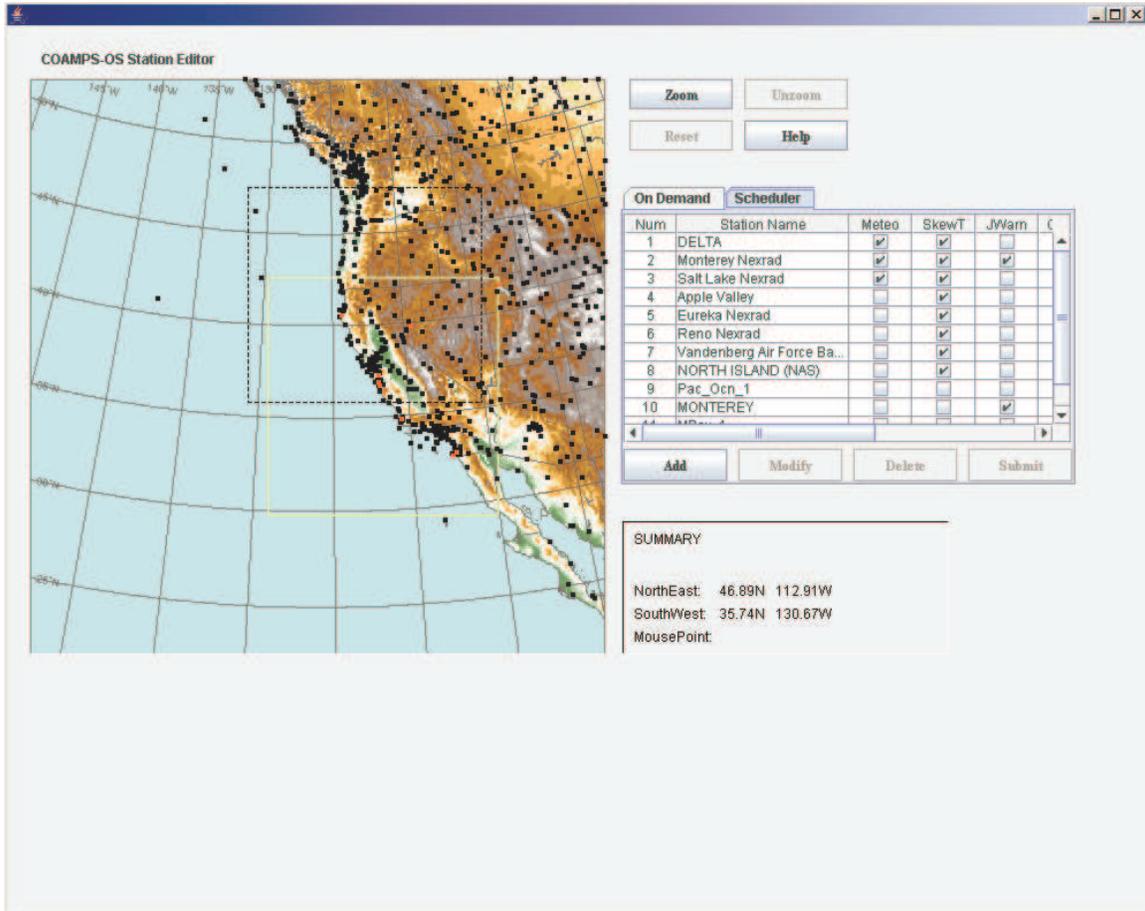


Figure 4. A bounded box with dashed lines is used to select a group of stations.

To move the box, release the mouse button, move the mouse into the box, and press the left mouse button. The cursor will change shape from an arrow with a single point to a symbol with four-arrows pointing in four directions. Press and hold the left mouse button and drag the cursor to move the box until the box is positioned over the area of interest. The **SUMMARY** box will update with the lower left and upper right positions of the box as the box moves. To remove the box, click over the map and outside of the box. The box will disappear.

3.3 ZOOMING AND UNZOOMING

To magnify a section of the map, select an area (see Section 3.2) and press the “Zoom” button. An image of the selected region will appear in the left panel. Although a user may zoom into the map image indefinitely, the highest resolution of the terrain database is four kilometers. To return to a previous image, select the “Unzoom” button. Press the “Reset” button to return to the original map image.

IV. USING THE STATIONS TABLE

The “Scheduler” tab of the stations table lists stations in the configuration file for the selected COAMPS™ area. The interface allows the user to add, remove, or modify the stations in the configuration file. The Station Editor GUI provides checkboxes for selecting either meteograms and/or skew-t products for a selected station. A checkbox may also be provided for JWARN products if the option is enabled in COAMPS-OS™.

The “On Demand” tab is similar, except the panel contains only the necessary fields to run the meteogram and/or skew-t processing. The stations are defined in the “On Demand” tab will be discarded after the user closes the GUI. The stations in the “Scheduler” tab can be saved to the server and are automatically loaded the next time the GUI is run.

The instructions below apply to both tabs of the station’s table unless otherwise specified. The “On Demand” and “Scheduler” tabs are mutually exclusive; that is, actions made in one tab will not appear in the other tab.

4.1 ADDING STATIONS

To add a station to either tab of the station's table, select an area (see Section 3.2) on the map containing the station(s) to add. Click the “Add” button. A new window titled **Available Stations** (Fig. 5) will appear with available stations from TEDS inside the selected area.

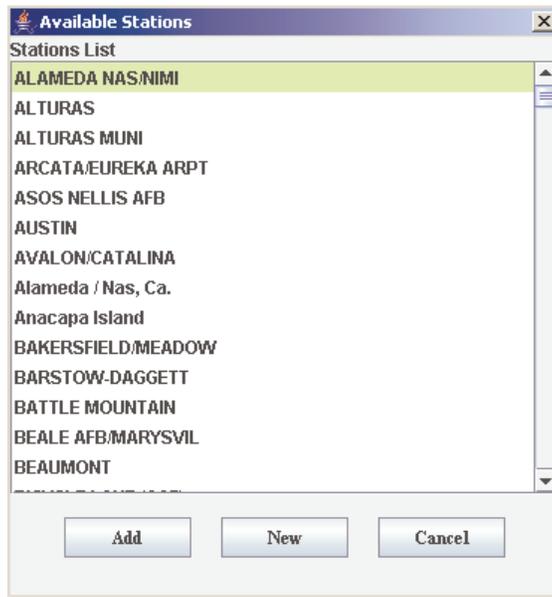


Figure 5. The **Available Stations** window shows a list of WMO stations retrieved from TEDS. The example in Figure 5 shows multiple selections highlighted in yellow.

To add a station, highlight the station name in the list and click the “Add” button. Selected stations are highlighted in yellow (Fig 5). After selecting “Add”, the station will be added to the stations table and the **Available Stations** dialog will close.

To add multiple stations from the **Available Stations** window, highlight the stations using the left mouse button and while holding the CTRL key. After highlighting a selection of stations, click the “Add” button. To select a list of stations, highlight the first station, press and hold the SHIFT key, and click the last station of the group. All the stations between the first and the last station will be highlighted. After clicking the “Add” button, the stations will be added to the stations table, and the **Available Stations** window will close.

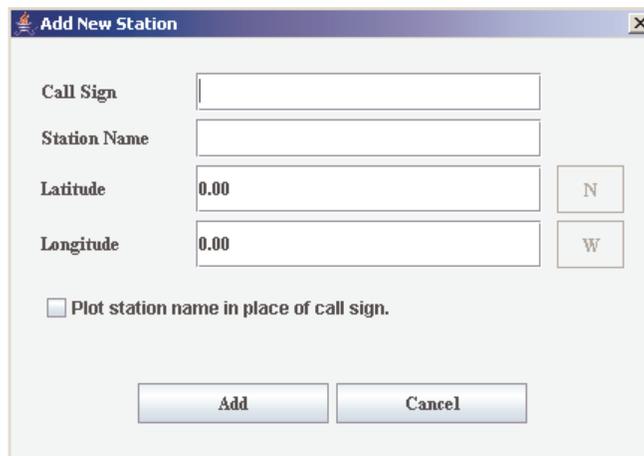


Figure 6. Stations may be added to the listing of **Available Stations** by selecting the **NEW** button on the **Available Stations** window. The window shown in Figure 6 will appear. A new station requires a call

sign, name, latitude, and longitude value. The N and W buttons are grayed out because all values of latitude and longitude fall within the Northern and Western Hemisphere for the selected map region.

To define a station that is not listed in the **Available Stations** window, click the “New” button in the **Available Station** window. A window will appear requesting detailed information for the station (Figure 6). Required fields include:

1. Call Sign
2. Station Name,
3. Latitude
4. Longitude

The call sign may be defined using the WMO call sign naming convention, typically four alphanumeric characters. The station name is the full station name best describing the location. The latitude and longitude fields must be entered as numeric values. Directional latitude and longitude buttons will be activated for cases where a choice of North/South or East/West is required for the map. The GUI will not permit latitude or longitudinal values that fall outside the map. After entering the required station information, the user may “Add” or “Cancel” the selections. Clicking the “Add” button will add the station to the list in the **Available Stations** window. Selecting “Cancel” will clear the station entries and close the window.

To add stations into the list shown in the Station Editor GUI, select the new station from the list shown in the **Available Stations** window.

4.2 DELETING STATIONS

Two methods are available to delete stations:

1. Right-click over the station. A menu will appear near the mouse cursor (Fig. 7). Select “Delete Station”. The station will be removed from the stations table.
2. Highlight the station row on the table by pressing the left mouse button over the row. Select the “Delete” button below the table. The station will be removed from the stations table.

To delete ALL stations from the stations table:

Right-click over the table. A menu will appear near the mouse cursor (Fig. 7). Click “Clear All Stations”. All stations will be removed from the stations table.

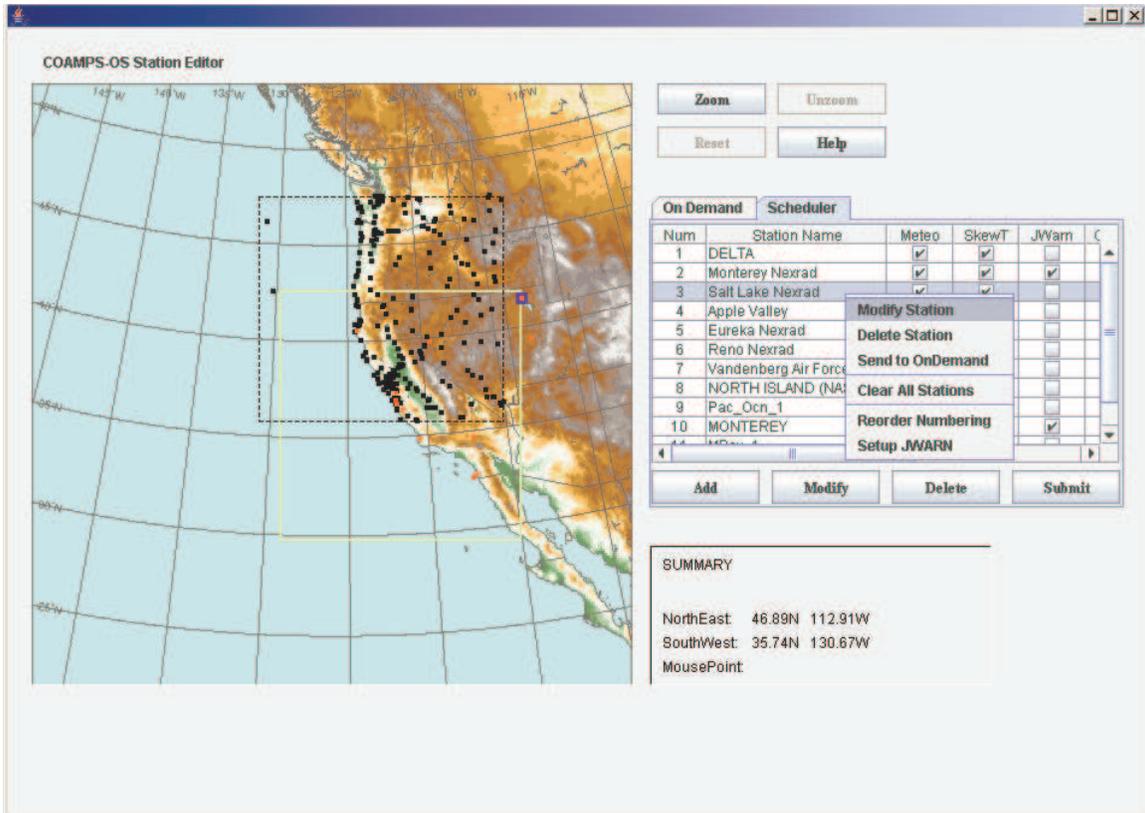


Figure 7. The options menu appears after a user has clicked the right mouse button over a selected station. The user can select an option from the menu.

4.3 ENABLING/DISABLING PRODUCTS FOR A STATION

Each station in the station table has a unique set of options to define products to be produced for the selected station. To enable meteograms, skew-t's, or both products for a station, click on the checkbox shown in the row of the selected station. To switch the product off, click on the checkbox for the corresponding station until the check disappears.

Num	Station Name	Meteo	SkewT
1	ANDREWS AFB	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	RICHMOND/BYRD FIEL	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	WASHINGTON/DULLES	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Figure 8. Users may select options to enable or disable meteograms (**Meteo**) or skew-t (**SkewT**) graphics by selecting a checkbox. In the example shown in Figure 8, meteograms will be produced for ANDREWS AFB and WASHINGTON/DULLES. Skew-T graphics will be created for RICHMOND/BYRD and WASHINGTON/DULLES.

4.4 MODIFYING A STATION'S INFORMATION

To modify a station's information, use the 'Modify Station Information' dialog. Two methods are available to open the dialog:

1. Right-click on the station to modify the table. A menu will appear near the mouse cursor. Select "Modify Station". The **Modify Station Information** dialog window will appear.
2. Highlight the station on the table by clicking anywhere on its row. Click the "Modify" button below the table. The **Modify Station Information** dialog window will appear.

Both procedures will open the **Modify Station Information** dialog window with the station's information displayed. The call sign, station name, latitude and/or longitude may be modified within the window.

To save the changes, select the "Confirm" button. To discard the changes, click the "Cancel" button.

4.5 OTHER FEATURES

The Station Editor GUI provides additional features to aid users during the station selection/configuration process. The features include:

Station Table Sorting:

Each column of the station table may be sorted alphanumerically. For example, stations can be sorted by name, or the station listing may be sorted by latitude.

To sort the fields of any column, click over the header of the column. For example, to sort the table by the station name, a user should click on the **Station Name** header. The stations will be sorted in alphabetical order by name.

Re-Order Numbering:

If a user has sorted the contents of the table by any means except using the selection number (indicated as **Num**), the stations may not appear in the same order as the stations will be saved in the configuration file (Scheduler tab only). The **Num** field indicates the position the station will occupy in the configuration file. The ordering of the stations is not necessarily preserved in the order shown in the station list. A following session of the Station Editor GUI might not contain the sorting configuration made within the current session.

To save the ordering of the stations shown in the table and reset the **Num** values:

Right-click on the station table. A dialog window will appear. Click on “Reorder Numbering”. The values in the **Num** fields will be renumbered, if necessary, and saved in the order shown in the station list.

Highlighting Stations On The Map:

The Station Editor GUI includes a feature to assist with locating a station on the map by highlighting the station location. Stations can be highlighted from the stations table and the **Available Stations** window opened when using the “Add” procedure. To highlight a station in the station table, click on the row containing the station name. The station on the map will now appear with a blue square border (Fig. 9).

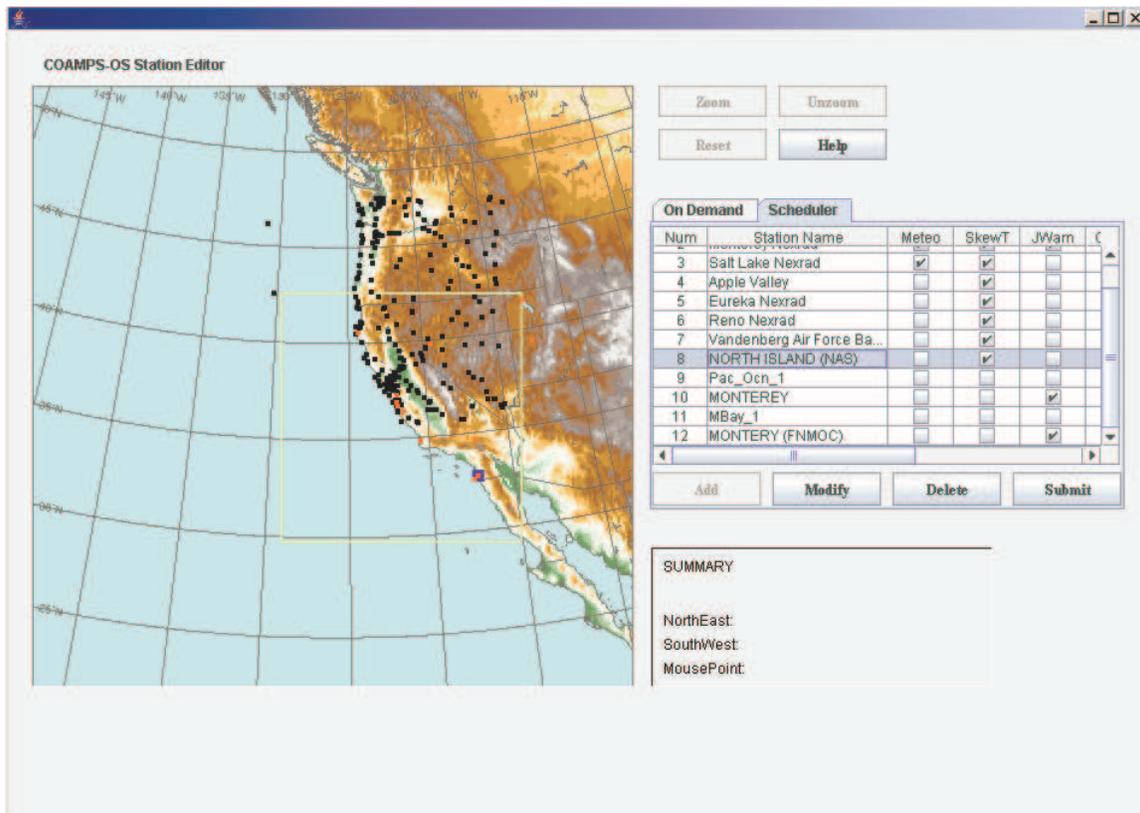


Figure 9. NORTH ISLAND (NAS) is highlighted with a blue square background on the map image. The station was highlighted by selecting the station value from the station listing shown in the right panel of Figure 9.

To highlight a station from the available stations in TEDS, select an area on the map containing the station to highlight. Click on the “Add” button below the station table. The **Available Stations** window will appear. Search for the station to highlight in the list and click over the station. The station on the map will now appear with a blue square border.

V. SUBMITTING THE CONFIGURATION

5.1 SAVING THE SCHEDULER TAB

After completing all necessary modifications to the Scheduler tab in the stations table, the modifications and station configuration may be saved to the COAMPS-OS™ server. The “Save” button below the stations table is enabled after changes are made to the table.

To write the information to the configuration file for the COAMPS™ project, click on the “Save” button. The **Submit Data?** dialog window will appear (Fig. 10). The **Submit Data?** Dialog window contains a summary of the station selections and two buttons to accept (OK) or cancel (Cancel) the changes. The summary includes a list of the stations (station identification number, latitude, longitude, and station name) selected for the project. A backup of the original configuration file is saved to the COAMPS-OS™ server prior to accepting any modifications to the station configuration. Select the Cancel button to return to the Station Editor GUI without saving any of the changes.

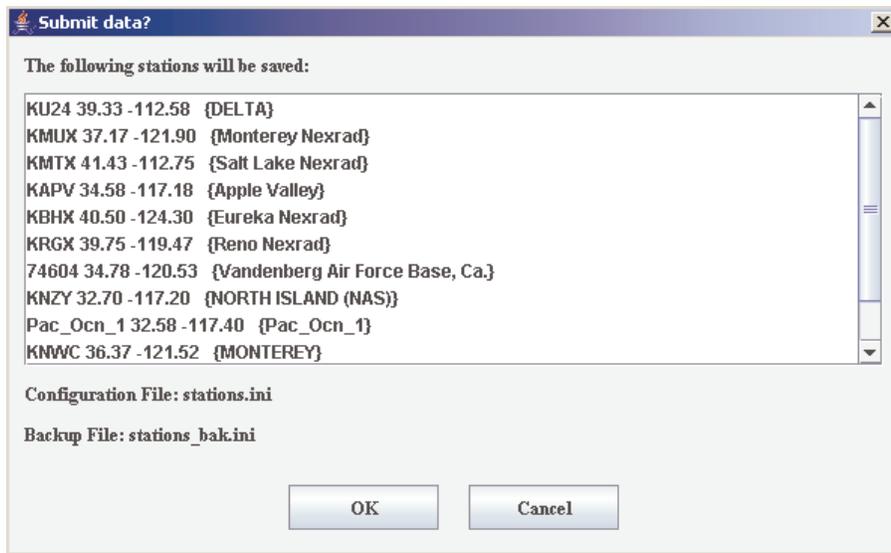


Figure 10. The **Submit Data?** window permits users to view station configuration information prior to saving the information to the COAMPS-OS™ server.

5.1 RUNNING PRODUCTS ON DEMAND

After selecting stations to dynamically create meteograms and/or skew-t's under the “On Demand” tab, the user may then on the Run button under the stations table to generate the graphics. A new browser window will open, and the output products will begin to load into the browser window as the products become available.

VI. JWARN (optional feature)

6.1 SETTING UP A SCENARIO

The optional JWARN feature was added to the Station Editor GUI in COAMPS-OS™ version 1.3. The JWARN option allows a user to set-up a threat ‘scenario’ simulating a chemical or biological release using a transport and dispersion model called VLSTRACK (Vapor, Liquid, and Solid Tracking Model). The user can automate a process to run VLSTRACK for a selected scenario using meteorological data from the COAMPS™ model. VLSTRACK is run for each scenario upon completion of each COAMPS™ forecast hour and produces graphical output of the simulated attack for the entire COAMPS™ forecast. If the COAMPS-OS™ Nowcast is enabled, VLSTRACK will run after each COAMPS-OS™ Nowcast using the COAMPS™ wind field re-analyzed from the most recent observations. See the COAMPS-OS™ GUI user’s guide for more information about the COAMPS-OS™ Nowcast.

Setting up a scenario consists of defining the latitude and longitude of the release location and defining the details of the scenario using the JWARN configuration page in the Station Editor GUI.

The following steps are required to set up and schedule a JWARN scenario:

- 1) Add a station (Section 4.1) if a station to run JWARN is not already available from the station list. Check the ‘JWarn’ checkbox for station(s) to be used to run JWARN.
- 2) Right-click on the ‘JWarn’ checkbox, or right-click on the row of the station and select ‘Setup JWARN’. A new dialog window will appear with VLSTRACK configuration parameters (Fig. 11). The ‘Munition’ and ‘Agent’ menus contain selections based on lists that reside on the JWARN server. The other parameters should contain a default value according to the munition and agent selected.

JWARN Scenario Configuration MONTEREY (36.37, -121.52)

Munition: ~1000kg Bomb

Chem/Bio Agent: VX

Line Length (m): 50.0 (0.0-9999.9)

Munition Fall Angle (deg): 45.0 (0.0-90.0)

Center of Mass Speed (m/sec): 1000.0 (0.0-9999.0)

Downrange Target Sigma (m): 150.0 (0.00-9999.99)

Number of Munitions: 16 (1-500)

Crossrange Target Sigma (m): 50.0 (0.00-9999.99)

Rate of Fire (rds/min): 1.0 (1.0-1000.0)

Height of Release (m): 500.0 (0.0-300000.0)

Mass Median Droplet Diameter (microns): 500.0 (1.0-10000.0)

Trajectory Angle (DTN): 180.0 (0.0-359.9)

Geometric Droplet Dist. Sigma: 1.7 (1.0-3.0)

Fill Weight (kg): 75.0 (0.0010-1000.0)

Dissemination Efficiency (%): 100.0 (0.01-100.0)

Lateral Sigma (m): 8.0 (0.0010-999.999)

Vertical Sigma (m): 6.0 (0.0010-999.999)

Source Type: Point Line

Save Scenario Load Scenario Cancel

Figure 11. The JWARN configuration screen allows a user to set-up and configure a JWARN scenario to be saved and run on the server.

3) Select the munition and agent for the scenario. The rest of the fields on the configuration page should automatically be populated with the default values for the munition/agent combination selected by the user. To modify any of the values, click on the text box of the field and make the necessary changes.

4) After creating a scenario for VLSTRACK, users can save the scenario to the COAMPS-OS™ server. Click on the “Save Scenario” button at the bottom of the JWARN configuration screen. A dialog window will appear (Fig. 12) with a list of the currently saved scenarios for the user/project combination. Type a new name for ‘Scenario Name’ and click the ‘Save’ button. The scenario will be saved to the server under the current user and project directory.



Figure 12. The 'Save Scenario' screen allows a user to save a scenario to the server under the user/project configuration directory.

6.2 ENABLING/DISABLING A SCENARIO

After saving the scenario to the COAMPS-OS™ server, users must also save the Station Editor GUI configuration file to 'enable' automated JWARN runs for the scenario. Begin by ensuring the 'JWarn' checkbox is selected for station(s) to run JWARN on. Click on the "Save" button on the main Station Editor GUI screen (with the map) to enable the scenario on the server.

To temporarily disable the automated runs of a JWARN scenario on the server, uncheck the JWARN checkbox for the station and resave the station list. The modification will temporarily disable JWARN runs for the station while keeping the scenario parameters saved on the server. To re-enable the scenario, select the JWARN checkbox and resave the station list.

6.3 MODIFYING A SCENARIO

To modify a previously defined JWARN scenario, right-click on the 'JWarn' checkbox of the station, or right-click anywhere on the station's row. Select "Setup JWARN". The JWARN configuration screen will appear with options for the selected station. Modify any parameters that need to be changed in the configuration screen. Click on the "Save" button at the bottom of the window to save the new configuration selections. The Save dialog will appear with the 'Scenario Name' automatically set to the name of the current scenario. Click "Save" to save the scenario to the server.

6.4 USING THE SCENARIO-LOAD FEATURE

When setting up a new scenario, the user may want to save time by loading a previously saved scenario from another station, from another COAMPS-OS™ project, or from another user. The JWARN configuration page of the Station Editor GUI includes a load button to allow users to import settings from other JWARN scenarios.

Click on the “Load Scenario” button at the bottom of the JWARN configuration screen. A new screen will pop up (Fig. 13) similar to a file selection dialog.

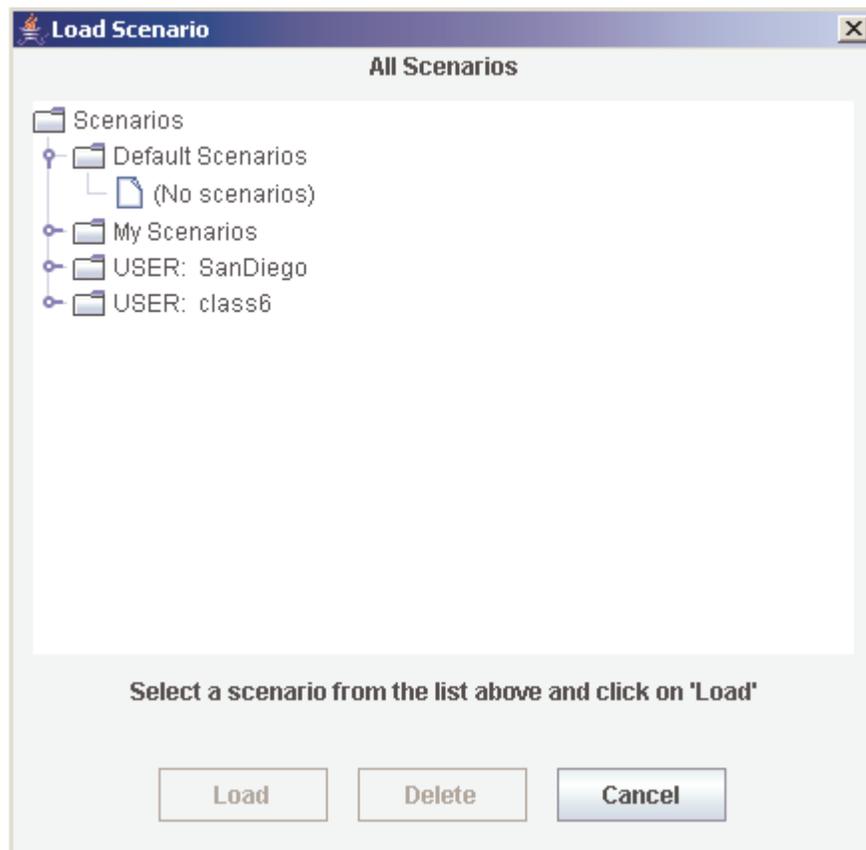


Figure 13. The ‘Load Scenario’ screen allows a user to load a previously saved scenario from the server into the current scenario potentially saving time for the user to set up a new scenario.

The dialog box contains a list of folders under a main ‘Scenarios’ folder with one folder for each user in the COAMPS-OS™ system. The folder labeled ‘My Scenarios’ contains the current user’s project folders. The other folders contain the project folders for other users in the system. To open a user’s folder, click on the icon to the right of the folder. The user’s project folders will now be displayed. To open a particular project folder, click on the icon to the right of the project folder. All of the scenarios defined for

the selected project and user will be displayed. Select the scenario to load (Fig. 14), and click on the 'Load' button.

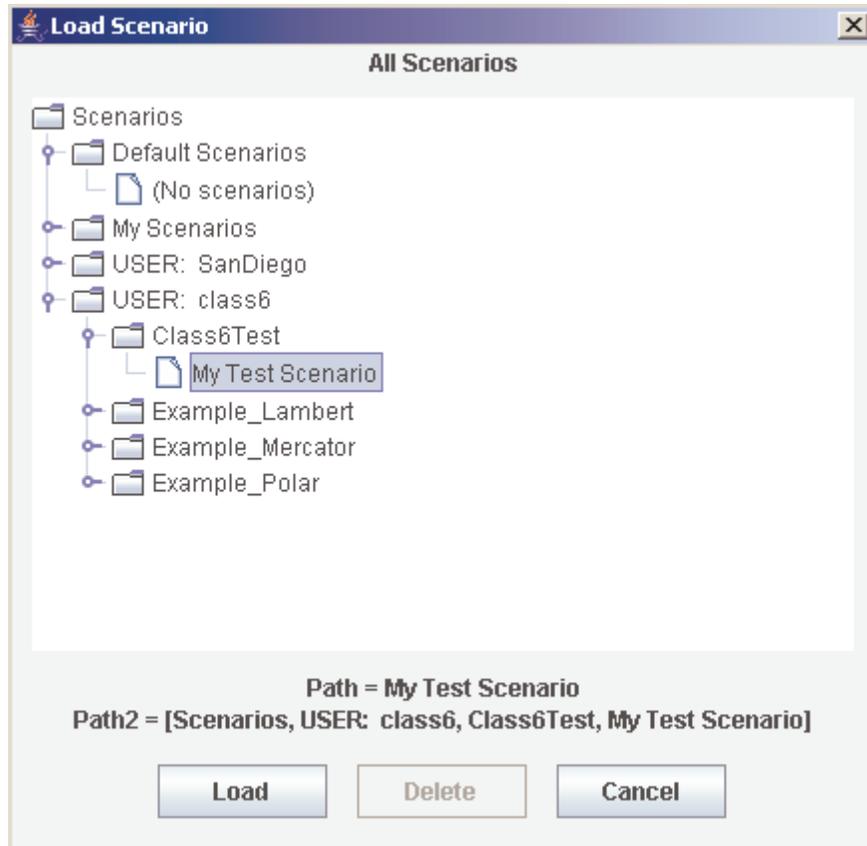


Figure 14. Select the scenario to load from the list of scenarios inside a user's project folder.

The scenario should now load into the JWARN configuration screen. All of the parameters will be set to the settings of the scenario that was loaded. The user may make modifications and save the scenario as described in Section 6.1.

6.5 VIEWING THE OUTPUT

To view output products from JWARN scenario(s), select a user under the COAMPS™ Daily Forecast section on the COAMPS-OS™ homepage. Select a project and date-time-group that was configured to run JWARN. After the right panel of the web browser refreshes with the selected project and date-time-group, a link labeled 'JWarn Images' will be visible at the bottom of the right panel. Clicking the link will prompt the user to enter a username and password. After authenticating the user and password, the JWARN visualization matrix will appear with links to available output images.

VII. APPENDIX

7.1 COAMPS-OS™ REQUIREMENTS

The following output parameters are required from COAMPS™ to produce complete meteogram graphics. The fields may be set using the COAMPS-OS™ GUI. The output selection requirements are shown in Table 2-1.

Table 1. Output requirements for producing meteograms are shown in Table 1. Output selections are made using the COAMPS-OS™ GUI.

Level (meters)	Field Description
2, 10, 305, 500, 610, 915,	Air Temperature
1220, 1525, 1830, 2135,	Dewpoint Depression
2440, 2745, 3050, 3355,	Modified Refractivity Gradient (1/km)
3660, 3960, 4265, 4570,	Relative Humidity
4880, 5180, 5485, 5790,	True U-Velocity Component
6095, 6400, 6705, 7010,	True V-Velocity Component
7315, 7620, 7925, 8230,	Water Vapor Pressure
8535, 8840, 9145	