



CLIMSOFT VERSION 4 USER MANUAL



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Contents

Introduction.....	5
1. Installation	6
1.1 System Requirements.....	6
1.2 Installation Procedures	6
1.3 Creating Climsoft Database in MariaDB	8
1.4 Climsoft First Login for Climsoft.....	11
1.5 Updated Climsoft Login and Database Connection.....	13
1.5.1 Login Dialog	13
1.5.2 Database Connection Dialog.....	13
2. Climsoft Main Menu and Welcome Dialog	14
2.1 Menu Bar Items.....	14
2.2 Main Menu Icons	15
3. User Management and Configuration Settings.....	16
3.1 User Management	16
3.2 Configuring General Settings	17
4. Metadata Management	19
4.1 Importing Station Metadata	20
4.1.1 Station Metadata Import procedure	22
4.2 Other Metadata.....	22
4.2.1 Elements Metadata.....	22
4.2.2 Station Element.....	24
4.2.3 Instruments.....	25
4.2.4 Station Location History	26
4.2.5 Station Qualifier.....	26
4.2.6 Schedule Class	27
4.2.7 Physical Feature	27
4.2.8 Paper Archive Definition	28
5. Key Entry.....	28
5.1 Setting up Key Entry Forms List	28
5.2 Opening a Key Entry Form.....	29
5.3 Key Entry Forms Layout	30
5.4 Key Entry Sequencer	30
5.5 Configuring synoptic hours for key entry	33
5.6 Key Entry Operation	34
5.6.1 Some special features for specific key entry forms	36
5.7 Emptying Key Entry Tables.....	41
5.8 Operational Monitoring	41
5.8.1 Users Records	42
5.8.2 Settings.....	42
5.8.3 Performance Monitoring	43
5.8.4 Double Key Entry Verification	44
6. Post Key Entry Quality Control Checks.....	45
6.1 Updating the database from a QC report	48
6.2 Transferring Data from “observationinitial” to “Observationfinal” table	48
6.3 Update Observations	49

7.	Data Transfer Operations	51
7.1	Data from Climsoft V3 – Data migration	51
7.1.1	Importing from Climsoft Version 3 MySQL Database	52
7.1.2	Importing from CLIMSOFT V3 Backup	52
7.2	Importing CLICOM data	52
7.3	Importing Automatic Weather Station (AWS) data.....	54
7.3.1	Selecting the import file and viewing the data.....	55
7.3.2	Configuring column headers and uploading data into Climsoft database	56
7.4	Importing data from text files with different structures.....	57
7.4.1	Hourly and Daily Data Import	57
7.4.2	Multiple Element Columns	60
7.5	Importing Summarized Data.....	63
7.6	Importing Upper Air data.....	64
7.7	Upload failures	64
7.8	Importing GTS data downloaded from NOAA – NCEI	65
7.9	Selecting Station and Element on the Import Dialog.....	66
8.	Data Backup and Restore	67
8.1	Data Backup.....	67
8.1.1	Data backup by station.....	67
8.1.2	Complete database backup.....	68
8.2	Data restore	70
8.2.1	Data restore by Station.....	70
8.2.2	Complete Database Restore	70
9.	Climate Products	71
9.1	Standard Products	71
9.2	Data Products for Other Applications.....	76
9.2.1	Data for CPT	76
9.2.2	Data for GEOCLIM	76
9.2.3	Data for Instat	77
9.2.4	Data for Rclimdex	77
9.3	Windrose Plot.....	78
9.4	Plotting Charts	79
9.5	Inventory Products	81
9.6	Products from Upper Air Observations	84
9.7	CLIMAT Messages.....	85
10.	AWS Real Time Data Operations	88
10.1	Server Settings	88
10.2	Sites Settings	90
10.3	Data Structure Settings	91
10.4	Updating existing structures	92
10.5	Creating a new structure	93
10.6	Coding Settings	95
10.7	Data Acquisition and Processing Dialog	96
11.	Paper Image Archiving	98
11.1	Archiving Images.....	99
11.2	Archiving Images with Standard Filename Structure	99
11.3	Archiving Images without Standard Filename Structure.....	100
11.4	Retrieving and Viewing Archived Images.....	101

11.5	Viewing a List of Archived Image Files	102
12.	TDCF Synoptic data Encoding Operations	103
12.1	Form for Synoptic data key entry and encoding	103
12.2	TDCF Settings	104
12.3	Climsoft TDCF Encoding in BUFR	105
13.	Climsoft Versions Upgrade	106
13.1	Upgrading Climsoft Interface	106
13.2	Upgrading Climsoft Database	107
14.	ACKNOWLEDGEMENTS	108

1. Introduction

What is Climsoft?

The Climsoft system is a suite of software which is specifically designed for storing climatic data in a secure and flexible manner, and for obtaining useful information using these data. Climsoft version 4 was developed using Microsoft Visual Basic.NET. The default database storage engine is the open source MariaDB which is a fork from MySQL.

The Climsoft system comprises:

- The database, which holds climatic data for multiple stations in a logical and flexible structure;
- A Key-entry component, to allow users to add new data to the database in a secure and controlled manner;
- Facilities for importing climatic data in various formats into the database e.g. Data from Automatic Weather Stations (AWS), CLICOM ASCII, NOAA GTS and Text Files;
- Facilities for exporting climatic data in formats ready for use by many climate applications (e.g.: RCLIMDEX, CPT, GEOCLIM, INSTAT, R- INSTAT, ENACTS, CDT, etc.);
- Management of images of paper records (paper archives) in support of Data Rescue (DARE);
- Quality Control checking of data that has been loaded into the database;
- A number of Products, application programs which use subsets of the data stored in the database to produce useful reports, summaries and diagrams; and
- System management facilities for managing user access, operations monitoring, administering the database and for tailoring the functions of the system to local needs.

2. Installation

2.1 System Requirements

Hardware:

The Climsoft system requires the following typical hardware specifications:

Computer with processor speed of 1 GHz, 2 GB RAM and enough disk space for installation of application software and storage of database. A minimum of 20 GB disk space is recommended. More disk space will be required for storage of AWS data and images of paper records for Data Rescue. However, it would be ideal to store images of paper records on removable storage media like external hard drives or Network Attached Storage (NAS).

Internet connection is also desirable.

Software:

- Microsoft Windows 7 or later, 64-bit Operating System (OS) is recommended for optimum performance of the database. Climsoft Version 4 is compatible with the following Windows Operating Systems: XP, Vista, Windows 7, Windows 8.x, Windows 10 and Windows 11;
- Microsoft Office with Excel spreadsheet is required since Excel spreadsheet application is the default application for displaying data products from Climsoft;
- Antivirus software;
- Minimum .Net Framework 4.5 is required. This version of the .NET framework is packaged with the Climsoft setup package;
- Climsoft installation setup. Can be downloaded from [met-eLearning](#) site. Registration may be required.
- MariaDB/MySQL database system and Climsoft database scripts which are also supplied through Climsoft installer and will be copied into the subfolder called "dbase" in the installation path;
- WRPlot software for Windrose plotting which will be copied into subfolder called "Bin" in the installation path.

2.2 Installation Procedures

Please ensure that your PC meets the hardware and software requirements before you install Climsoft. **You must also have Windows Administrator privileges for you to be able to install Climsoft.**

There are two setup packages for Climsoft, one for 32-bit Windows Operating System (OS) and the other for 64-bit OS. Choose the setup package that matches your Operating System.

1. Run the setup executable file with elevated privileges. To do this, right click on the setup file and choose "**Run as Administrator**" on the pop-up menu.
2. "climsoftv4_bit32_setup.exe" is for 32 - bit OS and "climsoftv4_bit64_setup.exe" is for 64-bit OS. The setup Wizard will guide you through the installation process.
3. When the core Climsoft setup has been completed, a dialog with options for installing additional applications required by Climsoft will appear as shown in Figure 1 below.

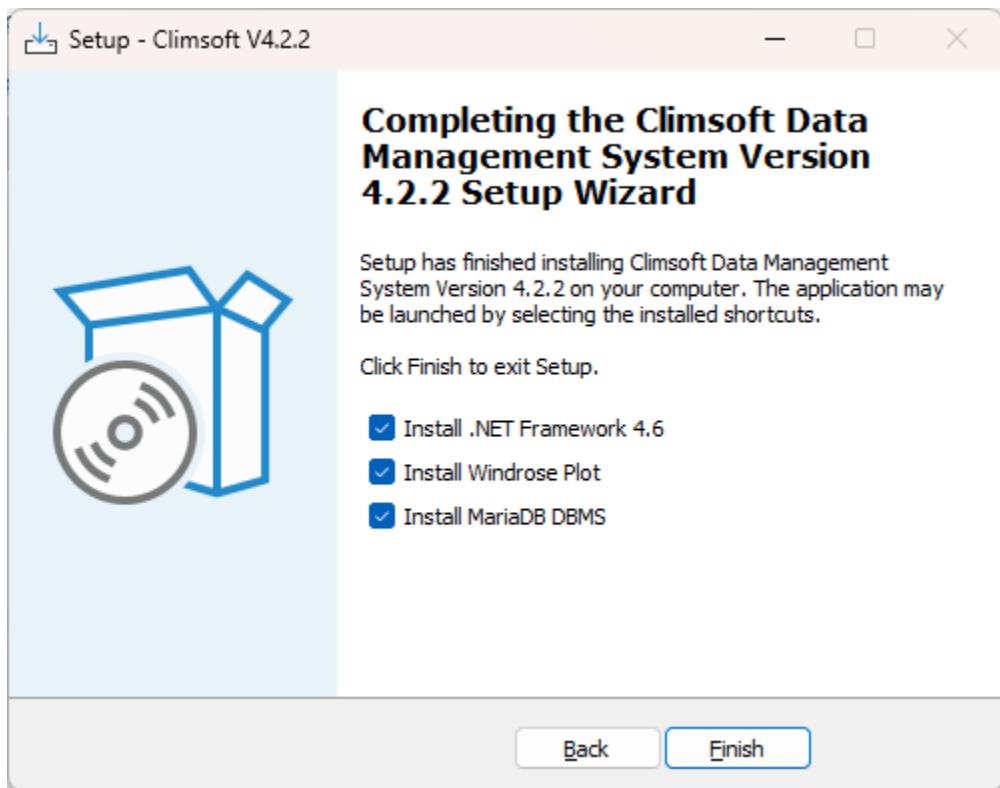


Figure 1(a): Installation of additional applications

You may uncheck the selected applications if they are already installed or you would wish to install them after Climsoft installation. If you choose to install them later then find their installers in the 'bin' folder of the installation path.

If you choose the default selections the applications listed in the above dialog will be installed automatically in the order they are listed on the above dialog. However, if the version of **Microsoft .Net Framework** on your computer is old and need to be upgraded, the system will prompt you to do the upgrade, below is an example of a typical error message you may get:

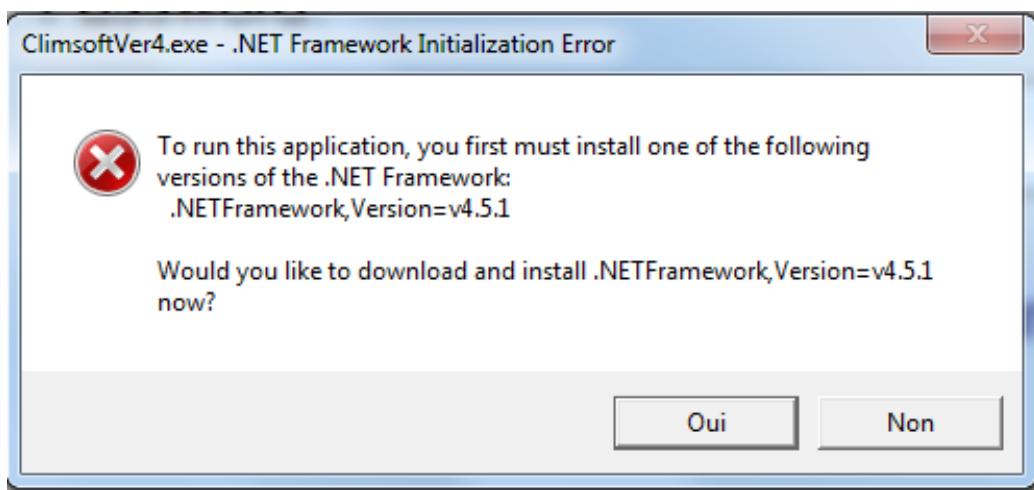


Figure 1(b): Dot Net Framework Initialisation Error

If you get a warning showing that you have a newer version of one of these applications already, click the **Close** button to continue with the installation of the next application.

When you get to the installation of MariaDB, and you reach the point of specifying the Port number for running the MariaDB Service, **it is strongly recommended that you choose the Port 3308**, this is the port number defined in the configuration file of Climsoft for connecting to the MariaDB database that comes with the Climsoft setup. If you choose a different number, you will need to reconfigure the connection to the database at the login dialog to make the port number the same as the one you have configured during the MariaDB setup.

It is also important to note that the password that you define during the installation and configuration of MariaDB will be required when you login to Climsoft for the first time.

NOTE: If prompted to restart the computer before all selected installations are complete, please choose "restart later" and then restart the computer when all installations are complete.

If the installation of WRPlot appears to take too long to complete, check for a second installation dialog that may be minimized on the bottom of the task bar requiring your input. If that dialog is there, open it and respond as appropriate.

Although WRPlot is a freeware, you need a license key to activate this application. An initial license key which is valid for one year is contained in the file "**WRPlot_license.txt**" in the sub folder "**Bin**" in the Climsoft installation folder. To renew the licence you will need to visit the "Lakes Environmental" website at <http://www.weblakes.com/>. This URL is also provided on the "About" box of the WRPlot application. The latest version of WRPLOT application can also be downloaded from this site.

If you need to install, or re-install MariaDB or WRPlot later, the installation files for these applications are contained in the "**Bin**" sub folder of the CLIMSOFT installation folder.

2.3 Creating Climsoft Database in MariaDB

After the successful installation of Climsoft and MariaDB (MySQL database engine), you need to run the script to create the Climsoft database at the MySQL Client prompt.

Follow the steps below to run the script:

- (i) Launch MariaDB Prompt from your **Start Windows** program by clicking on the **MySQL Client (MariaDB xx.x)** as illustrated in Figure 2. You can also type the name "**MariaDB**" in the search box. Dialogs obtained may look different, depending on your Version of Windows.

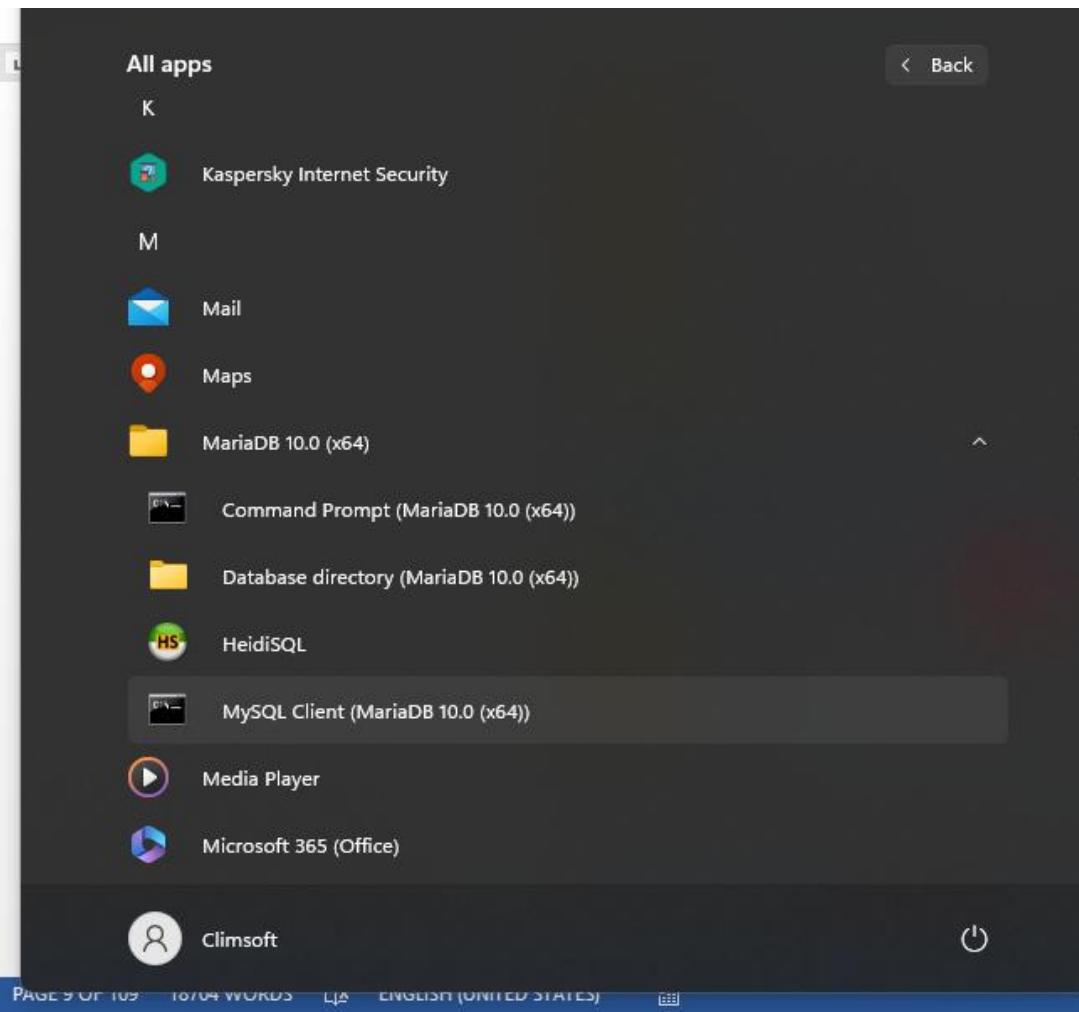


Figure 2: Launching the MariaDB Client

The dialog for entering the password then appears as shown in Figure 3.

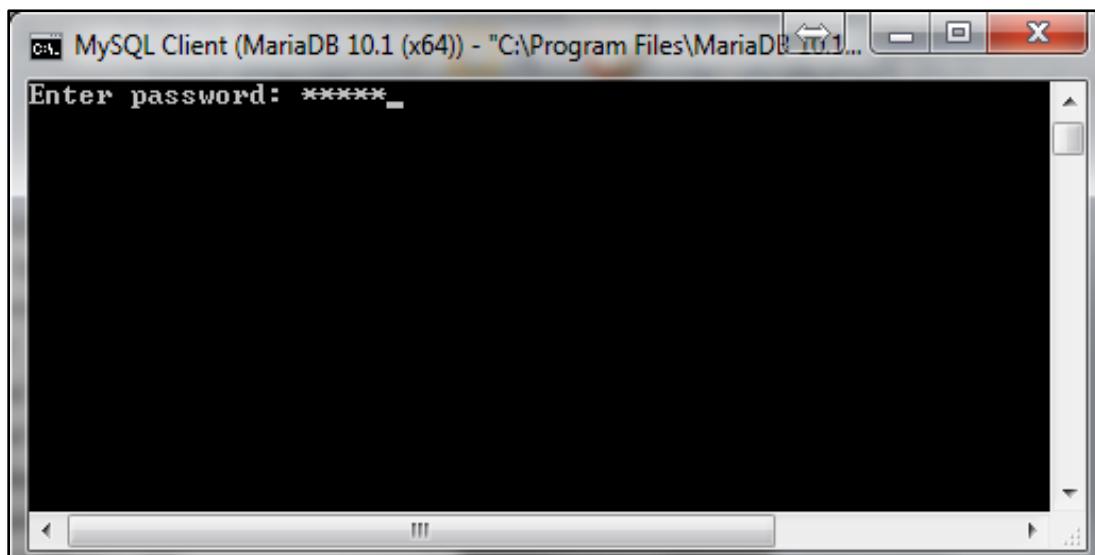
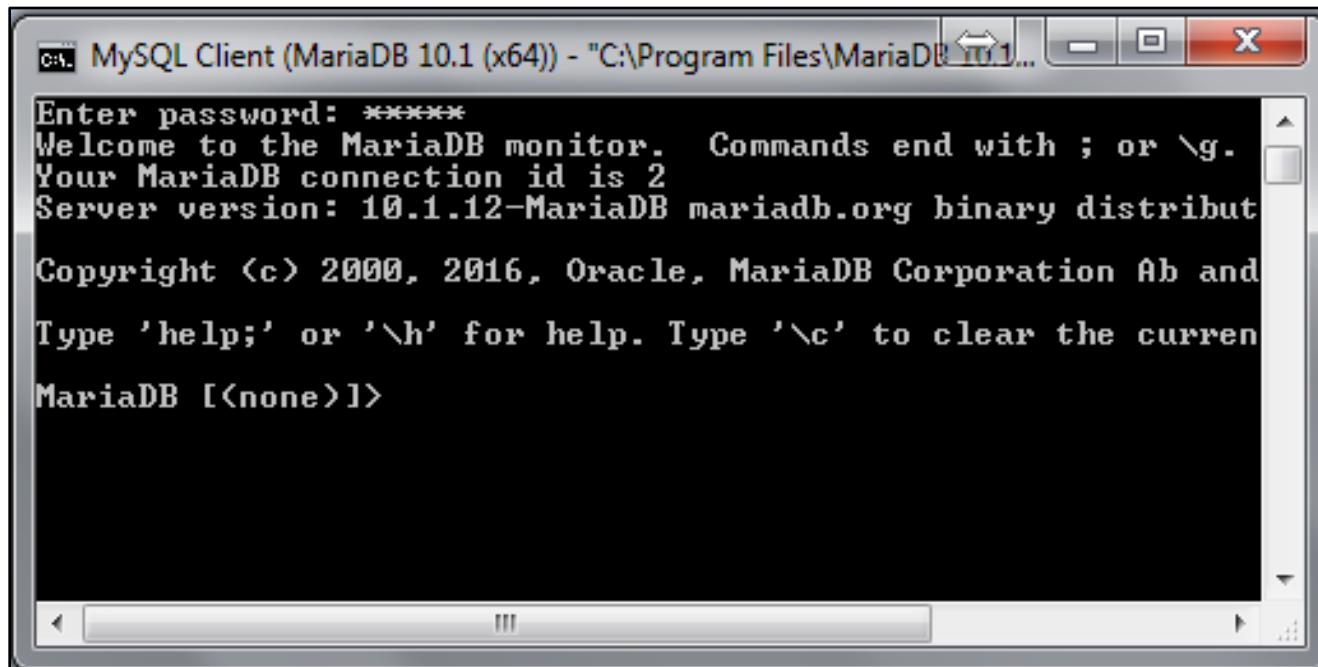


Figure 3: Entering the password on the MariaDB Client Prompt

Note that the user name is assumed to be “root”. (There is no provision for entering the username if you have launched the MariaDB Client Prompt as described above.)

If you have entered the correct password i.e. the same password that you entered during the installation and configuration of MariaDB, the **prompt** then appears as shown in Figure 4.



The screenshot shows a Windows command-line interface window titled "MySQL Client (MariaDB 10.1 (x64)) - "C:\Program Files\MariaDB 10.1..."". The window displays the following text:

```
Enter password: *****
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 2
Server version: 10.1.12-MariaDB mariadb.org binary distribut
Copyright (c) 2000, 2016, Oracle, MariaDB Corporation Ab and
Type 'help;' or '\h' for help. Type '\c' to clear the current
MariaDB [(none)]>
```

Figure 4: MariaDB Prompt after entering correct password

- (ii) Assuming the script file for creating the CLIMSOFT V4 database is in the Path “**C:\Program Files (x86)\ClimsoftV4\Dbase**”

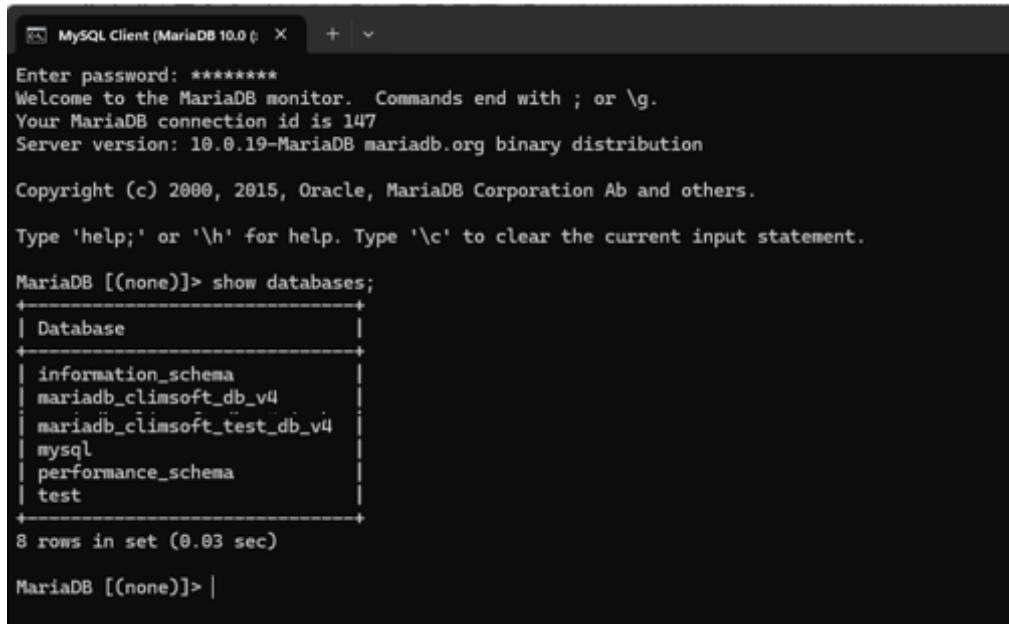
Type the following command at the prompt:

“Source C:\Program Files (x86)\Climsoftv4\Dbase\mariadb_climsoft_db_v4_all.sql”

Then press the Enter key. (This assumes the script file for creating the Climsoftv4 database is in the Path “**C:\Program Files (x86)\Climsoftv4\Dbase**”)

If you have typed the command correctly, the script will create the Climsoft Version 4 databases; Two (2) databases are created, the operational database (**mariadb_climsoft_db_v4**) and the test database which contains data for training and testing purposes (**mariadb_climsoft_test_db_v4**).

- (iii) To check or verify that Climsoft Version 4 databases have been created in MariaDB database engine, type: “**Show databases;**” command at the MariaDB Client Prompt and press the **Enter Key**. The 2 Climsoft databases will then listed together with other database schemas that come with MariaDB as shown in Fig 4a.



```

Enter password: *****
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 147
Server version: 10.0.19-MariaDB mariadb.org binary distribution

Copyright (c) 2000, 2015, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> show databases;
+-----+
| Database          |
+-----+
| information_schema |
| mariadb_climsoft_db_v4 |
| mariadb_climsoft_test_db_v4 |
| mysql             |
| performance_schema |
| test              |
+-----+
8 rows in set (0.03 sec)

MariaDB [(none)]> |

```

Figure 4a: List of databases (Schema) MariaDB database engine

2.4 Climsoft First Login for Climsoft

You are now ready to launch the Climsoft Version 4 application. Double click the Climsoft icon on the desktop to launch the Climsoft Version 4 application and login (Figure 6). On the first login, the User name must be “**root**” and the Password that was created during *MariaDB/MySQL* database engine installation. You may check the box **Remember username** so that the **User name** is remembered during the next login.



Figure 6: Climsoft Version 4 Login Dialog

- (iv) If you are sure you have typed the correct password but have been denied access, click on the blue label “**Manage database connections**” on the above dialog to check the database connection details and adjust accordingly. Then a dialog similar to **Figure 7** appears.

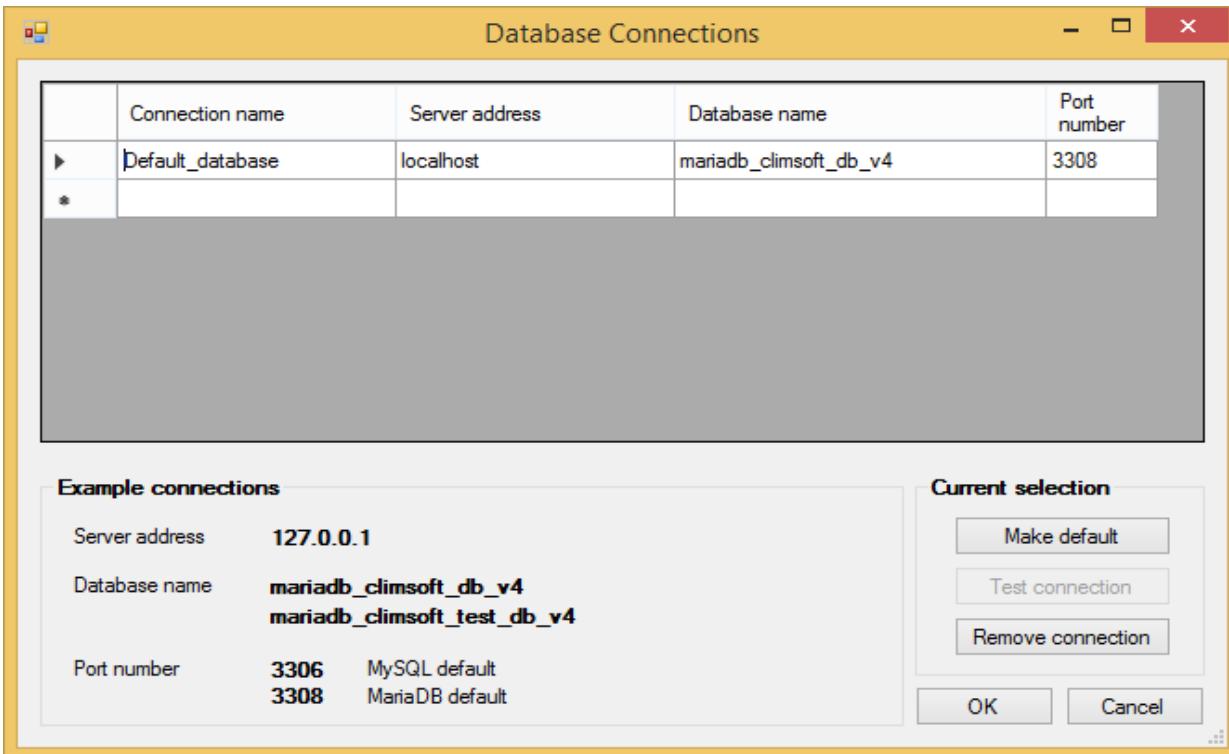


Figure 7: Database connection details

If the MariaDB database to which you want to connect is on your local computer then the server must be either “**localhost**” or “**127.0.0.1**”. If the port number you chose during the installation of MariaDB is different from “**3308**” as shown on the screenshot above, you will need to change the port number to the correct one and click **Ok**. More details on how to manage database connections are given in section **2.5.2** below.

After successful login, the Climsoft front-end will appear as shown (Figure 8). From the front-end, you can access all the components of the Climsoft CDMS, either through the top menu or by clicking the icons on the Welcome screen.

However, a user will be able to access only the features corresponding to the privileges associated with the user- group to which they belong.

2.5 Updated Climsoft Login and Database Connection

2.5.1 Login Dialog

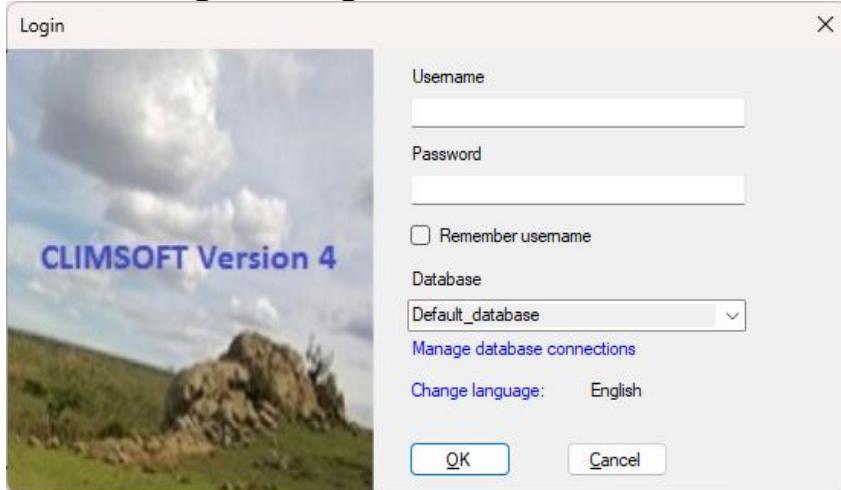


Figure 6a : Climsoft Login Dialog

To Login

Enter user name in *User Name* box
Enter Password in *Password* box

To Change database connection Click on [Manage database connections](#) then follow dialog in Figure 7a

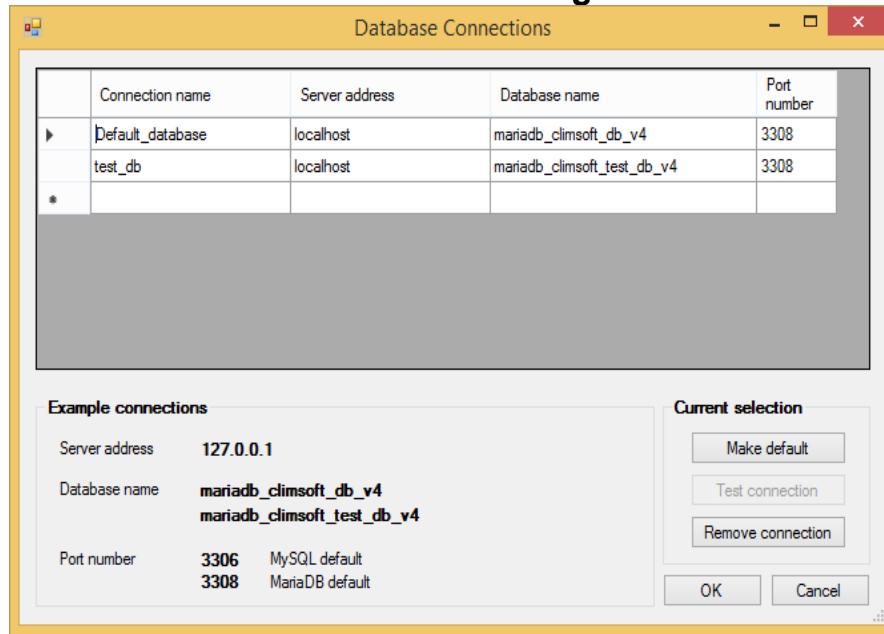
To remember user name in subsequent logins

Check the box *Remember username*

To Set the Language to use

Click on [Change Language](#) to select the appropriate language from the subsequent dialog

2.5.2 Database Connection Dialog



To connect to any of the listed databases

- Select the database by clicking on the left most cell of that row,
- Click on the button *Make default*.
- Click OK to save changes and close the dialog.

To connect to a database that is not listed

- Enter the database details in the new row marked *,
- Follow the provided *Example connections* to fill all cells for that row,
- Click on the button *Make default*,
- Click OK to save changes and close the dialog.

Figure 7a: Database connection details

Note that Climsoft V4 installation comes with two databases; one as the operational database while the one as test database. The test database is populated with observational data and metadata obtained from different NMHSs. In order to use the test database, it must be listed in the Database Connections as shown in Figure 7a and be selected at the Login dialog through the Database list box.

3. Climsoft Main Menu and Welcome Dialog

After a successful Login the main interface for Climsoft Version 4 displays (see Figure 8). It is referred to as the **Welcome** Dialog and consists of the Main Menu and icons through which all the functionalities are accessed.

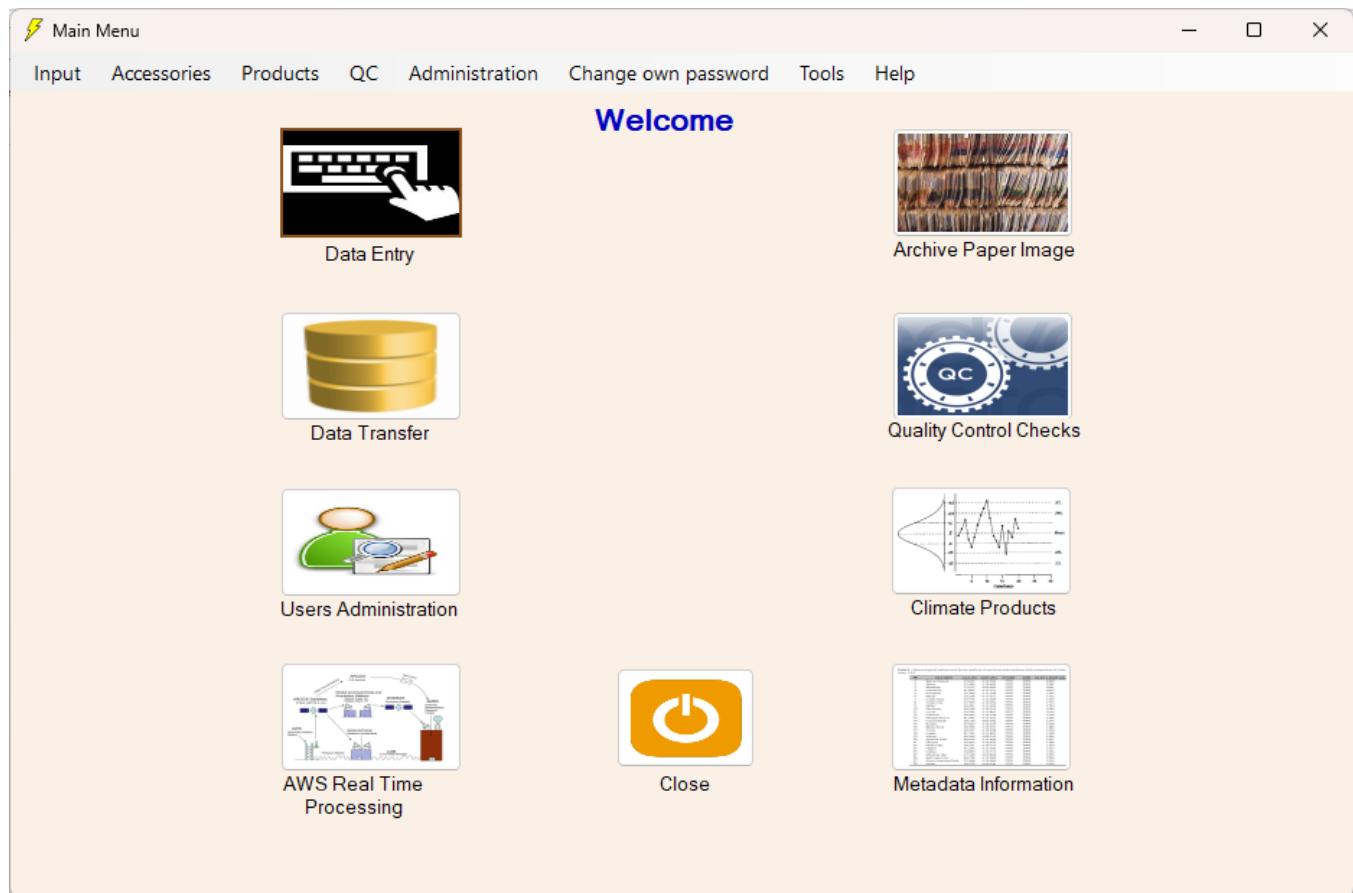


Figure 8: Welcome Dialog

The functions that are accessed from this dialog are as follows:

3.1 Menu Bar Items

- **Input** – Opens key entry forms and the paper archive dialog;
- **Accessories** – Opens the calculation of Relative Humidity and Dew point, given the Dry Bulb and Wet bulb temperatures;
- **Products** – Opens the Climate products development dialog;
- **QC** – Data quality control functions;
- **Administration** – Functions for administration of users and the database. This feature is only accessible to administrators;
- **Change own password** – Open the dialog for users to change their passwords;
- **Tools** – Opens dialogs for different operational settings;
- **Help** – About Climsoft V4 and online help on how to undertake various operations.

3.2 Main Menu Icons

- **Data Entry** – Lists key entry forms to enter climate data. Same as in the menu **Input**;
- **Data Transfer** – Opens a dialog for data upload, import (external data), backup and restore;
- **Users Administration** – Opens a dialog for adding users and updating their details. . . Same as in the menu **Administration**;
- **AWS Real Time Processing** – Opens a dialog for setting up and managing Automatic Weather Station (AWS) data real time operations;
- **Archive Paper Image** - Opens a dialog for managing paper images. Same as in the **Menu**;
- **Quality Control checks** - Opens a dialog for quality control checks. Same as in the menu **Input**;
- **Climate Products** - Opens a dialog to extract climate products. Same as in the menu **QC**;
- **Metadata Information** - Opens the metadata management dialog;
- **Close** – For Climsoft Shut down.

4. User Management and Configuration Settings

4.1 User Management

The default user of the Climsoft CDMS is “**root**”. This is the super user of the system with access to all the features of the Climsoft CDMS. To allow other users to make use of the system, the “root” user must add new users and assign them to different user groups. The different user groups that have been pre-defined for Climsoft are shown in Table1:

User Group	Summarized access rights
ClimsoftAdmin	All Climsoft features including creating and deleting other users
ClimsoftDeveloper	Modification of all Climsoft features
ClimsoftMetadata	Updating of metadata e.g. station information, instruments, etc.
ClimsoftOperator	Key-entry of observation data
ClimsoftOperatorSupervisor	Key-entry plus uploading key-entry data to observationinitial table
ClimsoftProducts	Extracting products from Climsoft
ClimsoftQC	Key-entry, upload to observationinitial and Quality Control
ClimsoftRainfall	Key-entry of only rainfall data

Table 1: CLIMSOFT user roles

The “**root**” user or any other user with administrative privileges is able to access the user management dialog by clicking the “**User Management**” icon on the Welcome screen or via the “**Administration**” menu. The dialog for User Management is shown in Figure 9.

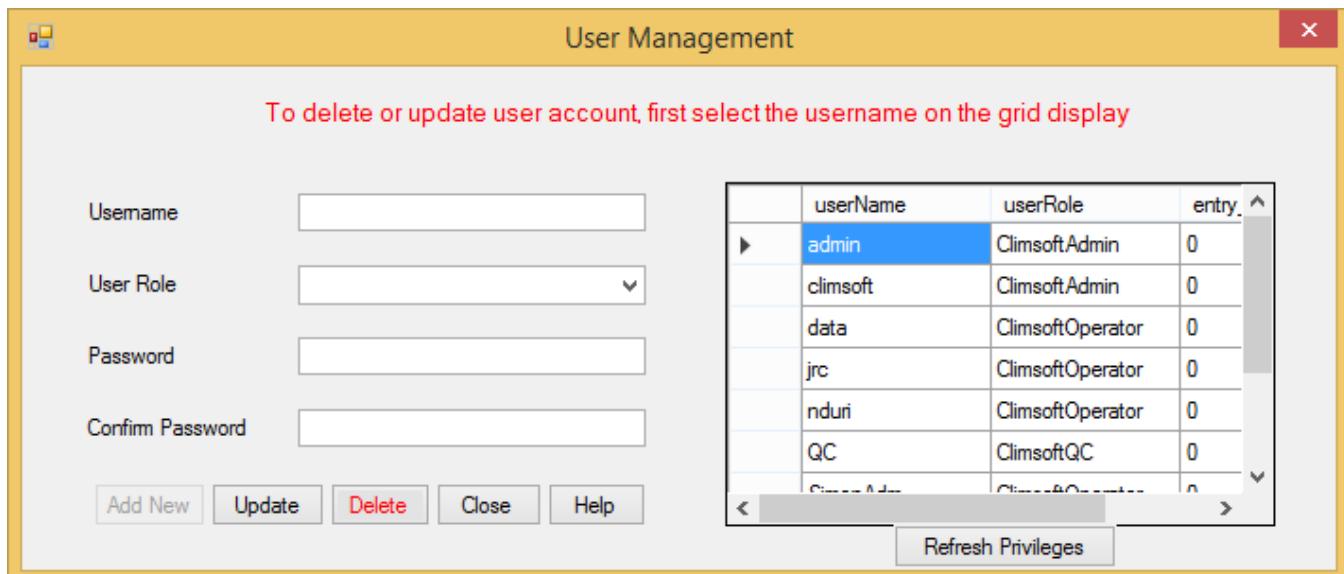


Figure 9: Climsoft user management

The user management dialog is self-explanatory. The “Add New” button is enabled after filling all the text boxes and picking the user role from the dropdown list.

Apart from creating new users, the Climsoft administrator can change the Password and also the User Role of any user. To change the password for the selected user, the new password must be entered and confirmed in the **Password** and **Confirm Password** boxes respectively then click **Update** button. The user role is changed by selecting the new one from the **user Role** list box then click the buttons **Update** and **Refresh Privileges** in that order.

Any user can change his/her own password via the menu item “**Change own password**” on the **Welcome** form in Figure 8.

The **root** user is managed through the database engine tools but not through the **User Management** dialog.

4.2 Configuring General Settings

To customize Climsoft for local use, the Climsoft administrator must configure the system via **Tools >> General Settings** from the top menu on the Climsoft front-end. Figure 10a shows the dialog for configuring the general settings in a view displaying one record at a time.

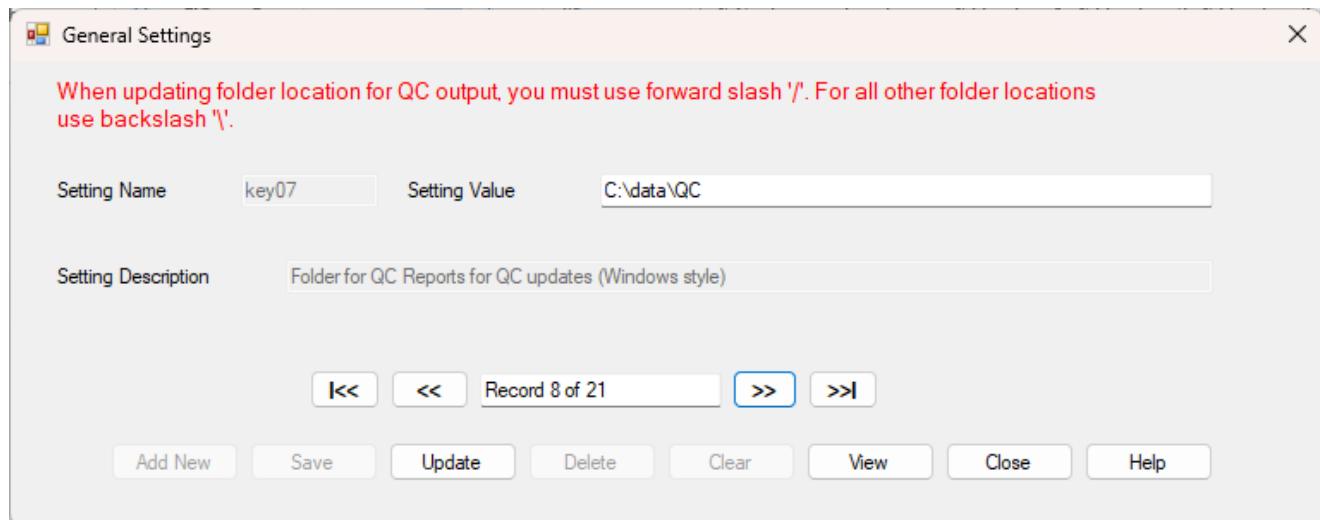


Figure 10a: General settings in a single record view mode

The Administrator must navigate through **all** the records in the dialog and change the contents in the text box to the right of the label “Setting Value” to suit the required local configuration. After changing any record click **Update** button before going to the next.

Alternatively, by clicking the “**View**” button, the settings can be viewed and edited in datasheet (table) view as shown in Figure 10b

	keyName	keyValue	keyDescription
▶	key00	850	Geopotential standard pressure level
	key01	6	Morning time for recording tmin and precip
	key02	18	Afternoon time for recording tmax
	key03	1	Month for starting recording of Gmin
	key04	12	Month for ending recording Gmin
	key05	3	Number of digits for wind direction
	key06	3	Number of digits for wind speed
	key07	C:\data\QC	Folder for QC Reports for QC updates (Windows style)
	key08	C:/data/QC	Folder for QC Reports for MariaDB output (Unix style)
	key09	inches	Units for Precipitation
	key10	Deg C	Units for Temperature
	key11	feet	Units for Cloud hight
	key12	C:\Image\Archive	Folder for Paper Archive image files
	key13	127.0.0.1	Remote server
	key14	metres	Units for Visibility
	key15	feet	Units for Cloud hight
	key16	C:\data\backup\...	Backup folder for keyentry form data (mapped on local)
	key17	!?'UicoCa_YnBY...	SSH key for generating outfile (DO NOT CHANGE THIS VALUE!)

Figure 10b: General settings in datasheet view mode

You may increase the columns width in the data sheet to see more details by dragging the columns boundaries to the right. With administrative privileges the records may be updated but not deleting or adding. **Update** and **Delete** buttons are enabled after clicking the button **Edit Mode**. Values in the column “**KeyName**” should not be changed because they are used by Climsoft to reference the selected record.

Through **Export** button the displayed records can be exported into a text (csv) file and saved as a backup data. The **Import** button does the reverse.

5. Metadata Management

Climsoft uses metadata to describe the data archived in its database. It is therefore important to manage the metadata well and ensure all metadata is in place before the data it describes is loaded into the Climsoft database. The dialog shown in Figure 11 below facilitates management of all metadata in the Climsoft database. Each tab opens a dialog for the management of each of the metadata type.

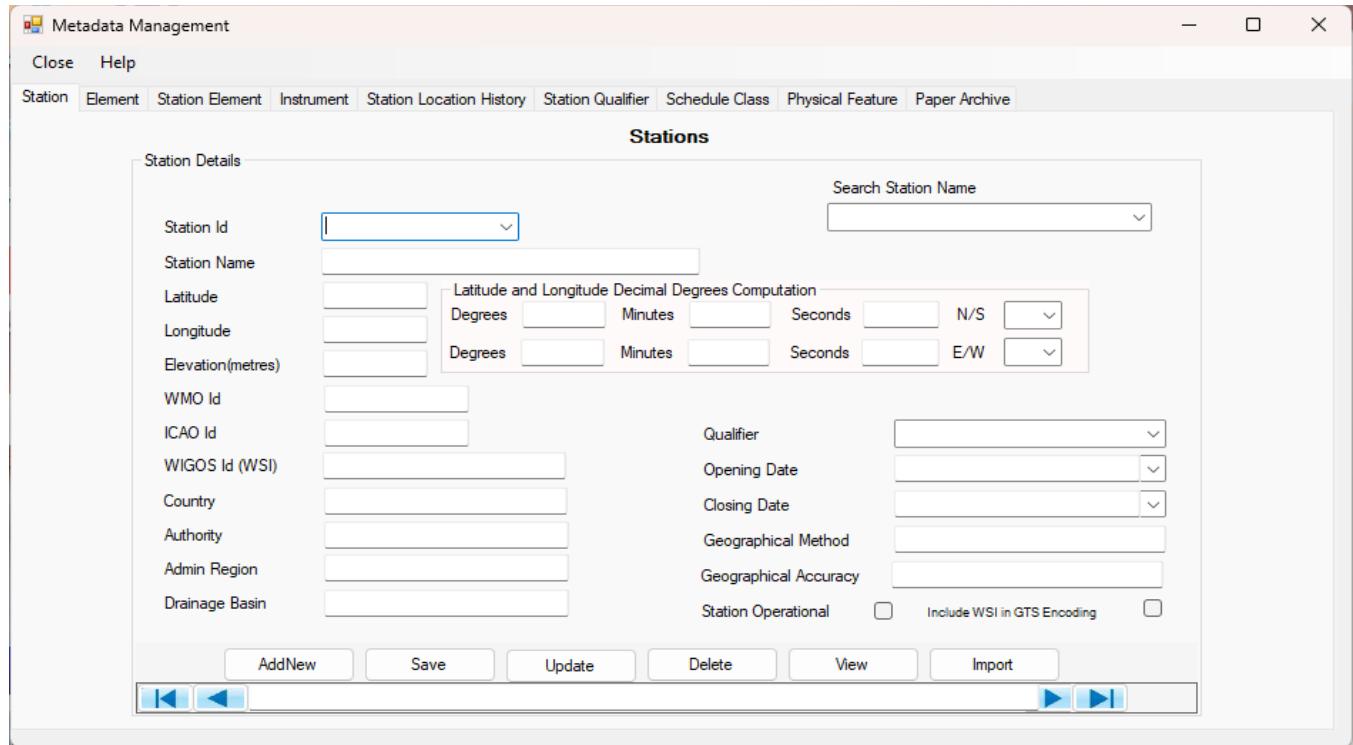


Figure 11: Metadata Management

The dialog in Figure 11 is for the station metadata. All other metadata dialogs have a similar structure.

The Station metadata dialog has the following controls:

- **Text boxes** – For the input of metadata values or showing the values for the selected record;
- **Scroll bar and buttons** – To navigate through the metadata records;
- **Searching records:**
 - **Search Station Name** list box – Searches station for the selected name and displays its details in the text boxes,
 - **Station Id** list box – Also searches a station record by selecting and clicking the station Id value from the list. Details of the selected station will be shown in their appropriate text boxes.
- **Latitude and Longitude** MUST be entered in decimal degrees. Where geographical coordinates are not available in decimal values but in degrees, minutes and seconds they may be entered in the provided boxes for conversion. They will get computed and filled into the appropriate boxes once the **N/S** or **E/W** is selected.

- **Command Buttons:**

- **AddNew** – Adds a new metadata record after details have been typed in. The Station Id is mandatory and must be unique in all records;
- **Save** – Adds and saves a new station record in the database whose details have been typed;
- **Update** – Updates the changes made on the selected record;
- **Delete** – Removes the selected and displayed record from the database;
- **View** – Displays the metadata records in a tabular form. The Export button will export the metadata file in csv format;
- **Import** – Opens a dialog through which stations metadata in a text (csv) can be imported into Climsoft. By clicking the **Import** Command button the dialog in Figure12 below appears;

5.1 Importing Station Metadata

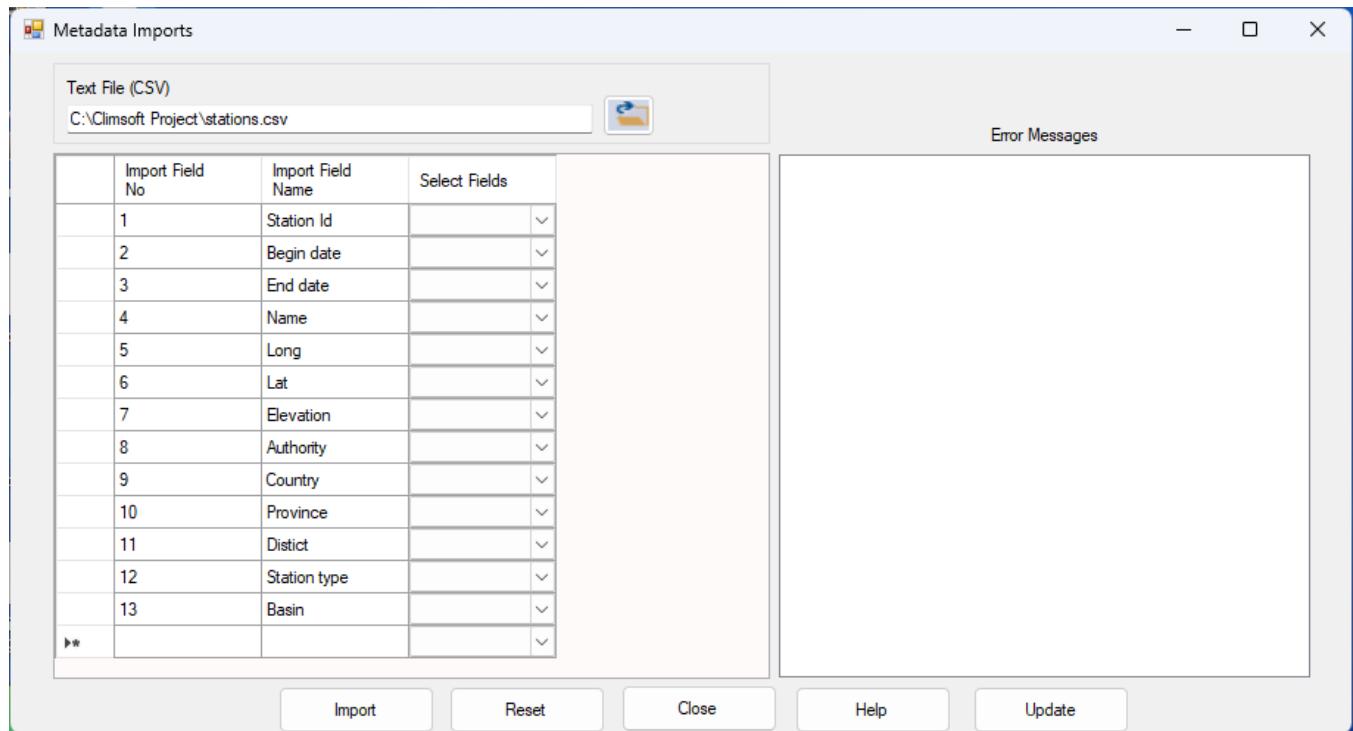


Figure 12: Importing stations metadata

The metadata import file can be created using EXCEL then saved as Comma Separated Values (CSV) with column headers. In EXCEL the structure is as shown in Figure 13;

id	wmoid	aviationid	begin_datetime	end_datetime	station_name	district	country	qualifier	drainagebasin	latitude	longitude	elevation
8435001			01/01/1970 00:00		KIBISH POLICE POST	TURKANA	KENYA	RAINFALL	2B	5.23	35.85	547
8534000			01/01/1949 00:00		LOKICHOGGIO POLICE POST	TURKANA	KENYA	RAINFALL	2B	4.25	34.35	638
8534001			01/01/1985 00:00		LOKICHOGGIO LOPANDING AMREF STATION	TURKANA	KENYA	RAINFALL	2B	4.2	34.4	638
8534002			01/01/1986 00:00		LOKICHOGGIO A.I.C	TURKANA	KENYA	RAINFALL	2B	4.2	34.35	638
8534003			01/01/1987 00:00		LOKUDULE PRIMARY SCHOOL	TURKANA	KENYA	RAINFALL	2B	4.05	34.83	547
8535000			01/01/1932 00:00		LOKITAUNG D.O.'S OFFICE	TURKANA	KENYA	RAINFALL	2B	4.25	35.75	729
8535001			01/01/1948 00:00		TODENYANG POLICE POST	TURKANA	KENYA	RAINFALL	2B	4.53	35.91	395
8535003			01/01/1966 00:00		KOKURO POLICE POST	TURKANA	KENYA	RAINFALL	2B	4.66	35.71	608
8535004			01/01/1970 00:00		KAMATHIA POLICE POST	TURKANA	KENYA	RAINFALL	2B	4.9	35.35	760
8535005			01/01/1973 00:00		KALENG TRADING CENTRE	TURKANA	KENYA	RAINFALL	2B	4.38	35.55	730
8535006			01/01/1973 00:00		LOWARENGAK MISSION	TURKANA	KENYA	RAINFALL	2B	4.28	35.9	380
8535007			01/01/1985 00:00		LOKITAUNG SECONDARY SCHOOL	TURKANA	KENYA	RAINFALL	2B	4.28	35.78	730
8535008			01/01/1986 00:00		KAIKOR T. R. P.	TURKANA	KENYA	RAINFALL	2B	4.53	35.4	700
8535009			01/01/1986 00:00		KACHODA T. R. P.	TURKANA	KENYA	RAINFALL	2B	4.35	35.63	547
8535010			01/01/1990 00:00		TODENYANG A. P. POST	TURKANA	KENYA	RAINFALL	2B	4.61	35.93	410
8535011			01/01/1992 00:00		NACHUKUI PRIMARY SCHOOL	TURKANA	KENYA	RAINFALL	2B	4.08	35.91	410
8535012			01/01/1983 00:00		KOYASA A. P POST	TURKANA	KENYA	RAINFALL	2B	4.95	35.65	608
8536000			01/01/1948 00:00		SABAREI POLICE POST	MARSABIT	KENYA	RAINFALL	2A	4.35	36.9	760

Figure 13: structure of station metadata file in Excel

After saving in a text (csv) format the data appears as shown in Figure 14.

```
manual_stations_loc.csv - Notepad
File Edit Format View Help
,id,station_name,qualifier,country,district,authority,begin_datetime,end_datetime,longitude,latitude,elevation,drainagebasin
10101100,GITEGA,AGROMET/SYNOPTIC,RWANDA,NYARUGENGE,KIGALI CITY,01/01/1970,31/12/9999,30.06,-1.95,1474,NIL
10105200,BUTAMWA,CLIMATOLOGICAL,RWANDA,NYARUGENGE,KIGALI CITY,01/01/1970,31/12/9999,30.03,-2.01,1400,NIL
10106500,MUHIMA,RAINFALL,RWANDA,NYARUGENGE,KIGALI CITY,01/01/1970,31/12/9999,30.06,-1.93,1530,NIL
10107500,KABUSUNZU,RAINFALL,RWANDA,NYARUGENGE,KIGALI CITY,01/01/1970,31/12/9999,30.05,-1.96,1530,NIL
10108500,COLLEGE ST ANDRE,RAINFALL,RWANDA,NYARUGENGE,KIGALI CITY,01/01/1970,31/12/9999,30.06,-1.96,1550,NIL
10109500,LYCEE ND CITEAUX,RAINFALL,RWANDA,NYARUGENGE,KIGALI CITY,01/01/1970,31/12/9999,30.06,-1.95,1550,NIL
10109600,RUGUNGA,RAINFALL,RWANDA,NYARUGENGE,KIGALI CITY,01/01/1970,31/12/9999,30.08,-1.95,1420,NIL
10109700,RWAMPARA,RAINFALL,RWANDA,NYARUGENGE,KIGALI CITY,01/01/1970,31/12/9999,30.08,-1.96,1425,NIL
10201500,RUBUNGO,Rainfall,RWANDA,GASABO,KIGALI CITY,01/01/1970,31/12/9999,30.16,-1.92,1450,NIL
10202200,KABUYE SUGAR,Climatology,RWANDA,GASABO,KIGALI CITY,01/01/1970,31/12/9999,30.07,-1.89,1400,NIL
10306100,KIGALI AERO,AGROMET/SYNOPTIC,RWANDA,KICUKIRO,KIGALI CITY,01/01/1970,31/12/9999,30.11,-1.95,1490,NIL
10308500,MASAKA,RAINFALL,RWANDA,KICUKIRO,KIGALI CITY,01/01/1970,31/12/9999,30.21,-2,1550,NIL
10308600,RUBIRIZI,RAINFALL,RWANDA,KICUKIRO,KIGALI CITY,01/01/1970,31/12/9999,30.11,-1.98,1450,NIL
20101500,NYANZA,RAINFALL,RWANDA,NYANZA,SOUTHERN,01/01/1970,31/12/9999,29.75,-2.35,1700,NIL
20101600,GIHISI,RAINFALL,RWANDA,NYANZA,SOUTHERN,01/01/1970,31/12/9999,29.75,-2.36,1700,NIL
20101700,BUSASAMANA-NYANZA,CLIMATE,RWANDA,NYANZA,SOUTHERN PROVINCE,01/01/1970,31/12/9999,29.76,-2.35,1805,NIL
20102PLP,BUSORO,CLIMATOLOGICAL/AWS,RWANDA,NYANZA,SOUTHERN,01/01/1970,31/12/9999,29.91,-2.28,1478,NIL
20106500,MWEYA,RAINFALL,RWANDA,NYANZA,SOUTHERN,01/01/1970,31/12/9999,29.63,-2.33,2000,NIL
20107500,NYAMIYAGA,RAINFALL,RWANDA,NYANZA,SOUTHERN,01/01/1970,31/12/9999,29.86,-2.46,1800,NIL
20109700,RURANGAZI,Rainfall,RWANDA,NYANZA,SOUTHERN,01/01/1970,31/12/9999,29.65,-2.35,1512,NIL
20201200,CYILI,CLIMATOLOGICAL,RWANDA,GISAGARA,SOUTHERN,01/01/1970,31/12/9999,29.88,-2.48,1391,NIL
20201500,GIKONKO,Rainfall,RWANDA,GISAGARA,SOUTHERN,01/01/1970,31/12/9999,29.86,-2.48,1612,NIL
20203200,KANSI ECOLE,CLIMATOLOGICAL,RWANDA,GISAGARA,SOUTHERN,01/01/1970,31/12/9999,29.75,-2.7,1670,NIL
20203500,KANSI PAROISSE,RAINFALL,RWANDA,GISAGARA,SOUTHERN,01/01/1970,31/12/9999,29.75,-2.71,1670,NIL
20205200,KIGEMBE,CLIMATOLOGICAL,RWANDA,GISAGARA,SOUTHERN,01/01/1970,31/12/9999,29.7,-2.73,1700,NIL
20206500,GAKOMA,RAINFALL,RWANDA,GISAGARA,SOUTHERN,01/01/1970,31/12/9999,29.85,-2.71,1450,NIL
20209700,MUKINDO,RAINFALL,RWANDA,GISAGARA,SOUTHERN,01/01/1970,31/12/9999,29.91,-2.46,1542,CONGO
20213500,SAVE PAROISSE,RAINFALL,RWANDA,GISAGARA,SOUTHERN,01/01/1970,31/12/9999,29.76,-2.55,1725,NIL
```

Figure 14: structure of station metadata file in Notepad.

5.1.1 Station Metadata Import procedure

- From the Metadata Import dialog, Figure 12, open the text file containing the stations metadata;
- The column headers in the text file are listed in the **Import Field Name** column of the dialog;
- For each field in the list click twice (not double click) on the **Select Field** to select the corresponding field name from the database;
- Click the **Import** command. The metadata will then be imported and any station that fails to be imported will be listed in **Errors message** box with the cause of the failure. The summary of the importing will be listed below that box.
- Scroll through the error messages, correct the text file and repeat the exercise. Duplicate error messages should be ignored since they indicate the record already exists in the database.
- Click **Close** to exit the dialog.

5.2 Other Metadata

Other metadata types do not require importing but are typed since they are usually few.

5.2.1 Elements Metadata

Observation elements are many and are supplied with Climsoft. They can be edited after clicking the Element tab to display the Observation Element dialog. This dialog enables the characteristics of a new climatic element to be specified and those of existing elements modified. Generally the elements will be standard but modification to customize them according to the user requirements is necessary. If there are Elements observed in a NMHS and not listed they should be added.

The elements may be viewed and updated in either Element view, Figure 15, or in Table View, Figure 16. Click the View button in Figure 15 to move to the Table view. In Table View, Click the View Mode button to return to the Element view of Figure 15.

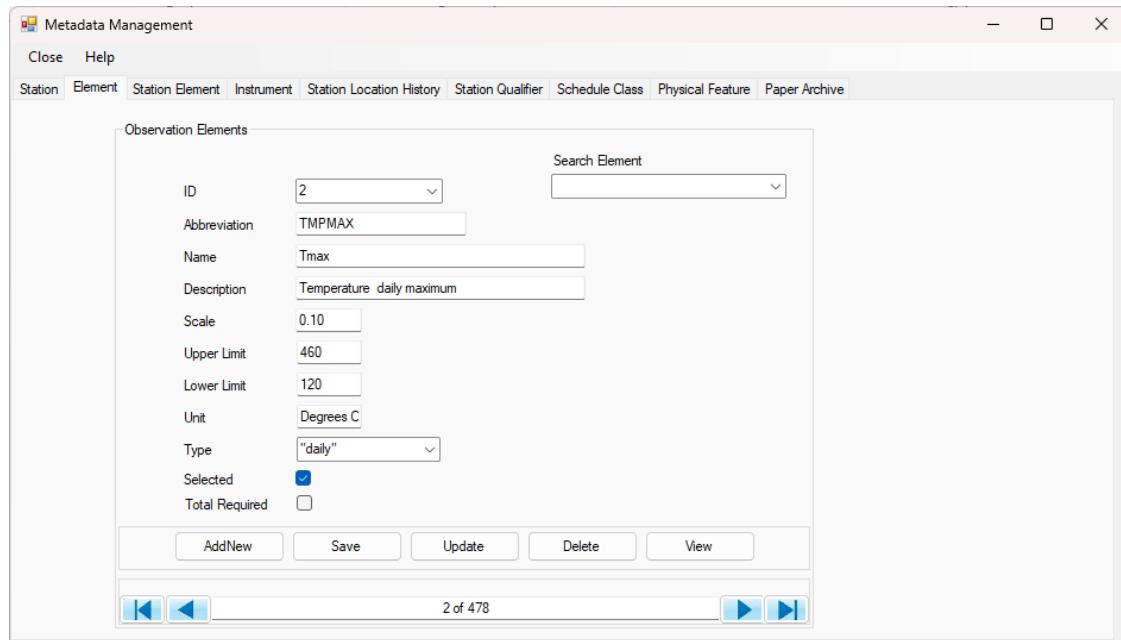


Figure 15: Elements dialog

The dialog in Figure 15 is used as follows:

(i) **Adding a new element record:**

- Click **AddNew** to obtain a blank form;
- Enter metadata values for the element;
 - Data for **ID** is mandatory and unique in all records,
 - **Scale** is the factor used in key entry for the decimal point. Therefore **Upper Limit** and **Lower Limit** values should take the scale into account,
 - **Type** is the frequency of observation e.g., minute, hourly, daily, AWS.
- Click Save to add the new record in database.

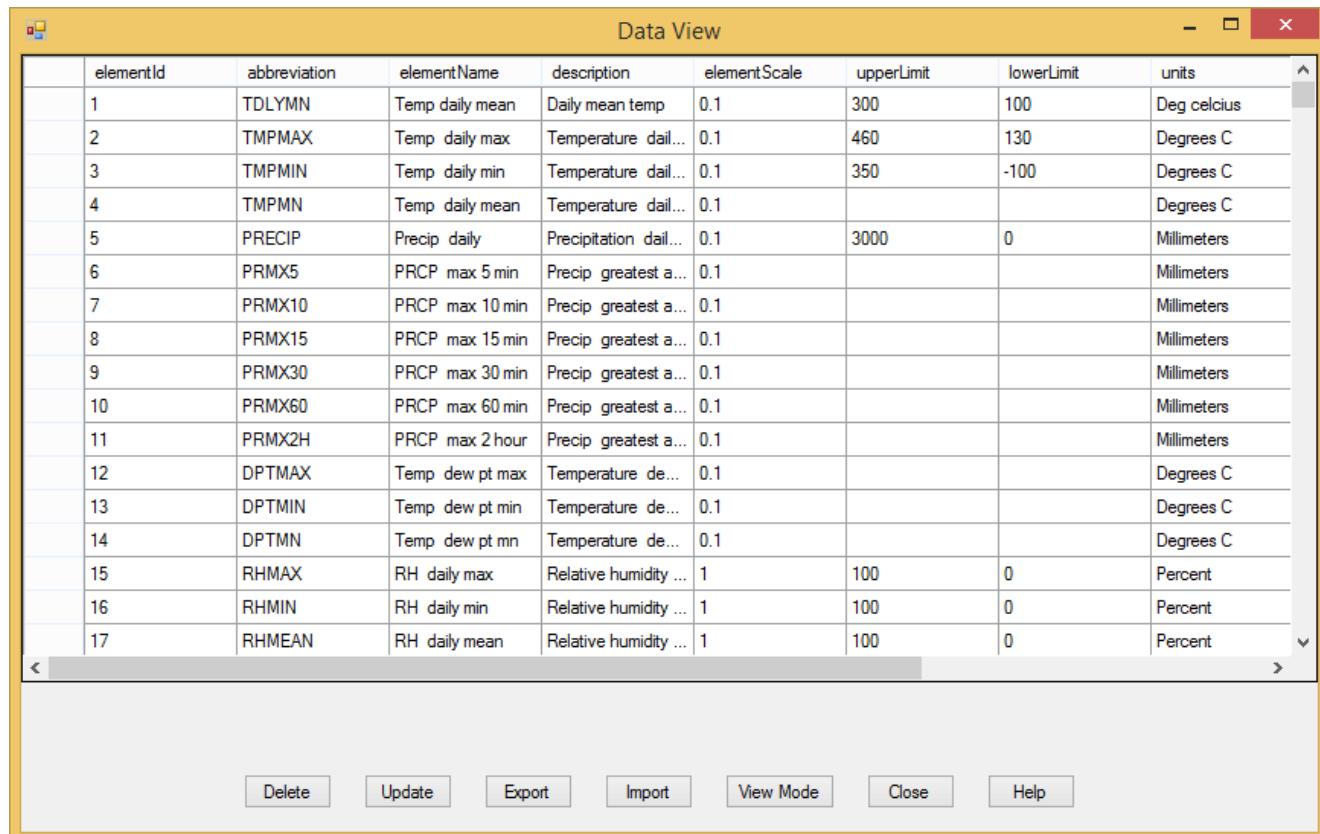
(ii) **Updating (editing) existing element record:**

- Use either **Search Element** box or **ID** to locate the required element record,
- Edit the desired values,
- Click **Update** to save the changes.

(iii) **Deleting elements**

- Use either **Search Element** box or **ID** to locate the required element record
- Click **Delete**

Alternatively move to Table View, Figure 16 and use the command buttons as described below;



elementId	abbreviation	elementName	description	elementScale	upperLimit	lowerLimit	units
1	TDLYMN	Temp daily mean	Daily mean temp	0.1	300	100	Deg celcius
2	TMPMAX	Temp daily max	Temperature daily max	0.1	460	130	Degrees C
3	TMPMIN	Temp daily min	Temperature daily min	0.1	350	-100	Degrees C
4	TMPMN	Temp daily mean	Temperature daily mean	0.1			Degrees C
5	PRECIP	Precip daily	Precipitation daily	0.1	3000	0	Millimeters
6	PRMX5	PRCP max 5 min	Precip greatest a...	0.1			Millimeters
7	PRMX10	PRCP max 10 min	Precip greatest a...	0.1			Millimeters
8	PRMX15	PRCP max 15 min	Precip greatest a...	0.1			Millimeters
9	PRMX30	PRCP max 30 min	Precip greatest a...	0.1			Millimeters
10	PRMX60	PRCP max 60 min	Precip greatest a...	0.1			Millimeters
11	PRMX2H	PRCP max 2 hour	Precip greatest a...	0.1			Millimeters
12	DPTMAX	Temp dew pt max	Temperature de...	0.1			Degrees C
13	DPTMIN	Temp dew pt min	Temperature de...	0.1			Degrees C
14	DPTMN	Temp dew pt mn	Temperature de...	0.1			Degrees C
15	RHMAX	RH daily max	Relative humidity ...	1	100	0	Percent
16	RHMIN	RH daily min	Relative humidity ...	1	100	0	Percent
17	RHMEAN	RH daily mean	Relative humidity ...	1	100	0	Percent

Buttons at the bottom: Delete, Update, Export, Import, View Mode, Close, Help.

Figure 16: Elements in table view

Use the commands as follows;

- **Delete:** Delete the current record by selecting on clicking the left most cell,
- **Update:** Updates changes made on the current (selected) record,
- **View Mode:** Switches between View and Edit mode,
- **Export:** Exports all the elements metadata into a text CSV file,
- **Import:** Imports elements metadata file from an Export operation.
- **Close:** Closes the view table,
- **Help:** Online help on how to use this dialog.

(iv) Selected elements

This box is used to select elements that will be listed in various dialogs where element list is required. Use this box and check (tick) for the required elements and uncheck (untick) for those that are not required. Note that Climsoft dialogs for different operations that have boxes for elements selection will only list the selected elements. Remember to click the **Update** button whenever the box is checked or unchecked otherwise the action will not be saved.

(v) Total Required

By default this box is unchecked (unticked). The box is used to check for those elements whose sum for the observation values will require to be entered in the key entry forms. This action is purely for QC purposes where the sum of the entered values will be compared with the totals computed by the observer. Those other elements without computed totals for key entry forms should not be checked. Remember to click the **Update** button whenever the box is checked or unchecked otherwise the action will not be saved.

5.2.2 Station Element

The details of the elements observed at a particular station are entered here:

This dialog enables the editing and updating of element information as recorded at a particular station. Before adding a station element record in this dialog the *stationId*, *elementId*, *instrumentId* and *scheduleclass* that describes this element should first be entered in their respective tables through the provided dialogs (under the Tabs) in that order. The value for Instrument Type is a code that can be obtained from the WMO Code and Flag tables manual. Not all instruments that have codes. In that case the box is left blank. Some of the Instrument types described in Code and Flag table are for measurement of evaporation and wind.

Metadata Management

Close Help

Station Element Station Location History Station Qualifier Schedule Class Physical Feature Paper Archive

Station Element

Station Element Details

Station ID	10306100
Element ID	2
Instrument ID	2
Instrument Type	1 (Code Table)
Schedule Class	3
Height	1.25
Begin Date	01/01/1964
End Date	31/12/9999

AddNew Save Update Delete View

1 of 5

Figure 17: Station Element details

5.2.3 Instruments

This dialog enables the system administrator to specify the characteristics of a particular instrument used to record an element at a given station.

Metadata Management

Close Help

Station Element Instrument Station Location History Station Qualifier Schedule Class Physical Feature Paper Archive

Instrument

Instrument Details

Instrument ID	1
Name	RAINGAUGE
Abbreviation	RG
Station ID	10306100
Serial Number	S001
Model	
Manufacturer	VAISALA
Uncertainty (%)	0
Installation Date	01/01/2015
Deinstallation Date	31/12/2015
Height	0.25
Image File	C:/Program Files (x86)/ClimsoftV4/Instruments_images/rain_ga

Instrument Picture

AddNew Save Update Delete View

1 of 4

Figure 18: Instrument details

5.2.4 Station Location History

The detailed history of the station locations are shown in the dialog in Figure 19.

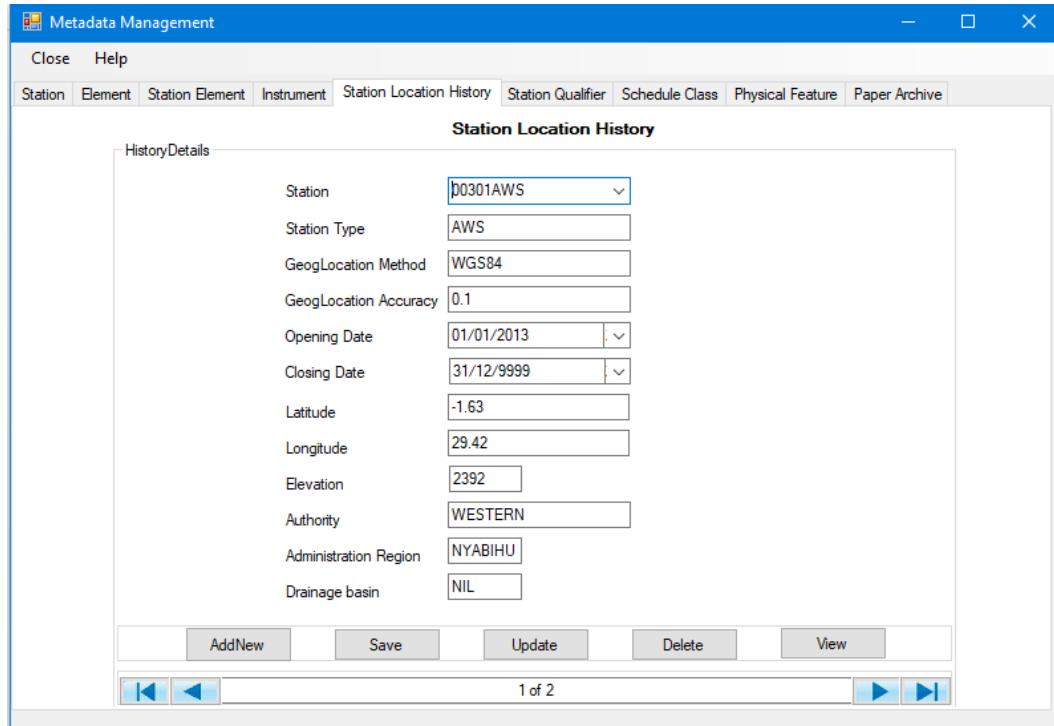


Figure 19: Station Location History

5.2.5 Station Qualifier

The qualifiers for the stations are described through the dialog shown in Figure 20.

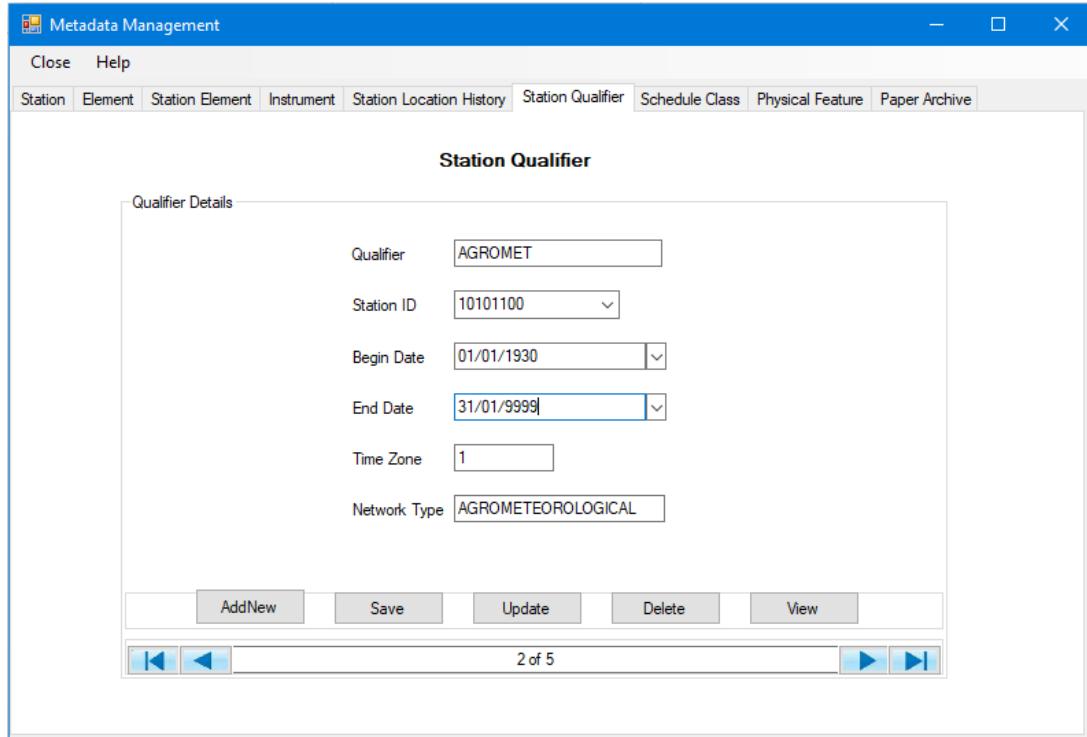


Figure 20: Station Qualifier

5.2.6 Schedule Class

Various observation schedule classes can be defined in Climsoft as shown in Figure 21.

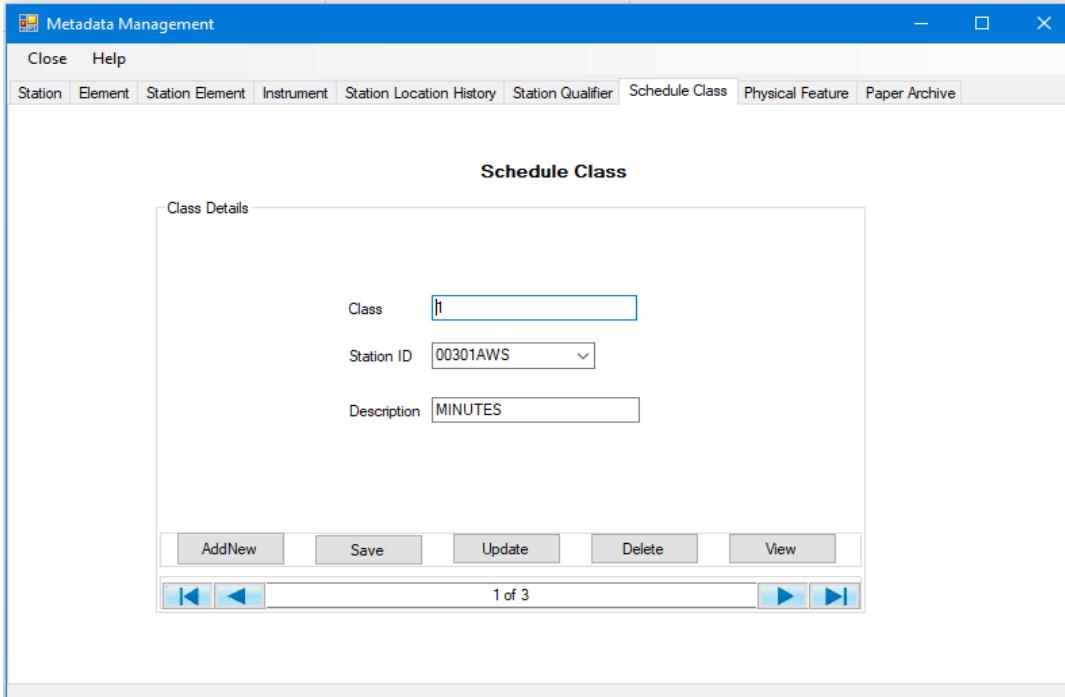


Figure 21: Schedule Class

5.2.7 Physical Feature

The detailed Physical features at the station's environment are shown in Figure 22.

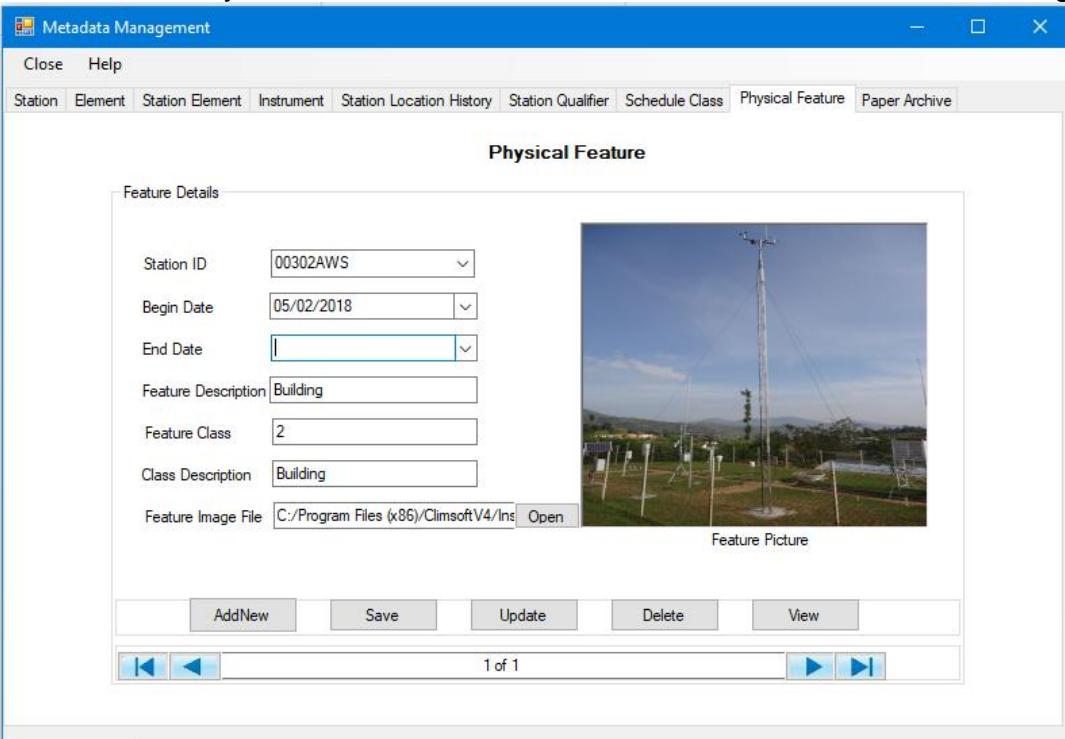


Figure 22: Physical Features

5.2.8 Paper Archive Definition

Metadata definitions of the paper images to be archived are shown in Figure 23. This information should be entered before the paper archive record can be added. Paper archiving operation is described in Chapter 12.

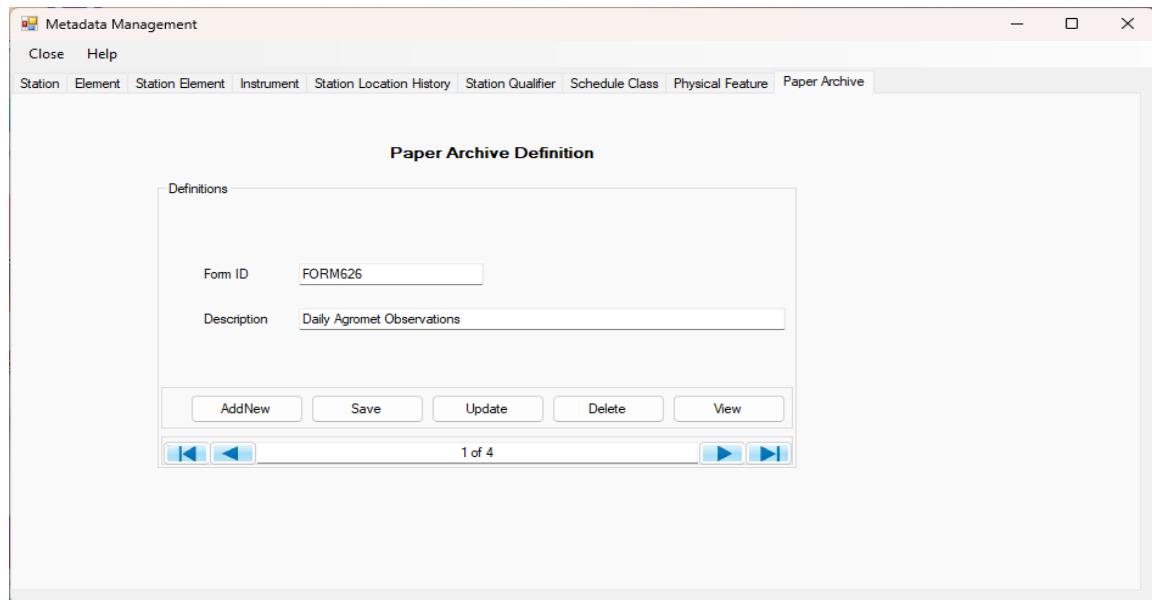


Figure 23: Paper Archive Definition

6. Key Entry

Climsoft comes with a list of Key-entry forms for a user to choose the form that suits the set of data to be entered. To start, the Climsoft administrator selects only those forms required by the key entry operators. The following paragraph describes how the key entry administration and operations are undertaken.

6.1 Setting up Key Entry Forms List

To access the list of all available key-entry forms, login as administrator and follow the steps below;

- From the Welcome form click the menu **Administration** then **Data Forms** to obtain the dialog in Figure 24.

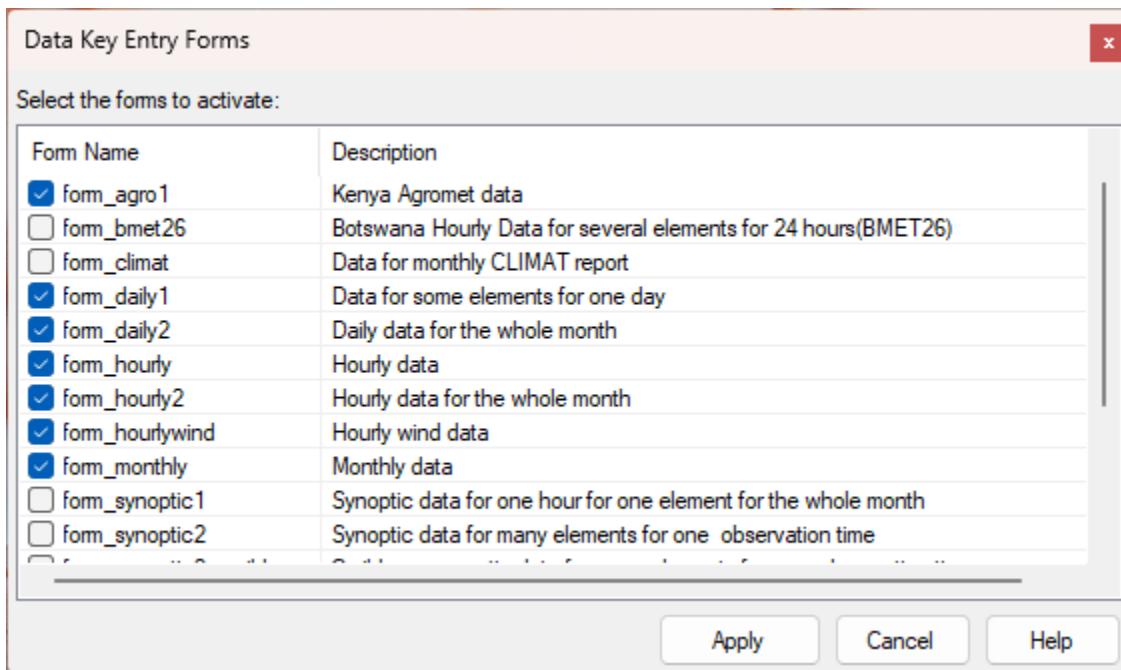


Figure 24: Key Entry Forms Settings

- Check the boxes for those forms to be shown and uncheck for those to hide,
- Click **Apply** to save the changes and **Cancel** to close the dialog.

6.2 Opening a Key Entry Form

- From the Welcome form click on the icon **Data Entry** to obtain the dialog shown in Figure 25;

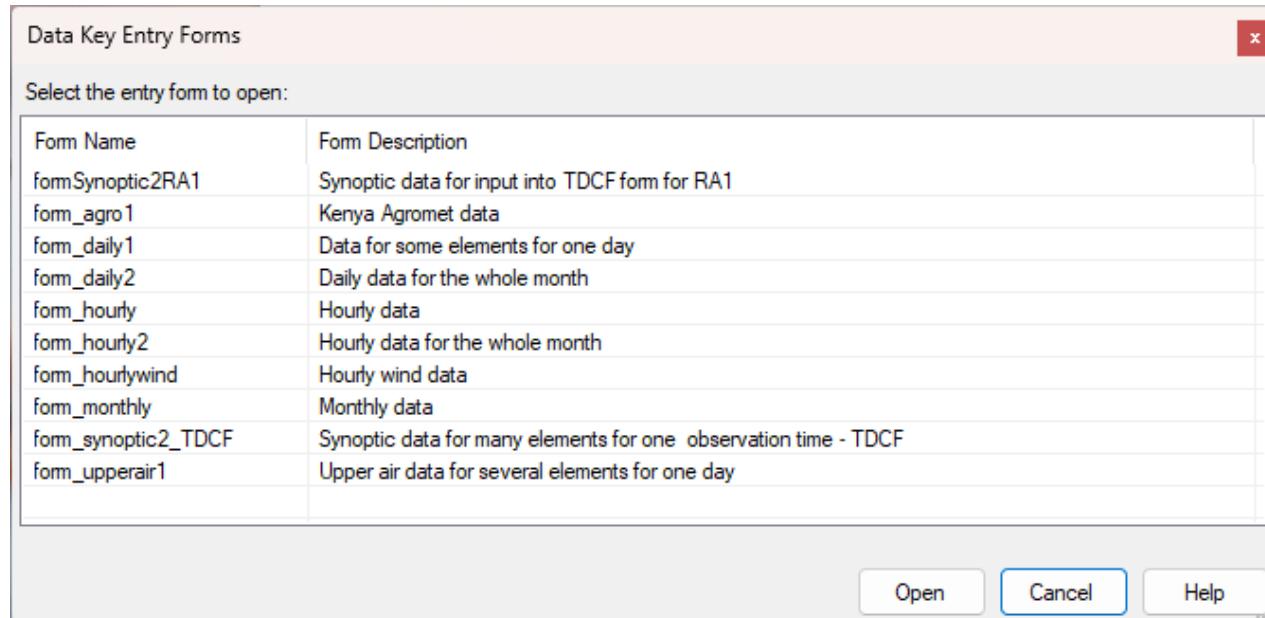


Figure 25: Key Entry forms opening

- Double click on the required form or select the form. Press the Enter key to open it,
- Clicking **OK** also opens the selected form,
- Select **Cancel** to close the dialog.

6.3 Key Entry Forms Layout

All key-entry forms in Climsoft have the same general layout. Figure 26 shows a sample screenshot of the form for entering hourly data.

Just below the title bar, there are controls for header information associated with an observation, typically station identifier, date/time information and element identifier.

Below the header area are text boxes for entering observation values, and near the bottom of the key-entry form is a data control for navigating through key-entry records.

Further down are buttons for triggering various key-entry actions e.g. the action to enter a new record.

When the “**Add New**” button is clicked, the header information for a selected form automatically moves to the next record to be entered.

Hour	Value	Flag	Hour	Value	Flag
00	190		12	260	
01	188		13	300	
02	185		14	310	
03	180		15	315	
04	180		16	316	
05	185		17	315	
06	190		18	300	
07	195		19	265	
08	200		20	230	
09	215		21	221	
10	230		22	201	
11	250		23	195	

Figure 26: Key Entry form for hourly data

6.4 Key Entry Sequencer

Assuming that the next element for which observation data will be entered is “**Temp wet bulb**” which is short form for wet-bulb temperature, then the value in the element list box will automatically change to “**Temp wet bulb**”. When the “**Add New**” button is clicked, the order in which the element abbreviation changes on the element list box is controlled by what is called a

“sequencer” in Climsoft. There is therefore need to customize the order or sequence in which the element name changes on the element list box. The name of the sequencer for the key-entry form is displayed in the text box below the key-entry buttons on the key-entry form.

For Hourly data, the required sequencer configuration is done on the appropriate dialog which is accessed via the top menu on the Climsoft front-end by clicking on **Tools >>Sequencer configuration >>hourly**. Figure 27 shows a screenshot of the dialog for configuring the sequencer for hourly data. The dialog is intuitive, with some guidelines in the top part of the form. Only **element_code** values that are typed in and the **seq** values filled by Climsoft.

	seq	element_code
▶	1	101
	2	102
	3	104
	4	105
*		

Sequencer for Hourly data Using formHourly

Edit the element codes to suit the order of elements when entering hourly data using [formHourly]. You can add a new record or delete an existing record if required. First column is incremented automatically. First column is incremented automatically when entering a new record.

Delete Update Close Help

Figure 27: Dialog for configuring the sequencer for hourly data

The dialog for configuring the sequencer for daily data is accessed via **Tools >> Sequencer configuration >> Daily**. A screenshot of the dialog is shown in Figure 28.

	seq	elementId
▶	2	2
	3	3
	4	5
	5	84
	6	18
	7	85
*		

Sequencer for Entering Daily Data on FormDaily2

Edit the element codes to suit the order of elements when entering daily data using [formDaily2]. You can add a new record or delete an existing record if required. First column is incremented automatically when entering a new record.

Delete Update Close Help

Figure 28: Dialog for configuring sequencer for daily data

Similarly, the dialog for configuring the sequencer for monthly data is accessed via **Tools >> Sequencer configuration >> Monthly**. A screenshot of the dialog is shown in Figure 29.

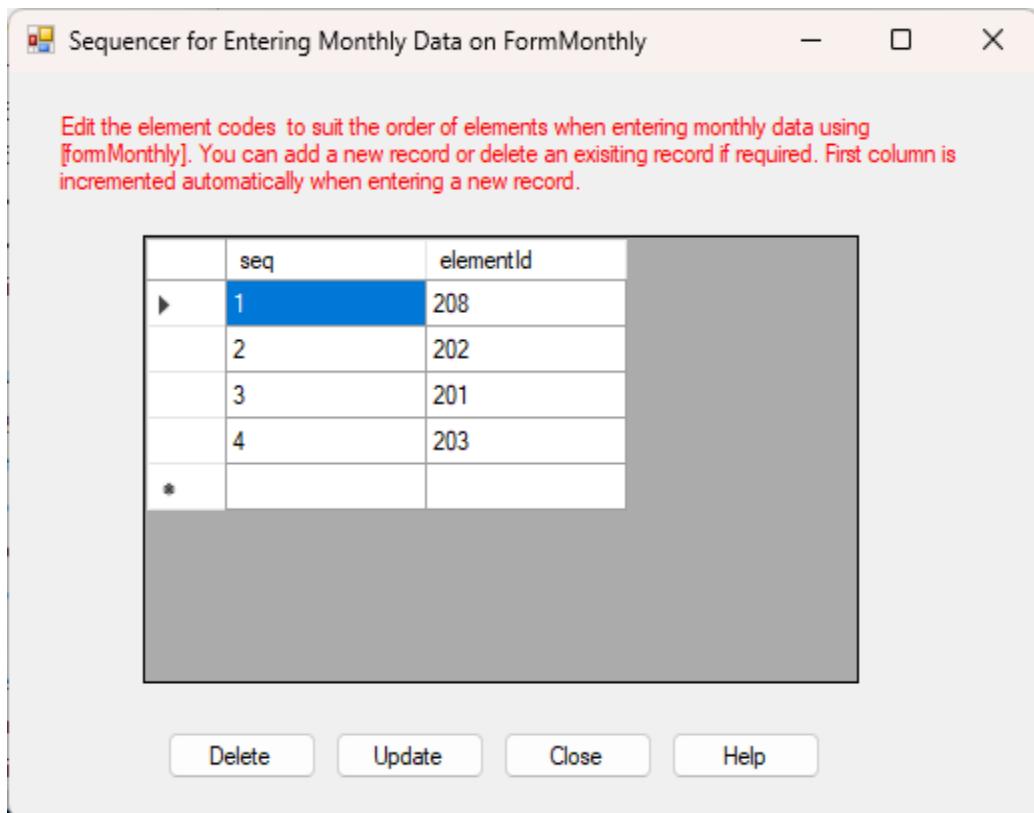


Figure 29: Dialog for configuring sequencer for monthly data

The dialog for configuring the sequencer for hourly data for the whole month is accessed via **Tools >> Sequencer configuration >> Hourly2**. A screenshot of the dialog is shown in Figure 29a.

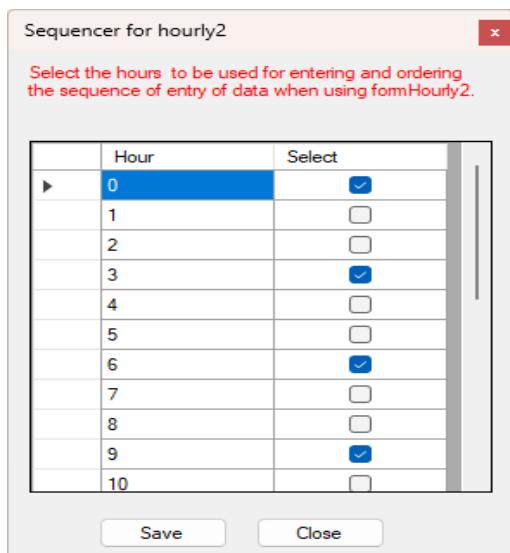


Figure 29a: Dialog for configuring sequencer for monthly data

The **form_hourly2** allows key entry for hourly data that is organized in hourly columns for the whole month. The sequencer is configured as shown in **Figure 29a**. Hours that are described in the data columns are selected as demonstrated in the configuration dialog. If there is data for all hours then all the hours are selected by checking every box in the **Select** column

In addition to the sequence of the elements, the date/time sequence is also changed automatically. This sequence does not require customization since it is the same for any location.

6.5 Configuring synoptic hours for key entry

The form for hourly data can also be used for entering data for selected hours. This is done by disabling the text boxes for only the hours with data by clicking the button “**Enable Selected hours only**”. This button is located just below the header information. Figure 30 shows the hourly form when key-entry is enabled for synoptic hours data entry. To ignore the hours selection and enter data for all hours click again on the same button while it reads “**Enable all hours**”

Hour	Value	Flag	Hour	Value	Flag
00	48		12	72	
01			13		
02			14		
03	60		15	65	
04			16		
05			17		
06	70		18	57	
07			19		
08			20		
09	76		21	51	
10			22		
11			23		

Total

Buttons at the bottom: Add New, Save, Update, Delete, Clear, Cancel, View, Push, Close, Help, Repeat Entry (unchecked), Sequencer: seq_element, Upload (highlighted in green).

Figure 30: Hourly form enabled just for synoptic hours

When the button “**Enable selected hours only**” has been clicked, its label immediately changes to “**Enable all hours**”, so it allows toggling between “all hours” and “selected hours”. The dialog for configuring the selected hours that would be enabled is accessed via **Tools >> FormHourly time selection**. A screenshot of the dialog is shown in Figure 31. From this dialog any set of hours can be selected for data entry. For instance for those NMHs that operate for 12 hour only say from 06 – 18 may wish to enable those hours only for data entry. Always remember to click the button “**Enable selected hours only**” if not all hours are used (i.e not 0....23)

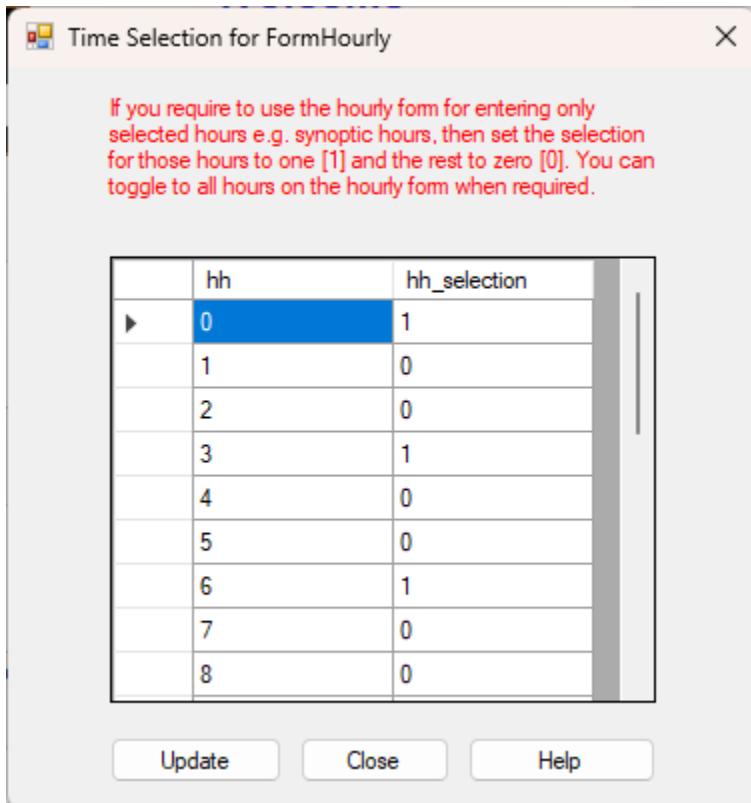


Figure 31: Configuring synoptic hours to be enabled on hourly form

6.6 Key Entry Operation

It is a strict requirement in Climsoft to enter station information in the station table before any key entry operation is done. The same requirement applies to importing of external data. Hence update the station information before attempting any of these operations. See the metadata section for the necessary instructions.

For key entry, it is also important to check the element information which comes with the Climsoft setup to ensure that all required elements are clearly defined, elements limits for QC are adjusted and any other properties where necessary, to meet local needs.

To start key entry, click on the “**Data Entry**” icon on the Climsoft “Welcome” screen. Select the key entry form that corresponds to the data to be entered and double-click on the selected form.

The use of the key entry forms is quite intuitive, so there is no need for detailed guidelines except to highlight the common aspects that apply to all key-entry forms, and some features related to specific forms.

- After selecting a value from a dropdown list e.g. a station name, or entering a value in a text box, the **Enter** key must be pressed for the value to be registered on the form and for the cursor to move to the next cell.
- Some key entry forms have a provision for entering the “**Total**” for elements that require the sum of values for a particular column of observation data. The Climsoft administrator must configure the metadata in the element table to enforce the requirement for the total to be entered for the elements that need a total to be entered during key entry.
- Some buttons are enabled or disabled depending on the situation. For example, the “**Save**” button is enabled only after clicking the “**Add New**” button to enter a new record.

Then the same “**Add New**” button is automatically disabled until the “**Save**” button has been clicked to save data for the newly added record.

- When the cursor leaves a particular text box or dropdown list after pressing the “**Enter**” key, quality control (QC) checks are carried out on the value that has just been entered. Figure 32 shows a QC message after entering a value that has failed the QC check for upper limits when entering daily data.

The screenshot shows a data entry interface for 'Daily data for the whole month'. The 'Station' is set to 'KIN BINZA' and the 'Element' is 'Precip - 24Hr'. The 'Year' is 2012, 'Month' is 1, and 'Hour' is 6. The 'Temperature' is 'Deg C', 'Precip' is 'mm', 'Cloud height' is 'feet', and 'Visibility' is 'metres'. The data table shows daily precipitation values from 01 to 31. An error dialog box is overlaid on the interface, showing a yellow exclamation mark icon and the message: 'This number must be: >= 0 and <= 3000'. The 'OK' button is visible at the bottom of the dialog. The bottom of the interface includes buttons for 'Add New', 'Save', 'Update', 'Delete', 'Clear', 'Cancel', 'View', 'Push', 'Close', 'Help', and an 'Upload' button.

Figure 32: QC checks during key entry

- All key-entry forms have an “**Upload**” button for transferring data from a key-entry table into a common table named “**observationinitial**” where more QC checks are carried out.
- The **Upload** button is not enabled for a user with the role of operator, but is enabled for users with the role of operator supervisor, QC and administrator,
- All key-entry forms have a “**View**” button for viewing the data that has been entered in datasheet view, **Figure 32**. To facilitate locating a required record, the rows are in ascending order by station ID, element ID, and date/time attributes,
- In the datasheet view, a key-entry operator can delete or update own records in the data entry table using the **Delete** or **Update** command button if the “**Edit Mode**” is active. To activate the “**Edit Mode**” simply click the command button “**Edit Mode**”,
- The “**Export**” command button exports all the records entered in the data entry form in a csv file for further processing,
- The “**Import**” command button is used to import data that had been saved into a text file through the **Export** command. Together Export and Import operations can act as backup

and restore of data in key entry forms. They can also be used to transfer data between Climsoft servers,

- An important feature of the datasheet view functionality is that in a network arrangement where multiple key-entry operators enter data into the same key-entry table from different workstations, a key-entry operator can only view and make changes to the data records that he/she has entered. The Administrator will be able to view all data records and make changes

stationId	elementId	yyyy	mm	hh	day01	day02	day03
8435001	5	2019	1	9	0	0	0
GZ008032	1	2019	1	9	278	307	250
GZ008032	2	2019	1	9	315	341	257
GZ008032	3	2019	1	9	225	250	240
GZ008032	4	2019	1	9	270	296	248
GZ008032	5	2019	1	9	0	0	16
GZ008032	19	2019	1	9	38	41	36
GZ008032	27	2019	1	9	0	0	0
GZ008032	49	2019	1	9	10140	10106	10122
GZ008032	50	2019	1	9	10106	10089	10118
GZ008032	51	2019	1	9	10105	10128	10135
GZ008032	67	2019	1	9	8	8	8
GZ008032	85	2019	1	9	0	17	15
GZ008032	86	2019	1	9	0	360	180
GZ008032	87	2019	1	9	11	22	11
GZ008032	88	2019	1	9	135	180	180
GZ008032	89	2019	1	9	11	20	0

Figure 33: Key entry datasheet view

6.6.1 Some special features for specific key entry forms

- Just below the header area of the form for daily data shown in Figure 22, there is a section indicating units of measurement for some elements. This is to accommodate entering historical data over different periods where the units of measurement for those elements have changed. For example, old historical paper records in some National Meteorological and Hydrological Services (NMHSs) had units of degrees Fahrenheit for temperature which were later changed to degrees Celsius. Similarly, old records for precipitation could have units of inches which were later changed to millimeters.
- The form for daily data is designed for entering different elements, with the next element being changed automatically after clicking the “Add New” button, being controlled by the sequencer. However, sometimes only a single element is entered, especially for data from rainfall stations. In such cases, the element sequencer can be turned off by unchecking the “enable element sequencer” checkbox.

- (iii) The form for daily data has text boxes for entering observations values for each day from day 1 up to a maximum of day 31. If the value of the month entered in the header section of the month has a maximum number of days less than 31, text boxes associated with day numbers beyond the maximum number of days for that month are disabled. This applies to months with 30 days and also for February with 29 days for a leap year and 28 days for a non-leap year.
 - (iv) The daily form and the hourly form have a provision to assign the same value for all observation days for a particular element. This is most appropriate especially when entering rainfall values of zero for the whole month, thereby reducing the number of key strokes substantially.
 - (v) As described under the section on “**Configuring selected hours for key entry**”, the hourly form can be configured for entering observation data for all hours or for selected hours.
 - (vi) The form for entering hourly wind data provides for fast entering of wind direction and speed as one number in the same text box with the direction and speed automatically separated into different text boxes. The splitting of the combined wind value into direction and speed is based on the configured number of digits for direction and speed. This configuration described under “**Tools => general settings**”. This form also has provision for entering wind data for all hours or for selected synoptic hours, similarly to the configuration available on the hourly form.
 - (vii) The form for entering synoptic data for an observation made up of many elements at the same hour of observation, shown in Figure 35, provides for the automatic calculation of derived elements, namely, mean sea level pressure, geopotential height, dew-point temperature and relative humidity.
- NOTE:** *The automatic calculation of mean sea level pressure and geopotential height require station elevation data to be available in the station metadata table.*
- (viii) Any key entry form will not accept data for future dates. A message will be prompted if the date selected manually or by the sequencer is beyond the current date.

Key entry form for hourly wind speed and direction

Hourly wind data

Station:	Year:	Month:	Day:						
Rawisonde Station	2019	1	3						
<input type="checkbox"/> Enable synoptic hours only Number of digits:- direction 2 Number of digits:- speed 3									
Hour	ddff	dd	ff	Flag	ddff	dd	ff	Flag	
00	30000	30	000		12	12012	12	012	
01	01010	01	010		13	13013	13	013	
02	02020	02	020		14	14014	14	014	
03	03030	03	030		15	15015	15	015	
04	04025	04	025		16	16016	16	016	
05	05005	05	005		17	17017	17	017	
06	06006	06	006		18	18018	18	018	
07	07007	07	007		19	19019	19	019	
08	08008	08	008		20	20020	20	020	
09	05005	05	005		21	21021	21	021	
10	10010	10	010		22	22022	22	022	
11	11011	11	011		23	23023	23	023	

Total [ff]

<< << Record 1 of 2 >> >>

Add New Save Update Delete Clear Cancel View Push Close Help

Repeat Entry Sequencer: Upload

Figure 34: Key entry form for hourly wind

Key entry form for Synoptic observations

Synoptic Data For Many Elements For WMO - RA1

Station Identifier	KAMEMBE AERO		Year:	2017	Month:	12	Day:	12	Hour:	6
Station Level Pressure-Po	8765		Vertical Significance 1	6		PresentWx	6			
Pressure Reduced to MSL-P	10738		Cloud Amt Lvl1-N1	1		PastWx1	7			
3hr Pressure Change-P3	1		Cloud Type Lvl1-C1	7		PastWx2	4			
3hr Pressure Characteristic	4		Cloud Ht Lvl1-HsHs1	1200		Tmax	290			
24hr Pressure Change-P24	5		Vertical Significance 2		M	Tmin	180			
Standard Pressure Level -a	850		Cloud Amt Lvl2-N2		M	Grass Min Temp	180			
Geopotential Height-hhh	1542		Cloud Type Lv2-C2		M	Evaporation	50			
DryBulb Temp-TTT	235		Cloud Ht Lvl2-HsHs2		M	SSS-24Hr	61			
Wetbulb Temp-TwTwTw	211		Vertical Significant 3		M	SSS-1Hr	35			
DewPoint Temp-TdTdTd	200		Cloud Amt Lvl3-N3		M	Precip-24Hr	200			
Relative Humidity-U	75		Cloud Type Lvl3-C3		M	Precip-3Hr	12			
Horizontal Visibility-VV	40000		Cloud Ht Lvl3-HsHs3		M	Wind Direction-dd	120			
Low Cloud Hght-h	78		Vertical Significance 4		M	Wind Speed -fff	8			
Total Cloud Cover- N	6		Cloud Amt Lvl4-N4		M	Insolation - Rad	232			
Vertical Significance	8		Cloud Type Lvl4-C4		M					
Low Lvl Clouds Amount-Nh	6		Cloud Ht Lvl4-Hshs4		M					
Low Lvl Clouds Type-CL	15									
Medium Lvl Clouds Type-CM	24									
High Lvl Clouds Type-CH	33									

Figure 35: Key entry form for many elements observed at the same time

Key entry form for Upper Air observations

The form for entering upper air observations is made up of many elements at the standard pressure levels namely *Surface, 1000, 925, 850, 700, 500, 400, 300, 250, 200, 150, 100, 70, 50, 30, 20, 10* shown in Figure 35a. The key entry is sequenced in the order of *Levels, Day, Month and Year*. At the metadata configuration the observation elements for the upper air data should be configured as detailed in **Table 2** below. However, the QC limits and units should be set according to the observation practice at the given centre.

Figure 35a: Key entry form for upper air observations at standard levels

Element Id	Abbreviation	Element Name	Description	Element Type
301	PRESS	Pressure Level	Pressure level	Upper Air
302	HEIGHT	Height of Pressure Level	Height of pressure level	Upper Air
303	TEMPDB	Temp at Press Lvl	Temperature at pressure level	Upper Air
304	DPTDEP	Dew Point Depress at Press Lvl	Dew point depression at pressure level	Upper Air
305	WNDDIR	Wind Dir at Press Lvl	Wind direction at pressure level	Upper Air
306	WNDSPD	Wind Spd at Pressure Lvl	Wind speed at pressure level	Upper Air
307	WNDSHR1B	Wind Sheer 1km lyr blw	Wind shear 1km layer below	Upper Air
308	WNDSHR1A	Wind Sheer 1km lyr abv	Wind sheer 1km layer above at pressure level	Upper Air
309	LATHDISP	Lat displ at pressure lvl	Latitude Displacement at Pressure Level	Upper Air
310	LONGHDISP	Lon Displ at press lvl	Longitude Displacement at Pressure Level	Upper Air
311	ACCTMDISP	Time Displ at press lvl	Time Displacement at Pressure Level	Upper Air
312	ACCVERSIG	Vert Signf at press lvl	Vertical Significant at Pressure Level	Upper Air
313	RELHUM	RH at Press Lvl	Relative Humidity at Pressure Level	Upper Air

Table 2: Upper observation elements details – To be configured in Elements Metadata

6.7 Emptying Key Entry Tables

This operation facilitates emptying of key entry tables. This is necessary to avoid records growing to a point of slowing key entry and data uploading processes. However, it should be ensured that, before emptying any table the data therein has been uploaded, quality controlled, errors corrected, uploaded to the final database table and is ready for products generation.

This operation is undertaken through the dialog shown in Fig 36 as follows:

- (i) From the Main Menu click “Administration” -> “Empty Key Entry Forms”,
- (ii) On the Forms List check the box(es) for the form whose data is to be emptied,
- (iii) Select the records within the selected form that are to be deleted. Choose either the option “All Records” or “Selected Records”. In case of “Selected Records” enter the required time range in the relevant boxes,
- (iv) By default all the records that have not been uploaded to either “observationinitial” or “observationfinal” table but are within the selected option will not be deleted from the key entry table. But if it is felt that they must be deleted and re-entered later then uncheck the box “Skip Records Not Uploaded”.

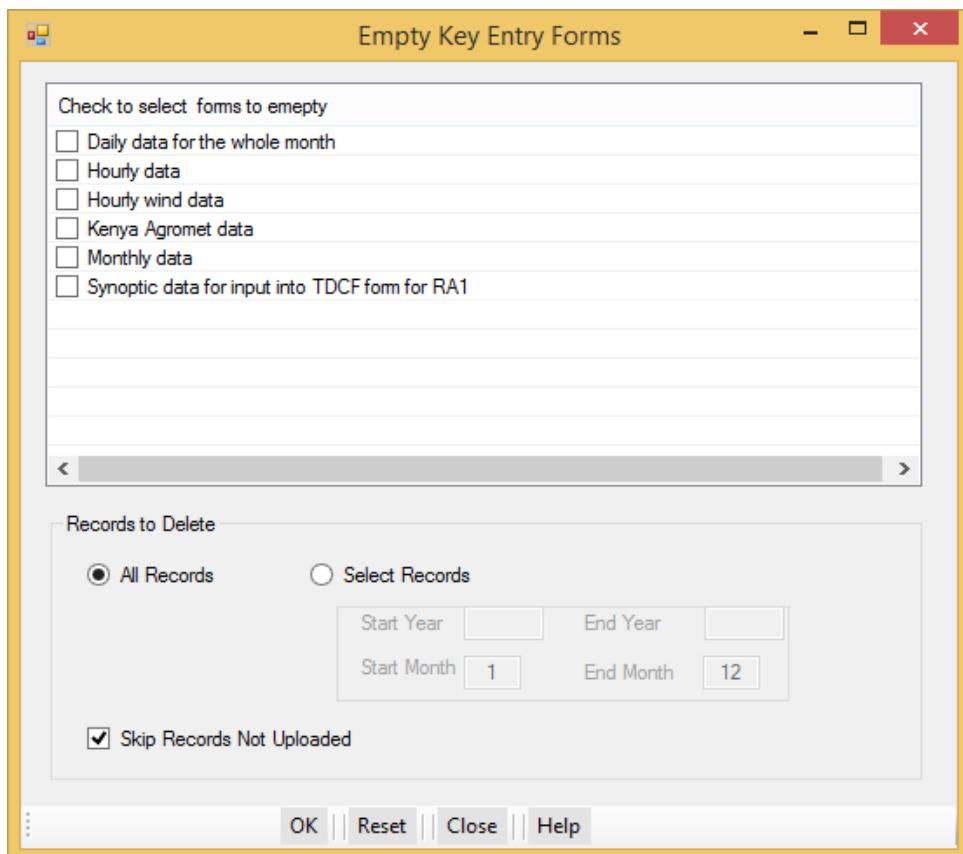


Figure 36: Dialog for Emptying Key Entry Forms

6.8 Operational Monitoring

During the key entry operation, details of the operator are captured. They are *login name* and *entry date time*. These details can be used to monitor data entered by any operator. The monitoring operation is started through “Administration” -> “Operations Monitoring” to obtain the dialog similar to Figure 36. The tabs on the dialog describe the different processes undertaken in the monitoring operation. They are:

- (i) **User Records:** See Figure 37. The Administrator can monitor records for a single operator or for all operators combined depending on the option selected. Any operator can monitor own records through **Accessories -> User Records**. In this case only the records for the current login operator that will be displayed. The Start Date and End Date should be appropriately selected then click **View Records**.
- (ii) **Settings:** The other 2 operations namely *Performance Monitoring* and *Double Key Entry Verifications* require some prior settings before they are undertaken. This is done through the tab “**Settings**” as described in **section 6.8.2**.

6.8.1 Users Records

The screenshot shows the 'Operations Monitoring' dialog box with the 'Users Records' tab selected. The dialog has a yellow header bar with the title 'Operations Monitoring' and standard window controls. Below the header is a navigation bar with tabs: 'Users Records' (selected), 'Performance Monitoring', 'Double Key Entry Verification', and 'Settings'. The main area is titled 'Users Records' and contains two radio buttons: 'User' (selected, showing 'root' in a dropdown) and 'All Users'. It also has two date pickers: 'Start Date' (01 November 2018) and 'End Date' (30 November 2018). A 'View Records' button is located below these controls. Below this is a table with the following data:

Login	Station	Year	Month/Code	Form	Entry Date/Time
root	10306100	2018	1	form_daily2	26/11/2018 20:54:57
root	10306100	2018	1	form_daily2	26/11/2018 20:56:03
root	10306100	2018	1	form_daily2	26/11/2018 20:57:28
root	10306100	2018	2	form_daily2	26/11/2018 20:58:15
root	10306100	2018	2	form_daily2	26/11/2018 20:58:44
root	10306100	2018	2	form_daily2	26/11/2018 20:59:49
root	10306100	2018	3	form_daily2	26/11/2018 21:00:56
root	10306100	2018	3	form_daily2	26/11/2018 21:01:17
root	10306100	2018	3	form_daily2	26/11/2018 21:01:57
root	10306100	2018	4	form_daily2	26/11/2018 21:02:21
root	10306100	2018	4	form_daily2	26/11/2018 21:02:43
root	10306100	2018	4	form_daily2	26/11/2018 21:03:20
root	10306100	2018	5	form_daily2	26/11/2018 21:03:47
root	10306100	2018	5	form_daily2	26/11/2018 21:04:12
root	10306100	2018	5	form_daily2	26/11/2018 21:04:37
root	10306100	2018	6	form_daily2	26/11/2018 21:05:00

Figure 37: Operations monitoring dialog

6.8.2 Settings

The screenshot shows the 'Operations Monitoring' dialog box with the 'Settings' tab selected. The dialog has a yellow header bar with the title 'Operations Monitoring' and standard window controls. Below the header is a navigation bar with tabs: 'Users Records', 'Performance Monitoring', 'Double Key Entry Verification', and 'Settings' (selected). The main area is titled 'Settings' and contains two radio buttons: 'Targets Records' (selected) and 'Data Entry Mode'. The 'Data Entry Mode' section contains two options: '0 for Single Data Entry' and '1 for Double Key Entry'. Below these are 'View' and 'Update' buttons. At the bottom is a table with the following data:

Close	Total Records = 0	Help
-------	-------------------	------

Figure 38: Operations monitoring settings dialog

To undertake any of the operation in this dialog select the required settings option and click **View** to obtain a grid table from where the values are set as follows:

(i) Target Records

Settings

Targets Records

Data Entry Mode
0 for Single Data Entry
1 for Double Key Entry

View **Update**

	User	Target_Records
	root	100
	operator1	600
...	operator2	600
*		

Figure 39: Target records setting

Enter the target value for each operator against which the performance for the selected period will be measured then click **Update**.

(ii) Data Entry mode:

Settings

Targets Records

Data Entry Mode
0 for Single Data Entry
1 for Double Key Entry

View **Update**

	form_name	description	entry_mode
	formSynoptic2...	Synoptic data for input into TDCF...	0
	form_agro1	Kenya Agromet data	0
	form_daily2	Daily data for the whole month	0
	form_hourly	Hourly data	0
	form_hourlywind	Hourly wind data	0

Figure 40: Data entry mode settings

If any of the listed forms requires to be set to double key entry status then the entry mode should be set to **1** in the column “entry_mode” and click **Update**. On reverse it should be set to **0**.

While in double entry mode, data entered will be compared with the previous entry. Where the 2 entries conflict the operator will be prompted for a repeat entry. A form that is set for double key entry will not accept any data that has not been previously entered. To enter new data the key entry mode has to be set back to **0** (single data entry).

6.8.3 Performance Monitoring

Performance monitoring can be done on monthly basis or for a selected period of time. Select the appropriate option then click **“Compute Performance”**. Click **“Save Output”** to save the performance output to a CSV file. See the dialog in Figure 41.

Operations Monitoring

Users Records Performance Monitoring Double Key Entry Verification Settings

Users Performance Monitoring

Monthly Month Year

Range From To

Total Records = 1

User	Records	Target	Performance %
root	33	100	33

Figure 41: Data entry mode settings

6.8.4 Double Key Entry Verification

Where key entry has been set to double entry mode it becomes necessary to verify which records have been repeated or otherwise. See Figure 42. The verification can be done for single form or all of them combined. From the dialog make the selections correctly then click “**Retrieve**”. The records that suit the selected criteria will be listed. Click “**Save**” to output the records in CSV file and opened in EXCEL.

Operations Monitoring

Users Records Performance Monitoring Double Key Entry Verification Settings

Double Key Entry Verification

Key Entry Form All Forms

Begin Year Begin Month End Year End Month

Selection Type
 NOT Verified Records
 Verified Records

Total Records = 987

Station	Element	Year	Month	Form	Login
10306100	2	2018	1	form_daily2	root
10306100	2	2018	1	form_daily2	root
10306100	2	2018	1	form_daily2	root
10306100	2	2018	1	form_daily2	root
10306100	2	2018	1	form_daily2	root
10306100	2	2018	1	form_daily2	root
10306100	2	2018	1	form_daily2	root
10306100	2	2018	1	form_daily2	root
10306100	2	2018	1	form_daily2	root

Figure 42: Double key entry verification

7. Post Key Entry Quality Control Checks

Climsoft provides a facility for further Quality Control (QC) checks on data that has been uploaded from key-entry tables or imported from external sources into the “**observationinitial**” table. The dialog for these QC checks, shown in Figure 43, is accessed by clicking the icon “**Quality Control Checks**” on the Welcome screen.

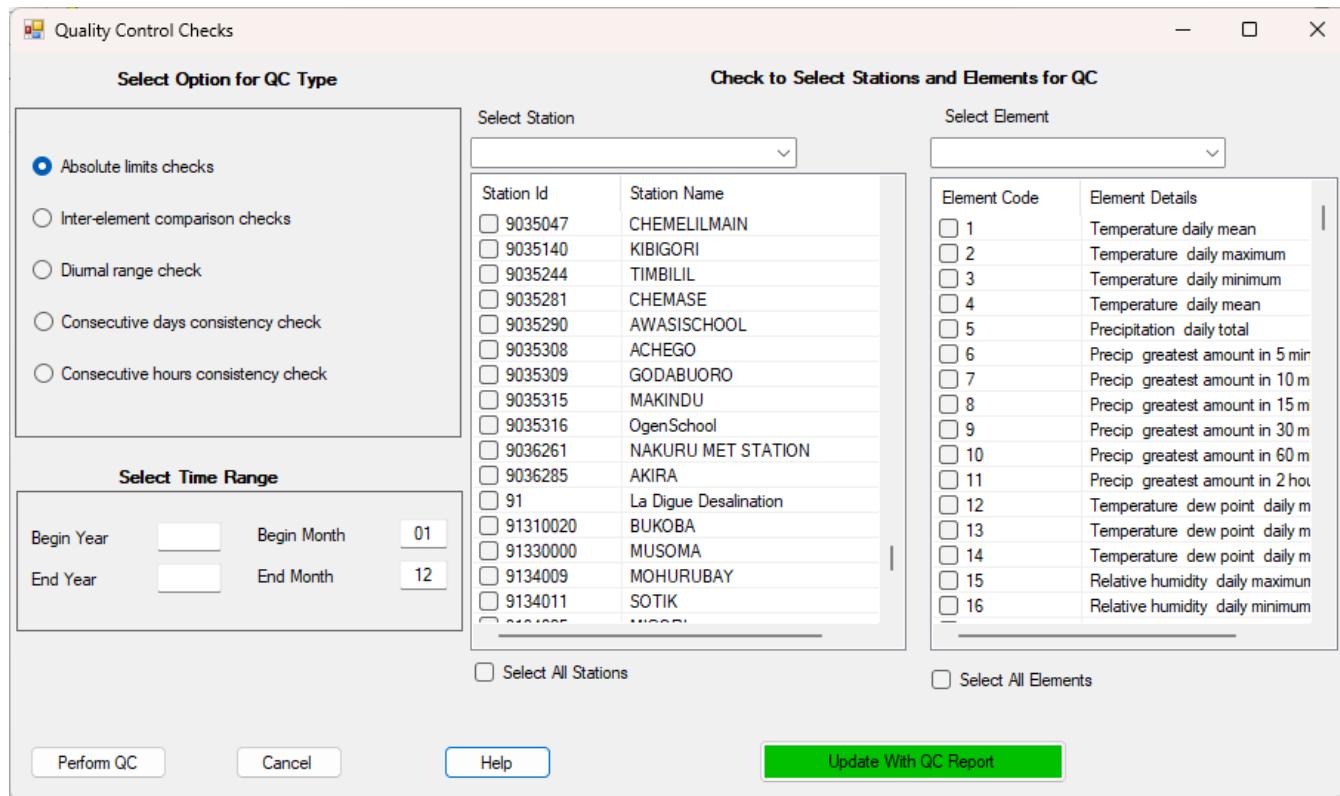


Figure 43: Quality Control Checks

QC operations in Climsoft are carried out by first selecting the option for the required QC type and then providing all other information as shown in the dialog in Figure 43 above. This dialog is simple and self-explanatory. Stations and Elements can be selected either through the list box or checking on the boxes in front of their Ids or Codes respectively. As many stations and elements can be selected as necessary. If any required item (station or element) is not shown scroll bars can be used so that they are displayed and selected

Perform QC button is used to start the process and any data that fails the QC test will be saved in text (CSV) file and displayed in EXCEL once the operation is completed. The generated files usually referred as the QC Report files are saved in the folder that had been configured in General Settings as described in Section 4.2 and Figure 10a above. .

Following are the details of each QC type:

(i) Absolute limits checks

This is the default option and this QC is mandatory on all new data in Climsoft. It checks for data values that exceeds the element limits that have been set in the elements metadata. Two (2) report files are generated one for data that exceeds the upper limits and the one for the lower limits. The files names are automatically generated and structured according to the limit type and the data period e.g. `qc_report_upperlimit_202101_202112.csv` and `qc_report_lowerlimit_202101_202112.csv`.

The report on the screenshot in Figure 44 shows two values of maximum temperature, 6.6 and 6.4 that are below the lower limit of 12.0 for maximum temperature. The other useful information displayed is the station ID, element ID, date/time, the username of the person who entered the data and the key-entry form used for entering the data.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	StationId	ElementId	DateTime	yyyy	mm	dd	hh	ObsValue	lowerlimit	qcStatus	acquisitionType	obsLevel	capturedBy	dataForm
2	67774010	2	01/01/2002 12:00	2002	1	1	12	66	120	1	1	1 surface	amhanda	form_synoptic_2_ra1
3	67774010	2	01/01/2002 15:00	2002	1	1	15	64	120	1	1	1 surface	amhanda	form_synoptic_2_ra1
4														
5														
6														
7														
8														

Figure 44: QC report showing values below lower limit

(ii) Inter-element comparison checks

The QC under this option, different types of temperature data for every day in the selected time range and from selected stations are compared. The compared temperature observations are *maximum*, *minimum*, *dry bulb*, *wet bulb* and *dew point*. In this operation, the elements are predetermined by Climsoft hence the Elements window in the dialog is disabled. Data that fail the comparison test is saved in report files located in the QC folder. Five output files in csv format are generated. Each file contains the report on related elements and the file names are structured such that the element codes and time period are included as listed below and also in Figure 45

- (a) Maximum and Minimum temperatures =
- (b) Dry and Wet bulb temperatures =
- (c) Wet bulb and Dew point temperatures =
- (d) Maximum and Dry bulb temperatures =
- (e) Dry bulb and Minimum temperatures =

qc_interelement_2_3_202101_202112.csv
qc_interelement_101_102_202101_202112.csv
qc_interelement_102_103_202101_202112.csv
qc_interelement_2_101_202101_202112.csv
qc_interelement_101_3_202101_202112.csv.

Name	Date modified	Type
<i>qc_interelement_101_3_200101_200312.csv</i>	27/12/2015 20:52	Microsoft Excel
<i>qc_interelement_101_102_199001_201012.csv</i>	27/12/2015 13:45	Microsoft Excel
<i>qc_interelement_101_102_199001_201012_updated.csv</i>	27/12/2015 14:03	Microsoft Excel
<i>qc_interelement_101_102_200101_200312.csv</i>	27/12/2015 20:52	Microsoft Excel
<i>qc_interelement_102_103_199001_201012.csv</i>	27/12/2015 13:45	Microsoft Excel
<i>qc_interelement_102_103_200101_200312.csv</i>	27/12/2015 20:52	Microsoft Excel
<i>qc_report_lowerlimit_199001_201012.csv</i>	27/12/2015 13:43	Microsoft Excel
<i>qc_report_lowerlimit_199001_201012_updated.csv</i>	27/12/2015 19:53	Microsoft Excel
<i>qc_report_lowerlimit_200001_200112.csv</i>	27/12/2015 20:23	Microsoft Excel
<i>qc_report_lowerlimit_200001_200212.csv</i>	27/12/2015 20:51	Microsoft Excel
<i>qc_report_lowerlimit_201001_201012.csv</i>	27/12/2015 21:16	Microsoft Excel
<i>qc_report_upperlimit_199001_201012.csv</i>	27/12/2015 19:53	Microsoft Excel

Figure 45: List of QC report files

Figure 46 shows a QC report for inter-element comparison. The report shows maximum temperatures (2) below dry bulb temperatures (101) for the same day.

	A	B	C	D	E	F	G	H	I	J	K	L
1	stationId	elementId_1	elementId_2	obsDatetime_1	obsDatetime_2	yyyy	mm	dd	hh_1	hh_2	obsValue_1	obsValue_2
2	67774010	2	101	01/01/2002 12:00	01/01/2002 12:00	2002	1	1	12	12	66	121
3	67774010	2	101	01/01/2002 15:00	01/01/2002 12:00	2002	1	1	15	12	64	121
4	67774010	2	101	01/01/2002 12:00	01/01/2002 15:00	2002	1	1	12	15	66	141
5	67774010	2	101	01/01/2002 15:00	01/01/2002 15:00	2002	1	1	15	15	64	141
6												

Figure 46: QC Report for inter-element comparison

(iii) Diurnal range check

The QC in this option checks for days whose data is very high or low as compared to the rest in a given month. For every element that is selected statistical values for upper and lower limits are computed (limitValue) for each month. All data that exceed those limits fail the QC check and are saved in a report file for confirmation and corrections where necessary. The QC report file name includes the selected time period e.g. *qc_report_diurnalRange_198003_198005.csv*. Figure 46a shows data that fail the diurnal check QC for Maximum (2), Minimum (3), Dry bulb (101) and Wet bulb (102) temperatures. Diurnal range check process may take long to complete if a big time period is used. It is therefore recommended that shorter time periods say few months be considered.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	StationId	ElementId	Datetime	YYYY	mm	dd	hh	obsValue	limitValue	qcStatus	acquisitio	obsLevel	capturedE	dataForm
2	1036	2	04/06/1980 06:00	1980	6	4	6	290	346	1	2	surface		
3	1036	3	30/06/1980 06:00	1980	6	30	6	210	244	1	2	surface		
4	1036	101	01/06/1980 15:00	1980	6	1	15	412	363	1	2	surface		
5	1036	101	16/06/1980 15:00	1980	6	16	15	430	363	1	2	surface		
6	1036	101	16/06/1980 18:00	1980	6	16	18	424	363	1	2	surface		
7	1036	101	20/06/1980 15:00	1980	6	20	15	412	363	1	2	surface		
8	1036	101	20/06/1980 18:00	1980	6	20	18	408	363	1	2	surface		
9	1036	101	22/06/1980 15:00	1980	6	22	15	410	363	1	2	surface		
10	1036	101	22/06/1980 18:00	1980	6	22	18	406	363	1	2	surface		
11	1036	101	30/06/1980 15:00	1980	6	30	15	218	278	1	2	surface		
12	1036	101	30/06/1980 21:00	1980	6	30	21	232	278	1	2	surface		

Figure 46a: QC Report for Diurnal range check

(iv) Consecutive days consistency checks

The QC in this option compares change in observation values between the current day and the previous one at the same hour. If the difference is higher than the expected statistical change data for both days fail the QC check and are saved in a report file for confirmation and corrections where necessary. The QC report file name includes the selected time period e.g. *qc_report_consecutivedays_198006_198006.csv*. Figure 46b shows data that fail the consecutive days consistency QC for Dry bulb (101) and Wet bulb (102) temperatures.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	StationId	ElementId	Datetime	YYYY	mm	dd	hh	obsValue	obsPrevDay	qcStatus	acquisitio	obsLevel	capturedE	dataForm
2	1036	101	30/06/1980 15:00	1980	6	30	15	218	364	1	2	surface		
3	1036	101	30/06/1980 18:00	1980	6	30	18	240	348	1	2	surface		
4	1036	102	11/06/1980 12:00	1980	6	11	12	220	270	1	2	surface		
5	1036	102	12/06/1980 12:00	1980	6	12	12	264	220	1	2	surface		
6	1036	102	30/06/1980 15:00	1980	6	30	15	210	254	1	2	surface		
7														

NOTE:

The QC reports are saved in the folder configured for the QC reports under “General Settings”. Hence make sure that the folder for QC reports has been configured correctly.

The name of the QC report file generated is based on the type of QC selected and the specified period for the QC.

After analyzing a QC report and making any changes, the report with updated values should be saved with a different name. What is recommended is to add a suffix “_updated”. Both files should be maintained with data in the original one remaining unchanged. Data in the updated file can be edited as many times as the corrections are found necessary.

7.1 Updating the database from a QC report

To update the database from the QC report, the “Update With QC Report” button on the QC main dialog shown in Figure 43 should be clicked. When the “Update With QC Report” button has been clicked, the dialog in Figure 47 will appear, with provision to browse for the original QC report file and the updated report file. After clicking the “OK” button, the database is updated with the changes made in the QC report.

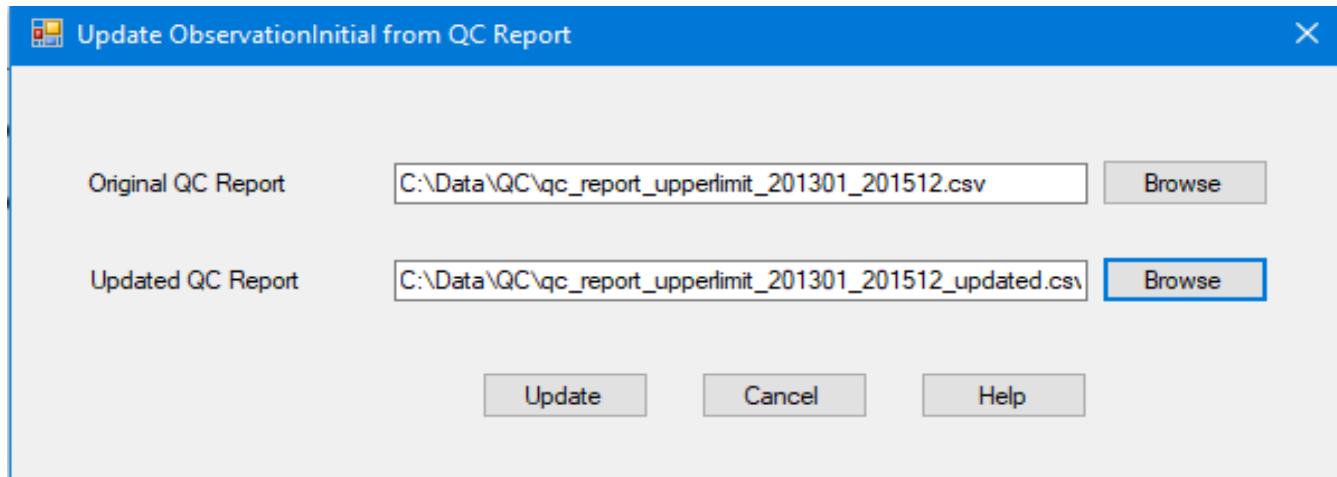


Figure 47: Dialog for updating database from a QC report

7.2 Transferring Data from “observationinitial” to “Observationfinal” table

After quality control of the data in the “observationinitial” table, the QC’d data can be transferred to the “observationfinal” table from which products can be derived. The dialog for transferring data to the “observationfinal” table is accessed from the Welcome screen by clicking the “Data Transfer” icon, followed by clicking the menu “Upload” then “ObsInitial to Final” to open the dialog shown in Figure 48.

Upload to ObservationFinal

Select Station		BAINES DRIFT POLICE STN.	Select Element	
Station Id	Station Name		Element Code	Element Details
<input type="checkbox"/> 000002AWS	GACURABWENGE		<input type="checkbox"/> 1	Temperature daily mean
<input checked="" type="checkbox"/> 002-BAIN	BAINES DRIFT POLICE STN.		<input checked="" type="checkbox"/> 2	Temperature daily maximum
<input type="checkbox"/> 00301AWS	BIGOGWE_AWS		<input checked="" type="checkbox"/> 3	Temperature daily minimum
<input type="checkbox"/> 00326AWS	Rwanda AWS326		<input type="checkbox"/> 4	Temperature daily mean
<input type="checkbox"/> 01013WA-	01013WA Ghana		<input checked="" type="checkbox"/> 5	Precipitation daily total
<input type="checkbox"/> 033-FRAN	Francistown Met		<input type="checkbox"/> 6	Precip greatest amount in 5 minutes
<input type="checkbox"/> 035-SSKA	S.S.K. AIRPORT		<input type="checkbox"/> 7	Precip greatest amount in 10 minutes
<input type="checkbox"/> 039-GANT	GANTSI AIRPORT		<input type="checkbox"/> 8	Precip greatest amount in 15 minutes
<input type="checkbox"/> 0409337_9	Nhlangano met		<input type="checkbox"/> 9	Precip greatest amount in 30 minutes
<input checked="" type="checkbox"/> 0409759_X	Jericho		<input type="checkbox"/> 10	Precip greatest amount in 60 minutes
<input type="checkbox"/> 041-GOO2	GOODHOPE MET. STATION		<input type="checkbox"/> 11	Precip greatest amount in 2 hours
<input checked="" type="checkbox"/> 0410556_X	Lavumisa		<input type="checkbox"/> 12	Temperature dew point daily maximum
<input type="checkbox"/> 0413158X	Namibia 0413158X		<input type="checkbox"/> 13	Temperature dew point daily minimum
<input type="checkbox"/> 04191829	04191829		<input type="checkbox"/> 14	Temperature dew point daily mean
<input type="checkbox"/> 0444703_7	Musi Clinic		<input type="checkbox"/> 15	Relative humidity daily maximum
<input type="checkbox"/> 0445274_5	Malkems		<input type="checkbox"/> 16	Relative humidity daily minimum
<input type="checkbox"/> 0445568_X	Hlatikhulu		<input type="checkbox"/> 17	Relative humidity daily mean
<input type="checkbox"/> 0445578_7	Nyonyane Clinic		<input type="checkbox"/> 18	Evaporation pan1 daily total
<input type="checkbox"/> 0445732_3	Moti Clinic		<input type="checkbox"/> 19	Evaporation lake daily total

Select All Stations Select All Elements Update existing records

Begin Year: Begin Month: Data transfer in progress

End Year: End Month:

Figure 48: Upload data to observationfinal table

Data for the selected **Stations** and **Elements** for the period specified in the time range (*Begin Year*, *End Year*, *Begin Month* and *End Month*) will be transferred into the “**observationfinal**” table. The dialog is self-explanatory on how to select data to upload. Stations and Elements can be selected from the list box or the displayed view. The selected items will have the box to the left of the Id or Code checked.

Click the “**Upload**” button to start the data transfer. The progress of data transfer will be shown in the progress box.

Data that had been previously uploaded can be overwritten by checking the box “**Update existing records**”. Otherwise duplicate data will be ignored if uploaded.

*Only data that have gone through QC are uploaded to the “**observationfinal**” table. Observation records that have not yet been QC’d have a QC status flag of zero “0” while records that have been QC’d have a QC status flag of one “1”. That have been changed through QC update have QC status flag “2”. Therefore data with QC status flag “0” will not be uploaded to “**observationfinal**”*

7.3 Update Observations

The **Update Observations** facility in Climsoft Version 4 enables users with administrative privileges to view and update data in the intermediate and final stages of the archiving process. The administrator is able to use the “**Update Observations**” dialog to view and modify (edit,

update and delete) selected records in the database. The dialog is in two pages (Tabs) one for selecting the records; Figure 49a and the other for listing the selected records in a grid table; Figure 49b. The dialog is intuitive and easy follow.

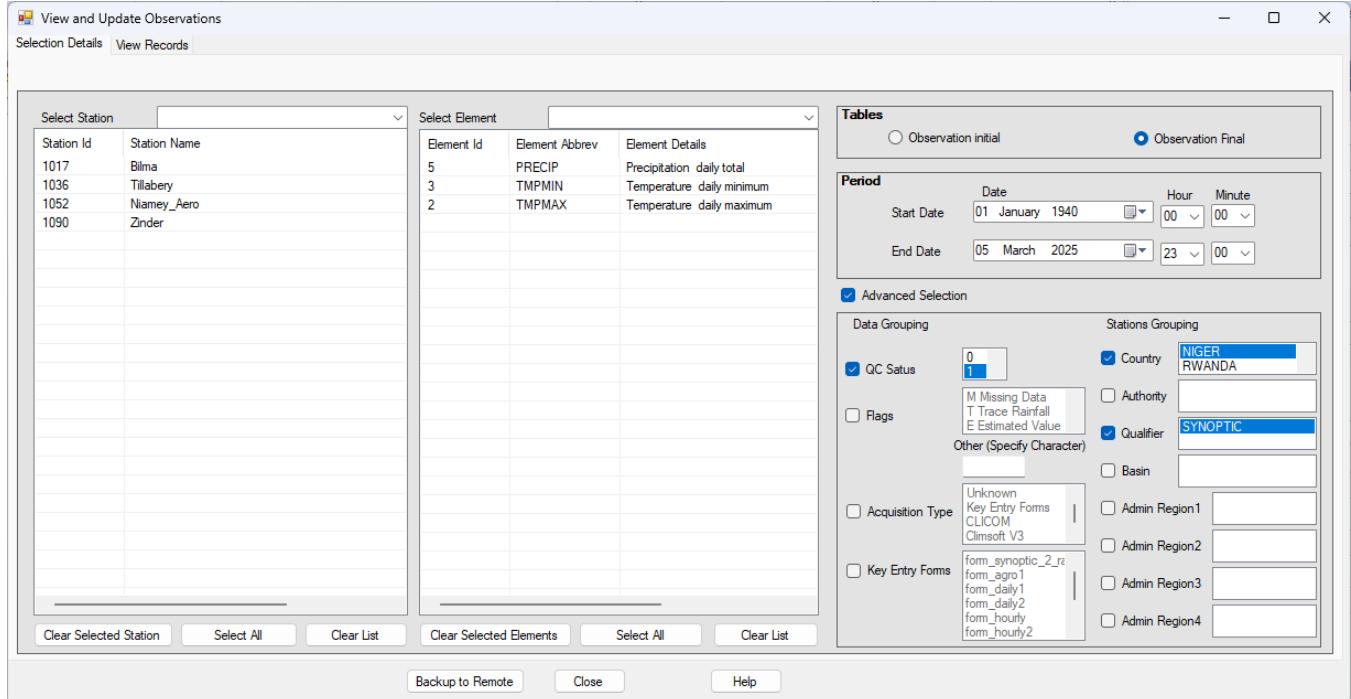


Figure 49a: Update Observations Dialog – Select records

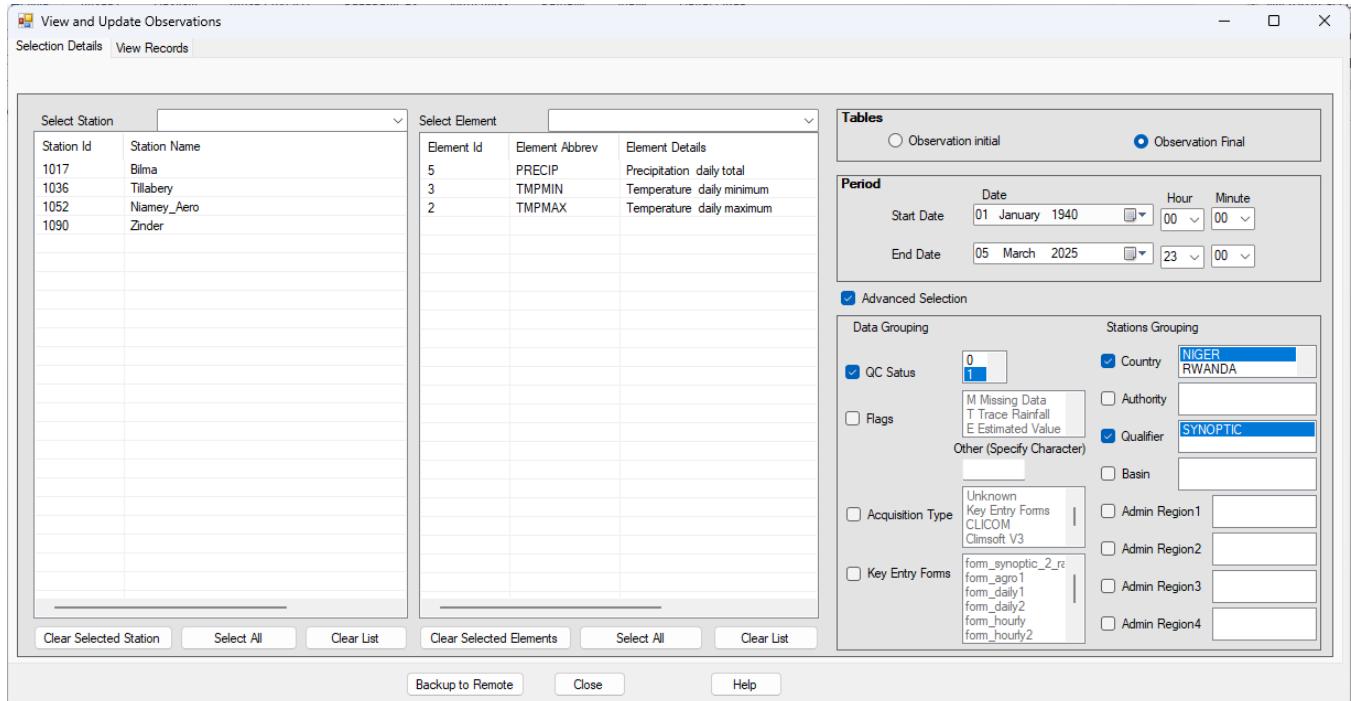


Figure 49b: Update Observations Dialog – View Selected records

The view dialog is operated as follows:

(v) Modify observations

To modify an observation value, click on the particular cell and edit the data value therein to the correct one. Then click the “**Update**” button in order to save the changes after every modification. Note that only the observation value that can be modified in the entire row.

(vi) Delete records

Click “**Delete**” button to remove all the selected and displayed records from the selected table i.e. observation initial or observation final. A delete confirmation message will be prompted to ensure that “**Delete**” button was not clicked by mistake. If “**Yes**” button on the message box is clicked, the record deletion will be completed without any other warning. Clicking “**No**” will cancel the delete action.

(vii) Export records

All the selected and displayed records will be exported into text (csv) file that will be saved in a location and filename to be selected by the Climsoft user.

Select the “**Close**” button to close entire dialog and “**Help**” button to get more help on the “**Update Observations**” procedures.

8. Data Transfer Operations

Data transfer involves the operations described below:

- (i) **Upload:** Transfers quality controlled data from the table “*observationinitial*” to “*observationfinal*”. More details in Section 7.2,
- (ii) **External Data:** Imports text data files in formats such as; CLICOM, Automatic Weather Station (AWS), NOAA GTS and any other text data in delimited texts files. Backup files from earlier Climsoft versions will also be imported through a process called “**Data migration**”. More details are given in Sections 8.1 through 8.5,
- (iii) **Backup:** Makes a backup of all data in table “*observationfinal*” to text files. More details in Section 9.1,
- (iv) **Restore:** Restores Climsoft version 4 backup files back to the database. More details in Section 9.2.

8.1 Data from Climsoft V3 – Data migration

From the Welcome dialog click on the icon “**Data Transfer**” then “**External Data**” and “**Data Migration**” to obtain the dialog in Figure 50.

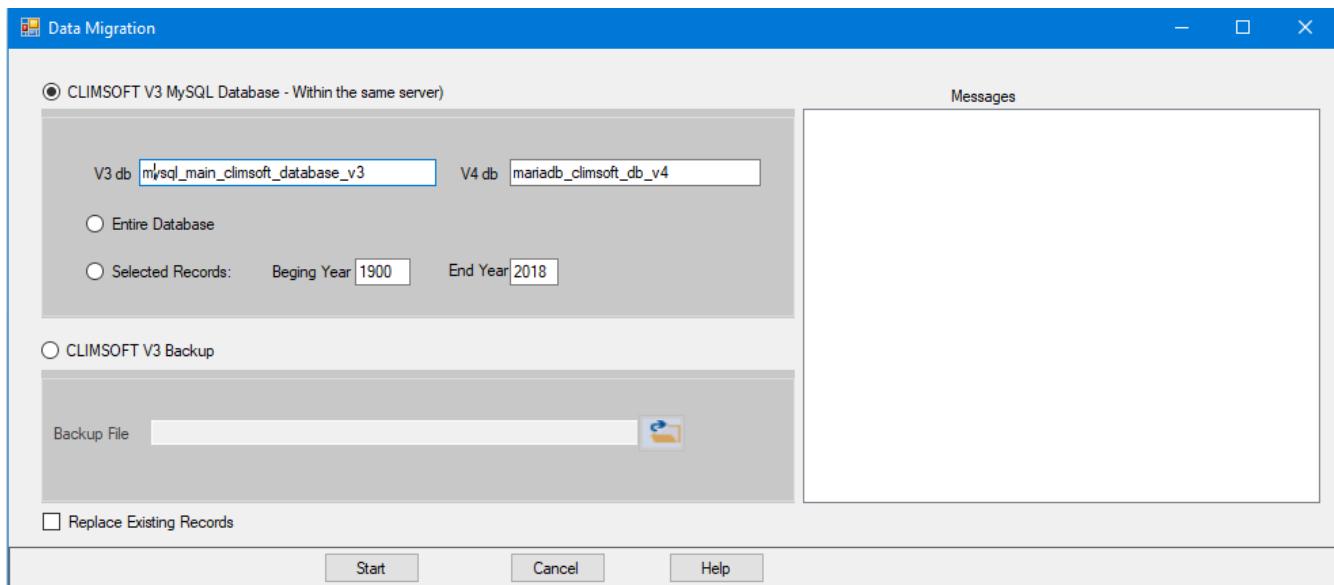


Figure 50: Data migration dialog

8.1.1 Importing from Climsoft Version 3 MySQL Database

This operation requires both Climsoft Version 3 database and Climsoft Version 4 database be installed in the same server.

Data migration from V3 to V4 will then be carried out in the following steps;

Ensure the database names for both V3 and V4 are correctly typed (See Figure 50 above);

- (ii) Select the option “**Entire Database**” if the entire database is to be migrated,
- (iii) Select the option “**Selected Records**” if only a range of data is to be migrated and provide the starting and the ending years appropriately,
- (iv) Check the box “**Replace Existing Records**” if any existing similar records are to be replaced. If Unchecked the duplicate records will be skipped,
- (v) Click **Start** command to start the process,
- (vi) Observe any message reported in the Messages box and address them accordingly.

8.1.2 Importing from CLIMSOFT V3 Backup

Climsoft Version 3 backup files archived in text (csv) files are imported through this operation.

The steps to be followed are:

- (i) Select the option “**Climsoft V3 Backup**” (see Figure 50 above),
- (ii) Through the explorer button  select the text backup file. The file name is then displayed in the box “**Backup File**” but wait for the messages; “**Climsoft V3 Backup converted to Climsoft V4 Structure**”,
- (iii) Check or uncheck the box “**Replace Existing Records**” appropriately,
- (iv) Click “**Start**” command to start the process,
- (v) Observe any message reported in the Messages box and address them accordingly.

8.2 Importing CLICOM data

From this operation the three CLICOM data formats namely *CLICOM Daily*, *CLICOM Synop* and *CLICOM Hourly* will be imported into Climsoft version 4.

Figure 51 shows a screenshot of sample CLICOM daily data. The data format is similar to that for CLIMBASE. Users with data from CLIMBASE can follow the same procedure to import CLIMBASE data into CLIMSOFT.

Figure 51: Sample CLICOM daily data

To import **CLICOM** daily data, click on the “**Data Transfer**” icon on the Climsoft Welcome screen, followed by clicking on the menu items **External Data ->CLICOM->Daily**. This will open the dialog shown in *Figure 52* below.

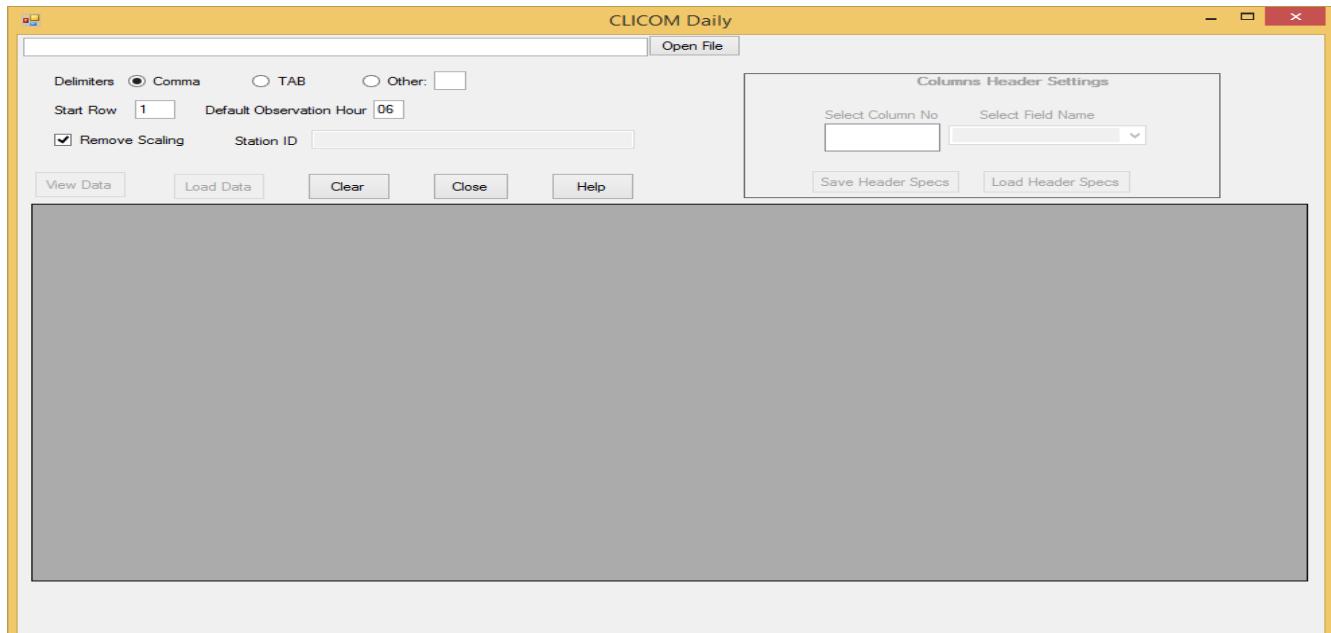


Figure 52: Importing CLICOM daily data

To import CLICOM daily data click “**Open File**” then select the file containing the data and click “**Open**” on the file open dialog. Enter the hour for the daily data observation in the text box “**Default Observation hour**”. 06Z has been set as the default. Then from the import dialog click “**View Data**” and the grid table gets populated with the data. Confirm that it’s the right data and

then click “Load Data”. Wait for the process shown in *Figure 53* to complete with a message “**Data import process completed**”. **CLICOM Synop** and **CLICOM Hourly** data are similarly imported.

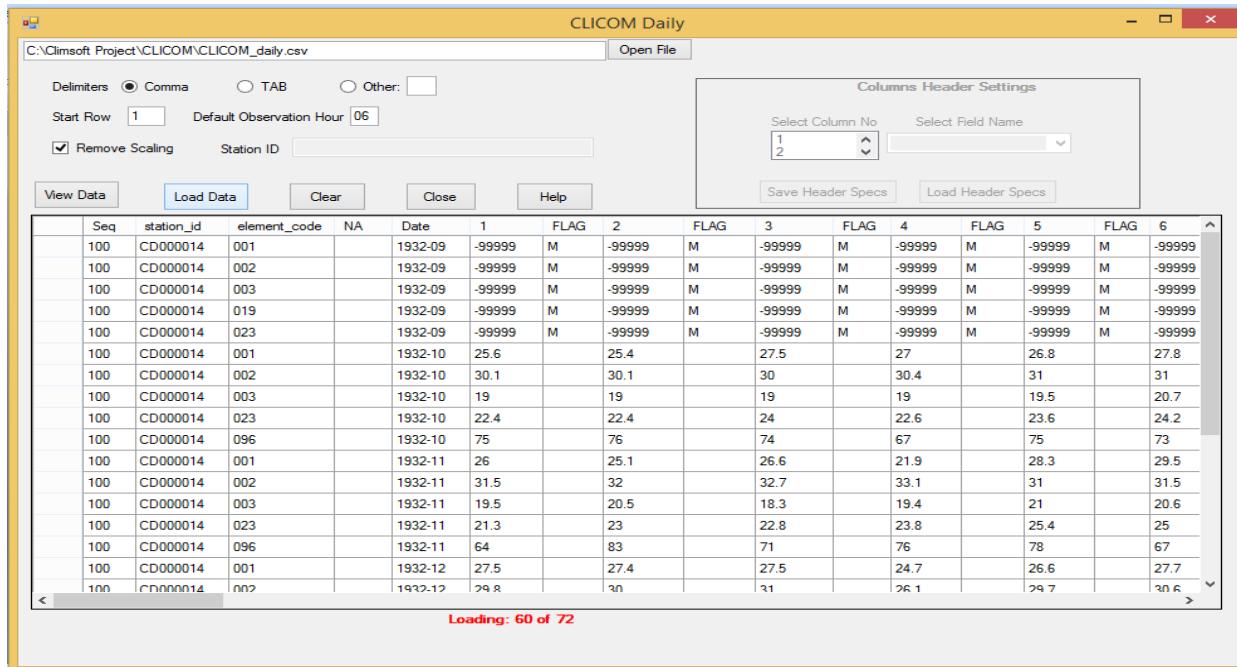


Figure 53: CLICOM daily data import process

8.3 Importing Automatic Weather Station (AWS) data

Before importing AWS data, it is important to note the structure of the AWS data file. Many Automatic Weather Stations (AWS) are configured to produce data output files in ASCII format. However, AWS systems from different suppliers tend to have different observation data outputs depending on the sensors available and configuration of the output file. Figure 54 shows a screenshot of sample data from an AWS site installed in Rwanda. The first row contains the field (column) headings representing different meteorological elements. In most cases, not all fields are required for data ingestion into Climsoft database.

```

1 station_id,date_time,Field3,H,Field5,Field6,Field7,TMIN,Amb T Inst,TMAX,Field1
2 20402AWS,10/11/2012 14:30:00,67.72,68.84,69.92,0.60,100,20.42,20.52,20.69,0.00
3 20402AWS,10/11/2012 14:40:00,64.38,68.03,69.71,1.50,100,20.50,20.82,21.32,0.00
4 20402AWS,10/11/2012 14:50:00,60.79,63.40,66.31,1.74,100,21.16,21.97,22.56,0.45
5 20402AWS,10/11/2012 15:00:00,60.60,62.23,64.66,1.26,100,22.11,22.39,22.61,0.00
6 20402AWS,10/11/2012 15:10:00,52.64,56.87,62.63,3.12,100,22.74,23.23,23.42,0.00
7 20402AWS,10/11/2012 15:20:00,50.87,54.43,56.93,1.91,100,22.72,23.00,23.52,0.00
8 20402AWS,10/11/2012 15:30:00,55.49,56.40,57.75,0.82,100,22.36,22.52,22.71,0.00
9 20402AWS,10/11/2012 15:40:00,55.24,56.46,58.18,0.95,100,22.65,22.71,22.81,0.00
10 20402AWS,10/11/2012 15:50:00,55.04,56.62,58.33,1.11,100,22.74,22.89,23.03,0.00
11 20402AWS,10/11/2012 16:00:00,56.55,57.95,59.70,0.93,100,22.29,22.48,22.70,0.00
12 20402AWS,10/11/2012 16:10:00,57.07,58.86,60.56,1.17,100,22.18,22.29,22.44,0.00
13 20402AWS,10/11/2012 16:20:00,58.31,59.48,61.33,0.96,100,21.90,22.04,22.20,0.00
14 20402AWS,10/11/2012 16:30:00,59.06,60.01,60.95,0.59,100,21.97,22.02,22.06,0.00
15 20402AWS,10/11/2012 16:40:00,60.40,61.19,63.61,0.92,100,21.95,22.02,22.13,0.00
16 20402AWS,10/11/2012 16:50:00,60.64,61.52,62.87,0.65,100,21.83,21.93,21.98,0.00

```

Figure 54: Sample observation data from an AWS

8.3.1 Selecting the import file and viewing the data

Procedures:

- (i) Select the “**Data Transfer**” Icon from the main menu **Welcome** dialog,
- (ii) Select “**External Data**” form the Database utilities menu,
- (iii) Select “**AWS**” to open import dialog shown as shown in *Figure 55*,
- (iv) Click on “**Open File**” to browse for the file to import,
- (v) After the file has been located, click “Open” in the file open dialog. The filename with its full path will then be shown in the Import File text box. See *Figure 55*,
- (vi) Select the “*Delimiter*” option that matches the data separator in the selected file. Selecting a wrong delimiter option will result in data *not being properly imported*. If data the delimiter is neither Comma nor Tab the click on the option **Other** and type the delimiter character e.g. “;” for semicolon.
- (vii) If some header rows are to be skipped while importing then, enter the row number where importing will start in the box “**Start Row**”. (*Start Row: 2* is the default i.e. data starts at row 2 when it is only row 1 that contains headers for the data columns),
- (viii) “*Remove Scaling*” is checked by default i.e. if data in the file has been scaled to some decimal points then the decimal point will be removed during the transfer into “observationinitial” table. If the data in the file is not scaled to decimal points then the “*Remove Scaling*” box should be unchecked.
- (ix) If all the data belongs to one station and that it does not have a column with station IDs, then type the ID for the station in the box “**Station ID**”,
- (x) After completing above steps click “**View Data**” to populate the grid view with the selected data. Note that only the first 100 rows of data from the selected file will be displayed in the grid table. This is meant enable viewing to confirm that the right data has been selected. However, the entire file will be imported if everything is well selected.

Note that the column headers in the grid table will be serialized with numbers from 1 up to the last column of that data. The following section outlines how to rename the column headers with the element codes for the observations they represent.

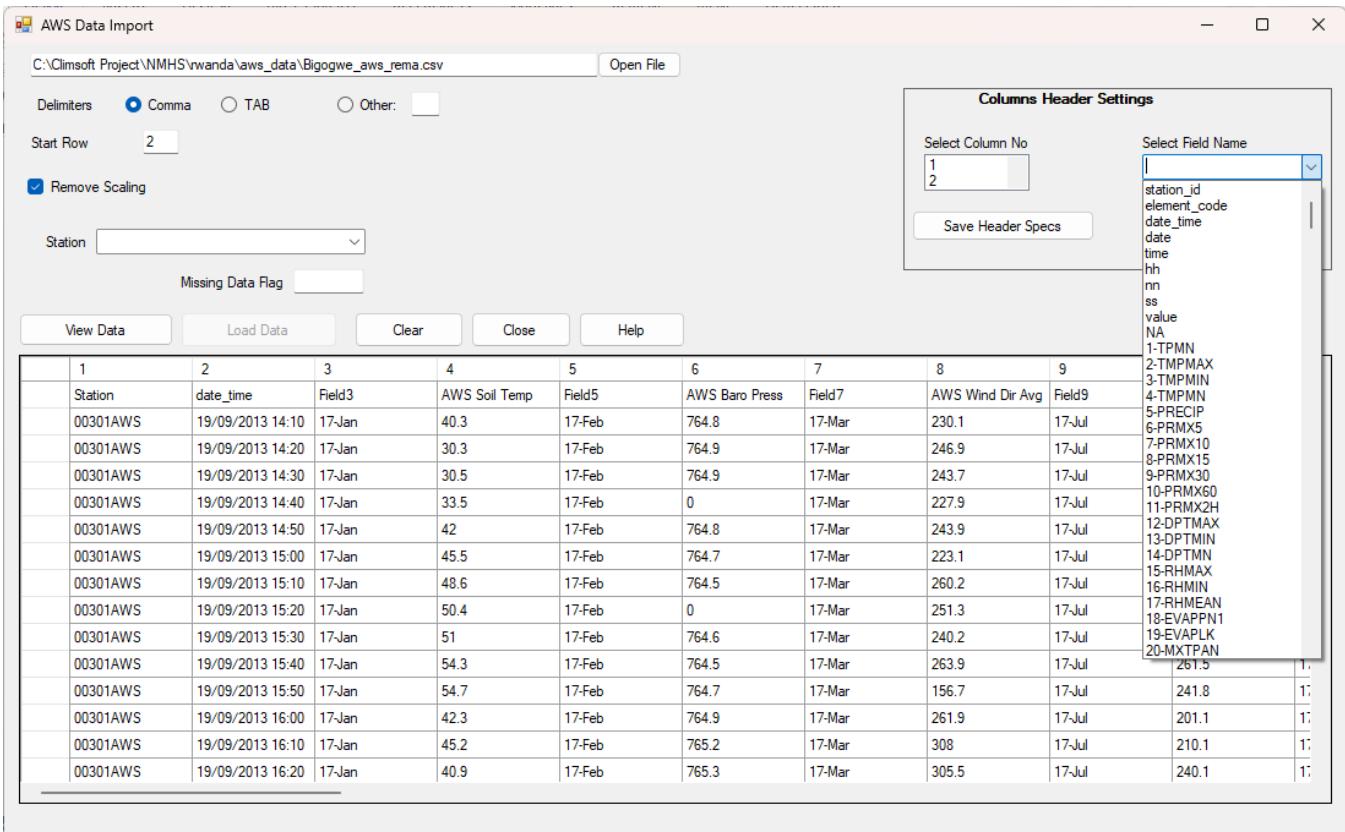


Figure 55: AWS Data Import

8.3.2 Configuring column headers and uploading data into Climsoft database

- (i) Under “**Columns Header Settings**”, select the *column number* and the *field name* that describes data in that column. Do that for each column until all of them are done. Make sure the correct field names are selected in order for the data to be appropriately mapped into the database. If any column contains data that does not need to be imported then “**NA**” should be selected for *field name*. See *Figure 55*,
- (ii) If the step (i) above is correctly completed, then the configured header specifications can be saved in a text file to be used later in importing a similar file without going through that process again. To save the specifications click “**Save Header Specs**” button and choose a convenient location (i.e. folder) and filename. Note that the file will be automatically allocated file extension of **sch** e.g. **aws1.csh** and the file with its path displayed below that button. See *Figure 56*,
- (iii) If the header specs had been saved earlier click “**Load Header Specs**” and select the header specs file. If correctly selected the columns in the displayed data table will be automatically labeled with the header specs. Note that after the header specs file has been saved or loaded, the button “**Load Data**” becomes enabled.

If satisfied that the columns are correctly named and the button “**Load Data**” is enabled then click it to start the uploading process. Wait until the busy mouse pointer changes to default. A message will be displayed at the bottom of the dialog in red showing the data transfer progress.

It should be noted that station IDs and element codes used must be described in the metadata. If not, data described by them will not be imported. Station IDs and Element Codes not found in metadata will be listed at the bottom of the dialog.

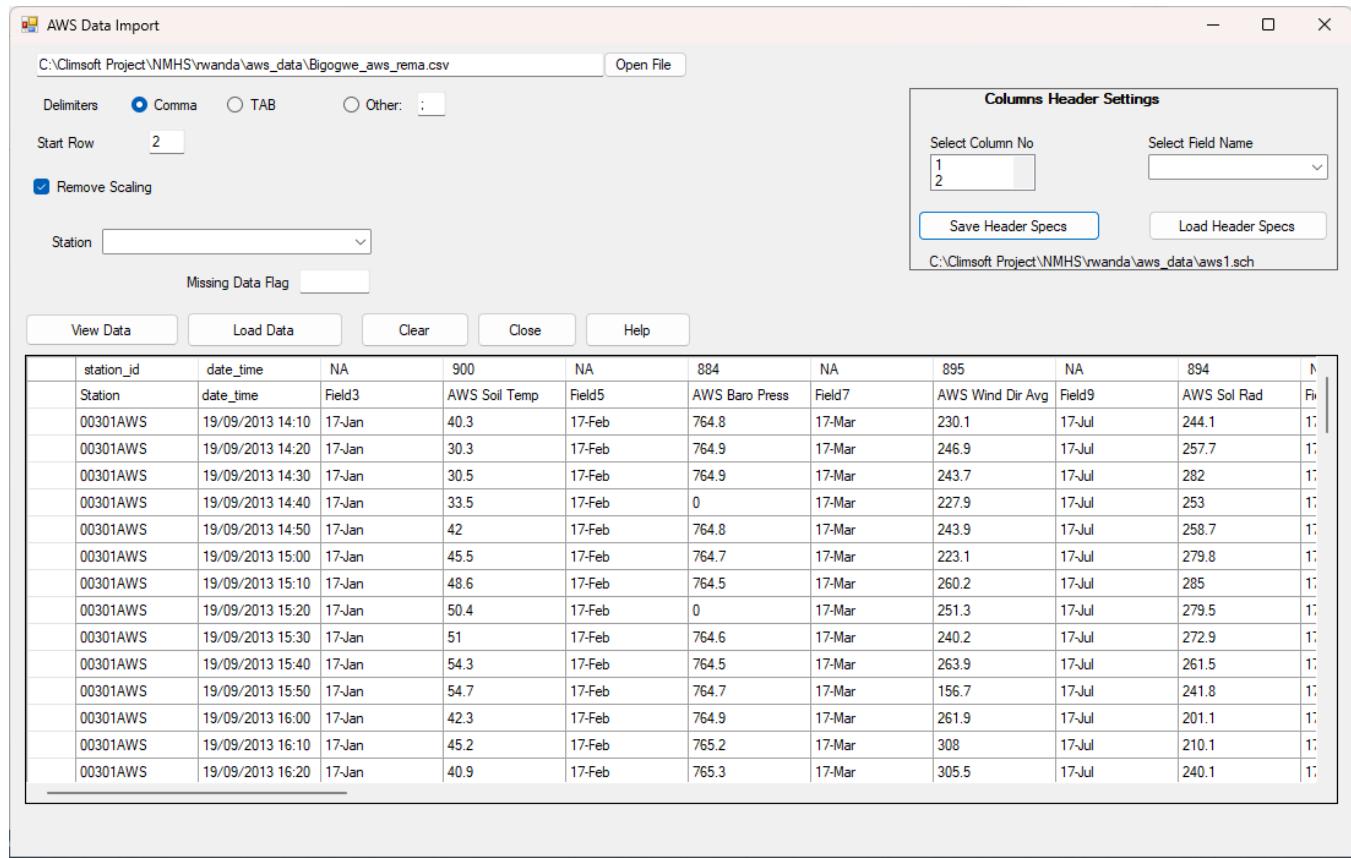


Figure 56: Configured column headers

8.4 Importing data from text files with different structures

8.4.1 Hourly and Daily Data Import

Daily/Hourly observation values arranged in one or many columns can be ingested easily into Climsoft version 4. The data should be in delimited text files. *Figure 57* and *58* are sample data files with data organized in different structures:

A	B	C	D	E	F	G	H
1	StationId	Element_Year	Month	Day	Hour	Rain	
2	10101100	5	1981	1	1	6	0
3	10101100	5	1981	1	2	6	8.8
4	10101100	5	1981	1	3	6	1.1
5	10101100	5	1981	1	4	6	0.6
6	10101100	5	1981	1	5	6	0
7	10101100	5	1981	1	6	6	11.1
8	10101100	5	1981	1	7	6	0
9	10101100	5	1981	1	8	6	0
10	10101100	5	1981	1	9	6	0

Figure 57: Sample file with observations in one column labeled G

A	B	C	D	E	F	G	H	I	J	K	L	M	
1	station_id	element	Year	Month	1	2	3	4	5	6	7	8	9
2	10101100	5	1930	10	0	0	24	9.1	9.6	12.1	1	12.9	0
3	10101100	5	1930	11	14.5	1	0	5.7	11.4	3	4	0	1
4	10101100	5	1930	12	0	0	7	6.5	7.5	7.5	0	3	0
5	10101100	5	1931	1	0	0	0	0	0	0	0	0	0
6	10101100	5	1931	2	19	0	2.4	0	0	0	0	0	0
7	10101100	5	1931	3	0	0	0	9.4	0	7.8	0	0	0
8	10101100	5	1931	4	0	6.8	0	11.4	0	1.3	0	0	1.4
9	10101100	5	1931	5	10.9	2.1	2	1.5	3	10.5	9	4.5	2.5
10	10101100	5	1931	6	0	0	0	12.2	0	0	0	0	0
11	10101100	5	1931	7	0	0	0	3.4	0	0	0.7	0	0
12	10101100	5	1931	8	0	0	0	0	0	11.5	0	0	0
13	10101100	5	1931	9	0	0	11.1	0	0	0	0	0	1.2
14	10101100	5	1931	10	0	0	0	1.4	8.4	0	4.2	0	0
15	10101100	5	1931	11	0	0	0	4.5	0	0	0	12.2	0
16	10101100	5	1931	12	8.6	7.8	5.2	9.1	4	22.3	35.4	2.4	0

Figure 58: Sample file with observations in many columns starting at column E (day 1)

Follow the steps below to transfer Hourly/Daily data with one or many columns structure into Climsoft version 4:

- Select “Data transfer” icon from the **Welcome** form,
- Select “External Data” and select “Text Files” and then “Hourly or Daily” option, *Figure 59*,

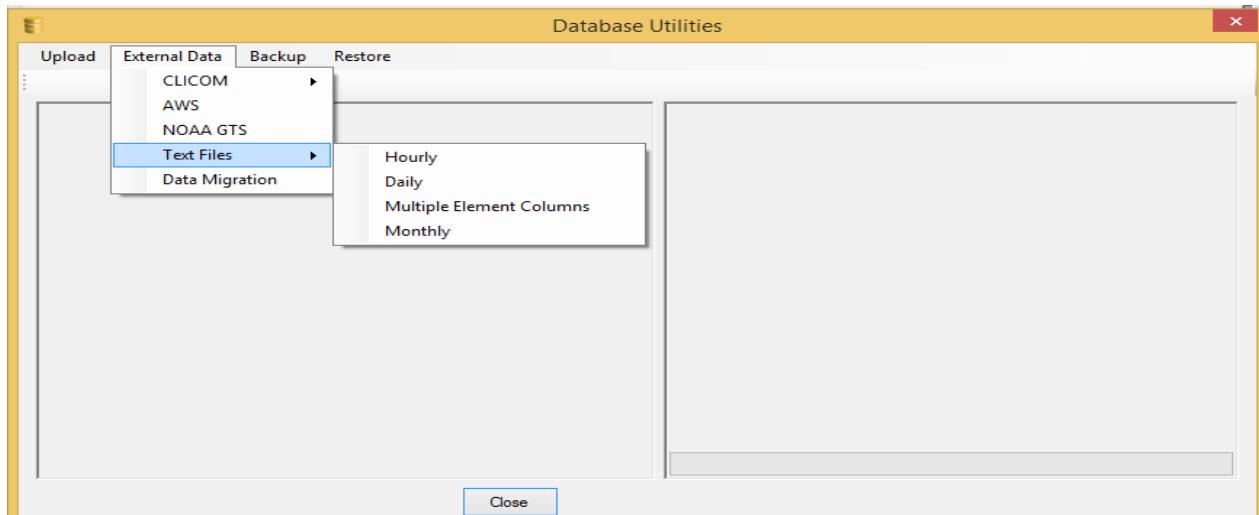


Figure 59: Import External Data Dialog

- After selecting “Hourly or Daily”, the dialog in *Figure 60* opens up. Click on “Open File” to browse and select the file containing data to transfer, specify the “delimiter” of the file to import e.g. comma (default), TAB or Others (type in the delimiter character). Check/uncheck the “remove scaling” box appropriately to ensure data is imported into “observationinitial” table without the decimal points. Click “View Data” button to view the data in a grid view (tabular form),
- Set the column headers by matching each data column by its corresponding field name then click the button “Save Header Specs” to have the dialog shown in *Figure 61*,

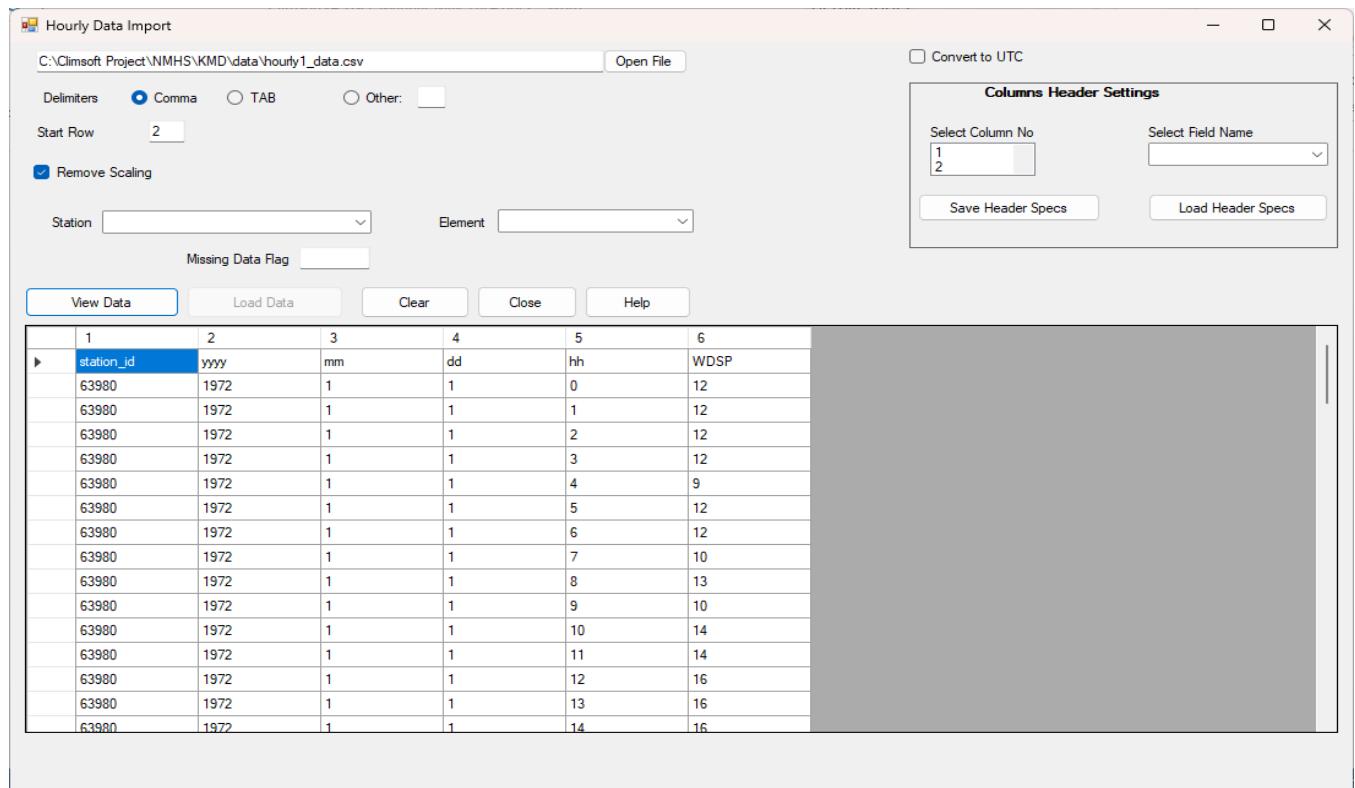


Figure 60: Importing Hourly Data

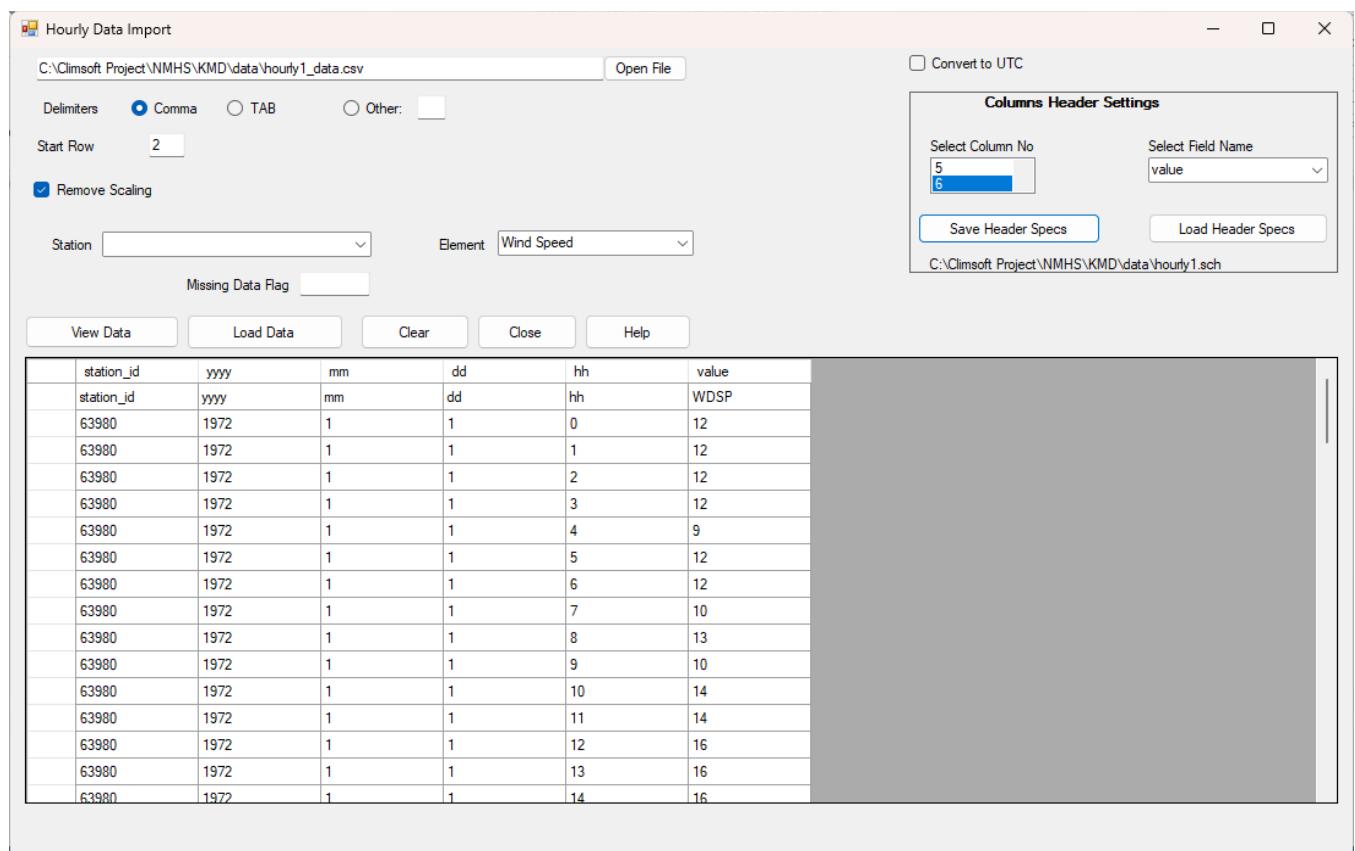


Figure 61: Columns Header Settings

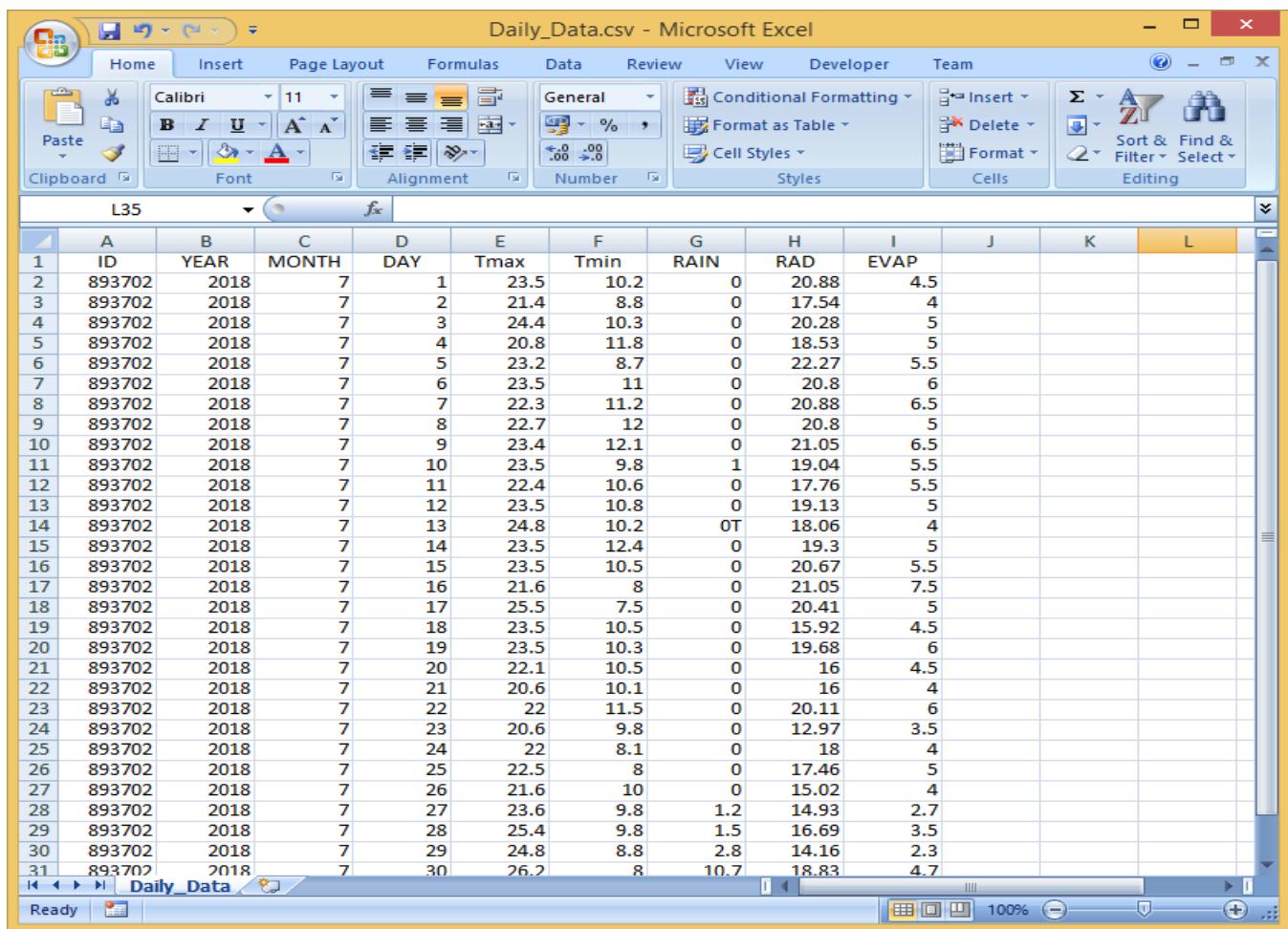
- (v) Click the “**Load Data**” button to load the data into the “*observationinitial*” table. Then observe the records uploading count and finally the process completion message at the bottom of the dialog. In case the upload fails a message will pop up accordingly.

Note: To avoid setting the columns headers each time a similar file is to be imported, save the columns header specifications by selecting the “**Save Header Specs**” button. Note the file extension (e.g. header1_specs.sch).

To retrieve and use the saved columns headers click the ” **Load Header Specs**” button and navigate to select the appropriate file.

8.4.2 Multiple Element Columns

Figure 62 shows a text (csv) file (opened in Excel) with 4 columns for *StationID*, *Year*, *Month*, *Day* and 5 columns for values of different Elements namely. *Tmax*, *Tmin*, *RAIN*, *RAD* and *EVAP*. This file can be easily imported in Climsoft V4 through the procedure described below:



	A	B	C	D	E	F	G	H	I	J	K	L
1	ID	YEAR	MONTH	DAY	Tmax	Tmin	RAIN	RAD	EVAP			
2	893702	2018	7	1	23.5	10.2	0	20.88	4.5			
3	893702	2018	7	2	21.4	8.8	0	17.54	4			
4	893702	2018	7	3	24.4	10.3	0	20.28	5			
5	893702	2018	7	4	20.8	11.8	0	18.53	5			
6	893702	2018	7	5	23.2	8.7	0	22.27	5.5			
7	893702	2018	7	6	23.5	11	0	20.8	6			
8	893702	2018	7	7	22.3	11.2	0	20.88	6.5			
9	893702	2018	7	8	22.7	12	0	20.8	5			
10	893702	2018	7	9	23.4	12.1	0	21.05	6.5			
11	893702	2018	7	10	23.5	9.8	1	19.04	5.5			
12	893702	2018	7	11	22.4	10.6	0	17.76	5.5			
13	893702	2018	7	12	23.5	10.8	0	19.13	5			
14	893702	2018	7	13	24.8	10.2	0T	18.06	4			
15	893702	2018	7	14	23.5	12.4	0	19.3	5			
16	893702	2018	7	15	23.5	10.5	0	20.67	5.5			
17	893702	2018	7	16	21.6	8	0	21.05	7.5			
18	893702	2018	7	17	25.5	7.5	0	20.41	5			
19	893702	2018	7	18	23.5	10.5	0	15.92	4.5			
20	893702	2018	7	19	23.5	10.3	0	19.68	6			
21	893702	2018	7	20	22.1	10.5	0	16	4.5			
22	893702	2018	7	21	20.6	10.1	0	16	4			
23	893702	2018	7	22	22	11.5	0	20.11	6			
24	893702	2018	7	23	20.6	9.8	0	12.97	3.5			
25	893702	2018	7	24	22	8.1	0	18	4			
26	893702	2018	7	25	22.5	8	0	17.46	5			
27	893702	2018	7	26	21.6	10	0	15.02	4			
28	893702	2018	7	27	23.6	9.8	1.2	14.93	2.7			
29	893702	2018	7	28	25.4	9.8	1.5	16.69	3.5			
30	893702	2018	7	29	24.8	8.8	2.8	14.16	2.3			
31	893702	2018	7	30	26.2	8	10.7	18.83	4.7			

Figure 62: Sample data with multiple columns

The procedure to import this file is as follows:

a) Selecting the import file and viewing the data

- Select the “**Data transfer**” icon from the welcome dialog,
- Select “**External Data**”, then “**Text Files**” followed by “**Multiple Element Columns**” as shown in Figure 59,

- (iii) Select **Open File** to browse the file to import,
- (iv) After the file has been located, click **Open** in the file open dialog. The filename with its path will then be shown in the “**Open File**” box. See *Figure 63*,
- (v) Select the **Delimiter** option according to the data separator for the selected file (comma, tab or others).
- (vi) If some rows are to be skipped while importing e.g. column headers then enter the row number where importing will start in the “**Start Row**” box. Row 2 is the default which is also the case in this example,
- (vii) If the data does not contain the observation hour column, fill the “**Default Observation Hour**” box with the hour used for the daily data. The value 06 has been set as default as it is the case with most observations,
- (viii) If the data in the file is scaled to some decimal points, then ensure the box “**Remove Scaling**” is checked,
- (ix) When all the above steps have been completed click “**View Data**” button. The table in the dialog is then populated with the data from the selected file. The column headers will be serialised with numbers from 1 up to the last column of that data, as shown in *Figure 63*.
- (x)

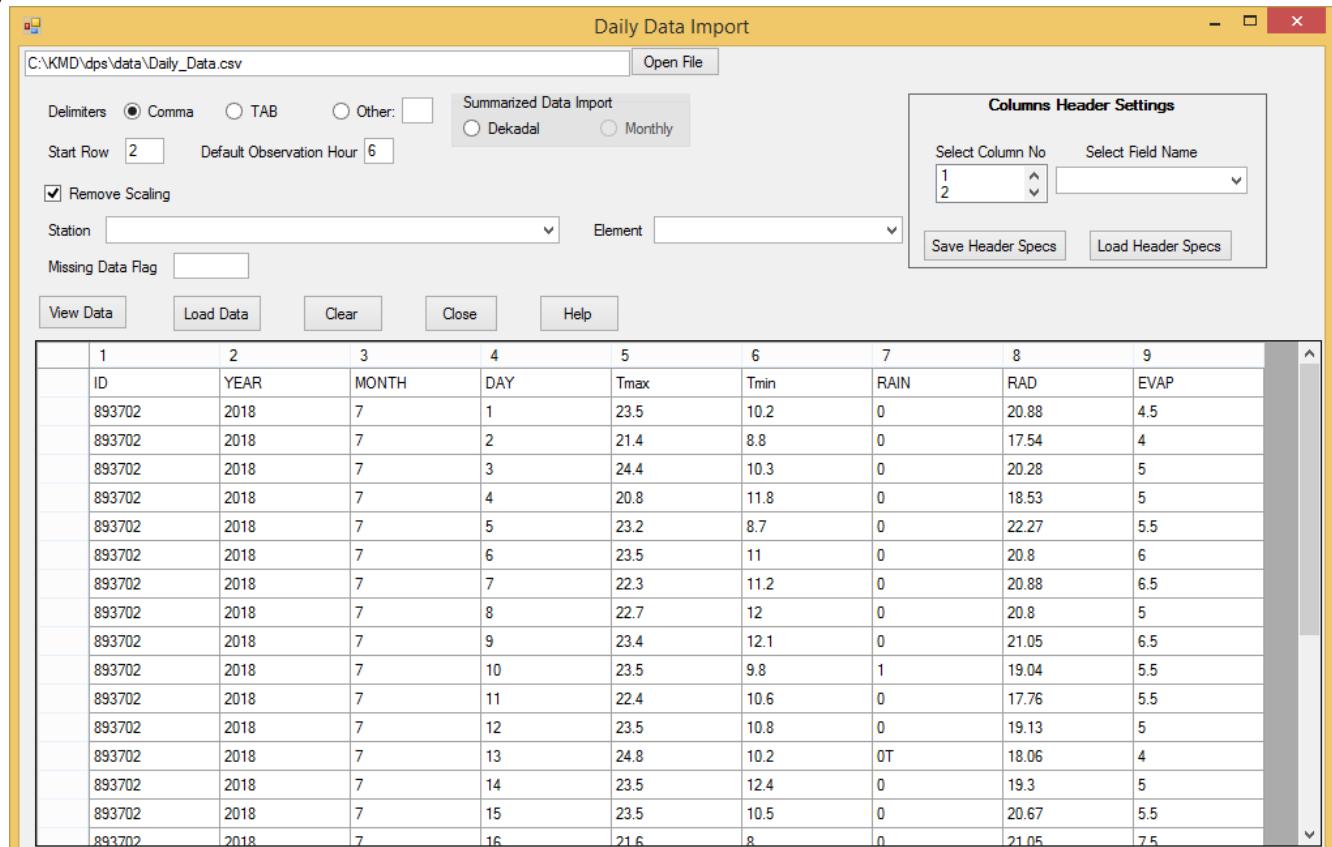


Figure 63: Multiple column data Import

b) Configuring column headers and uploading the data

- (i) Under “**Columns Header Settings**”, select the column number then click on the corresponding field name from the list box. For the data columns, the selected field name should be the element code for that data. Repeat for each column. Make sure the correct field names are selected in order for the data to be appropriately mapped in the database,

- (ii) Once step (i) is completed, the created header specifications can be saved in a text file to be used later for a similar file without going through the same process again. To save the header specifications follow the procedure described in **Section 8.3.2 (ii)** above,
- (iii) If the header specs had earlier been saved then click “**Load Header Specs**” and select the file containing those header specs. If the correct file is selected, the columns for the displayed data table are labelled automatically as shown in *Figure 64*,
- (iv) Once the columns are correctly named click “**Load Data**” to start the uploading process. Wait until the busy mouse pointer changes to the default. A message is then displaying at the bottom of the dialog in red showing the data transfer progress.

More details on the Command buttons for the data import dialog are as follows:

Save Header Specs - To save the created header specification to a file for future use;

Load Header Specs - To load header specification that had been saved for a file with the same structure;

View Data - To view data from the selected file in a table view;

Load Data – To start data uploading process from the selected text file to the “**observationinitial**” table;

Clear – To clear the grid view of the displayed data;

Close - To close the dialog;

Help - Click **Help** to get more information on the dialog;

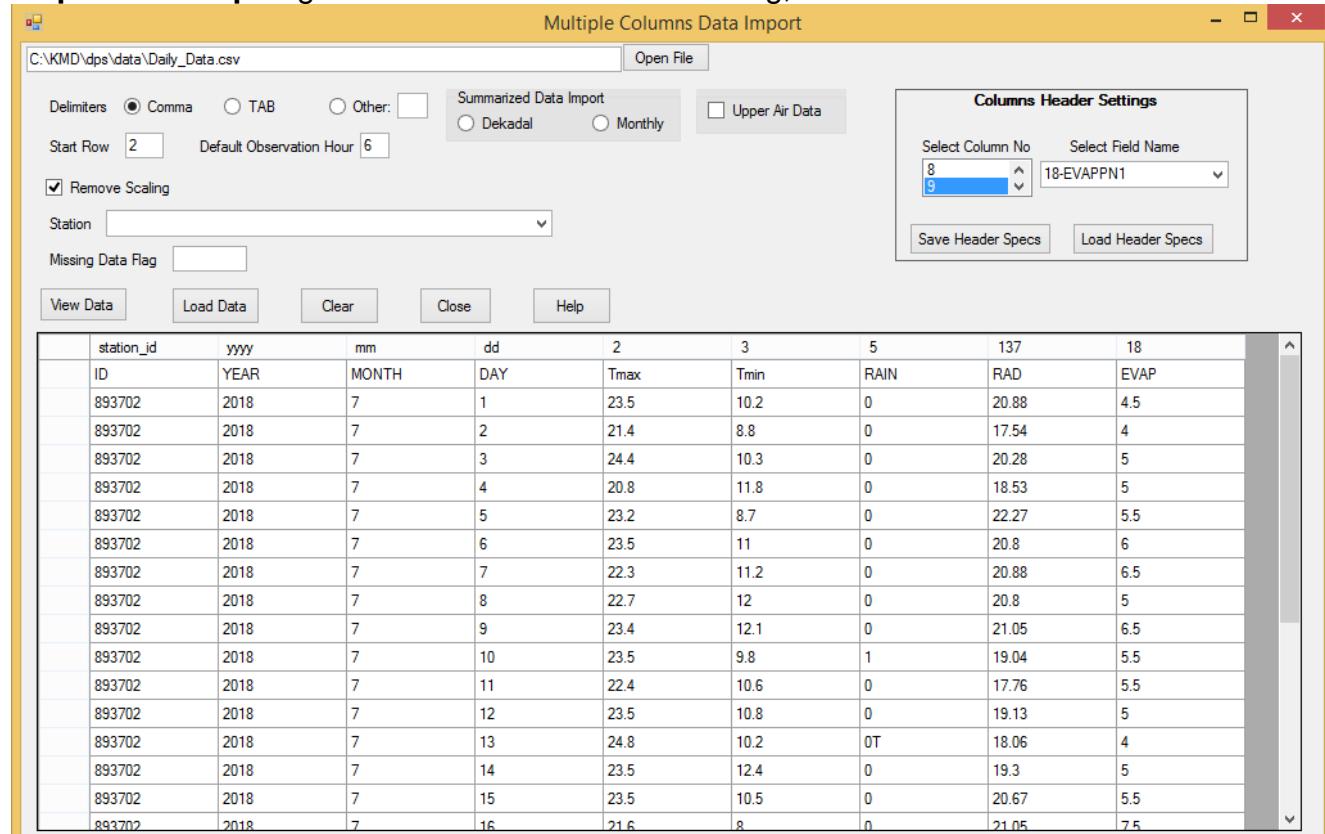


Figure 64: Multiple column data Import with column headers specification

8.5 Importing Summarized Data

Data that is summarized on Dekadal or monthly basis can be imported into Climsoft. In practice this is done when the raw data for those summaries is not available. Otherwise it is advisable to import the actual observation values because Climsoft is capable of producing those summaries whenever required. After importing, the summarized values will be placed in the appropriate day of the month and then allocated a period value that is equivalent to the number of days used in the summary. For instance, monthly summary values will be placed on the last day of the month and the period value will be the number of days in that month.

Following are examples of the summarized data with layouts:

StationID	Year	Month	DEKAD	TMIN	TMAX	PRECIP
9136130	1984	1	1	13	25.1	0.8
9136130	1984	1	2	13.5	26.1	0.0
9136130	1984	1	3	13.2	26.7	0.0
9136130	1984	2	1	13	27.5	0.0
9136130	1984	2	2	11.7	28.5	0.0
9136130	1984	2	3	13.8	27.8	0.2
9136130	1984	3	1	13.4	27.5	0.1
9136130	1984	3	2	15.2	27.7	0.3
9136130	1984	3	3	15.4	27.4	0.2
9136130	1984	4	1	16	28.4	0.9
9136130	1984	4	2	16	26.9	2.1
9136130	1984	4	3	15.3	25.9	5.8
9136130	1984	5	1	14.4	25.9	0.0
9136130	1984	5	2	14.1	25.7	0.1
9136130	1984	5	3	13.5	25.6	0.0
9136130	1984	6	1	12.4	24.6	0.4
9136130	1984	6	2	12.4	24.4	0.1
9136130	1984	6	3	12	24.5	0.0
9136130	1984	7	1	12.2	23.2	0.0
9136130	1984	7	2	12.3	22.5	0.8
9136130	1984	7	3	13	21.2	0.5
9136130	1984	8	1	11.6	21.3	1.3
9136130	1984	8	2	11.9	21.9	0.0
9136130	1984	8	3	12.2	21.7	0.0

Figure 64a Dekadal data – Multiple Elements columns

StationID	Code	Year	Month	1	2	3
9136130	3	1984	1	25.1	26.1	26.7
9136130	3	1984	2	27.5	28.5	27.8
9136130	3	1984	3	27.5	27.7	27.4
9136130	3	1984	4	28.4	26.9	25.9
9136130	3	1984	5	25.9	25.7	25.6
9136130	3	1984	6	24.6	24.4	24.5
9136130	3	1984	7	23.2	22.5	21.2
9136130	3	1984	8	21.3	21.9	24.7
9136130	3	1984	9	26.3	25.9	26.5
9136130	3	1984	10	23.7	25.5	22.8
9136130	3	1984	11	22.5	23.4	23.2
9136130	3	1984	12	25	22.8	23.7
9136130	3	1984	1	13	13.5	13.2
9136130	3	1984	2	13	11.7	13.8
9136130	3	1984	3	13.4	15.2	15.4
9136130	3	1984	4	16	16	15.3
9136130	3	1984	5	14.4	14.1	13.5
9136130	3	1984	6	12.4	12.4	12
9136130	3	1984	7	12.2	12.3	13
9136130	3	1984	8	11.6	11.9	12.2
9136130	3	1984	9	11.8	13.2	13.1
9136130	3	1984	10	14.8	13.6	14.7

Figure 64b Dekadal data – Single Element column

StationID	Year	Month	PRECIP
9136130	1984	1	0.76
9136130	1984	2	0.16
9136130	1984	3	0.53
9136130	1984	4	8.73
9136130	1984	5	0.16
9136130	1984	6	0.5
9136130	1984	7	1.28
9136130	1984	8	2.24
9136130	1984	9	1.39
9136130	1984	10	14.48
9136130	1984	11	12.39
9136130	1984	12	8.56

Figure 64c Monthly data – Multiple Elements columns

StationID	Code	Year	1	2	3	4	5	6	7	8	9	10	11	12
9136130	5	1981	0.37	0.2	10.63	32.34	14.49	3.07	0.96	3.04	4.39	4.17	4.02	5.99
9136130	5	1982	0.24	1.41	3.12	19.29	16.44	0.84	1.35	0.31	1.59	18.64	22.01	18.89
9136130	5	1983	0.18	12.8	4.34	13.71	3.8	3.1	2.25	2.98	0.36	6.36	2.24	22.57
9136130	5	1984	0.76	0.16	0.53	8.73	0.16	0.5	1.28	2.24	1.39	14.48	12.39	8.56
9136130	5	1985	0	9.12	8.8	18.88	5.97	3.24	5.02	0.31	2.25	2.06	6.75	10.5

Figure 64d Monthly data – Single Element column

The import procedures will depend on the layout of the summarized data as follows:

(viii) Data in multiple Elements Columns - **Figure 64a and 64c**

From **Welcome** dialog follow:

Data Transfer -> External Data ->Text File->Multiple Element Columns. Then check the option **Dekadal** or **Monthly** for type of **Figure 64a** or **64c** respectively.

(ix) Dekadal data in single Elements Column - **Figure 64b**

From **Welcome** dialog follow:

Data Transfer -> External Data ->Text File->Daily. Then check option “**Dekadal**”.

(x) Monthly data in single Elements Column - **Figure 64d**

From **Welcome** dialog follow:
Data Transfer -> External Data ->Text File->Monthly.

Notes on Daily Data Import

Trace Rainfall – Should be typed as **0T**

Missing Data – Should be left as blank. Any value that is not numeric will be regarded as missing data.

Cumulated data – Cumulated data should be type with C e.g. **200C**. Values for preceding days should be left blanks.

8.6 Importing Upper Air data

Importing procedures for upper air data that has been digitized through other applications and archived in delimited text files is similar to the files with surface observations data. The appropriate menus will be used depending on the layout of data in the files. The suitable menus are those for daily or multiple columns for elements. The only additional procedure is to indicate that the file contains upper air data by checking the box; **Upper Air Data** and entering date and time the balloon was launched in the format given. See **Figure 64e** below.

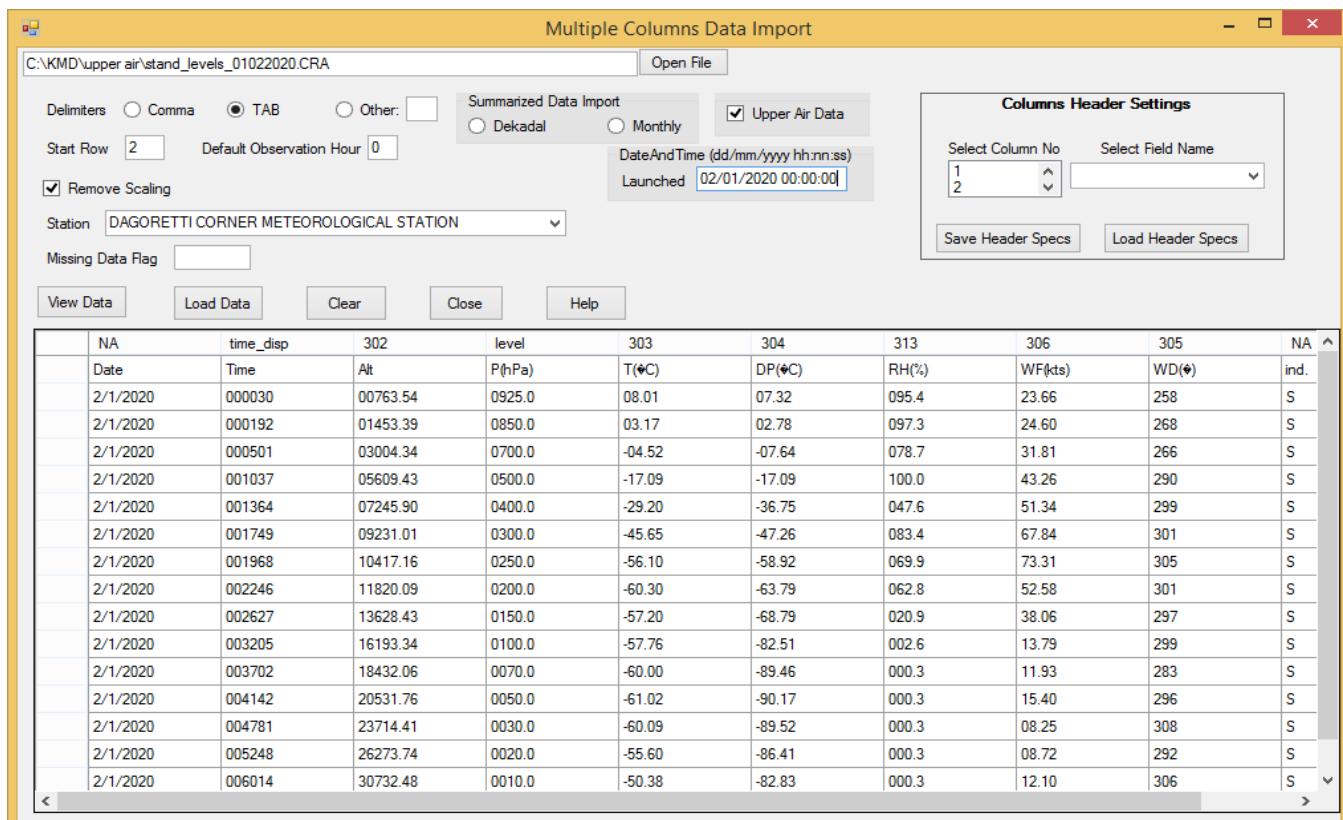


Figure 64e: Multiple element columns data Import for upper air data file

8.7 Upload failures

The data upload process may fail due to various reasons. Error messages will be given in each case. As much as possible the messages should be studied carefully and the problems described therein addressed. In case of station or element in the data that had not been defined in the metadata the affected records will be skipped then their stations/elements are listed at the bottom of the import dialog. The data should therefore be corrected accordingly and reloaded.

8.8 Importing GTS data downloaded from NOAA – NCEI

The NOAA-NCEI site has a huge archive of GTS daily observation data from all synoptic stations around the globe. Most of the data dates back to the early 1970s. The data goes through some QC at NOAA-NCEI and is updated on a daily basis. Data in this site is organized in summaries for different range of time and put in different datasets. The dataset for daily data that is suitable for Climsoft import is called [Global Surface Summary of the Day \(GSOD\)](#)

The data is publicly available in text (csv) files. Climsoft is able to import these files through the external data import dialog. Figure 65 below shows a screenshot of sample data downloaded from the NOAA-NCEI site:

STATION	DATE	LATITUDE	LONGITUD	ELEVATION	NAME	TEMP	TEMP_ATT	DEWP	DEWP_ATT	SLP	SLP_ATTRI	STP	STP_ATTRI	VISIB	VISIB_ATT	WDSP	WDSP_ATT	MXSPD	GUST	MAX	MAX_A	MIN	MIN_ATTR	PRCP	PRCP
63714099999	01/01/2021	-0.266667	36.1	1901	NAKURU, KE	66.2	7	57.1	7	9999.9	0	999.9	0	18.6	7	1.1	7	8	999.9	75.2	*	57.2		0.71	G
63714099999	02/01/2021	-0.266667	36.1	1901	NAKURU, KE	69.9	7	49.2	7	9999.9	0	999.9	0	18.6	7	6.3	7	15	999.9	79.7	*	54.5		0	I
63714099999	03/01/2021	-0.266667	36.1	1901	NAKURU, KE	69.3	7	46.4	7	9999.9	0	999.9	0	18.6	7	5.7	7	15	999.9	78.8	*	53.6		0	I
63714099999	04/01/2021	-0.266667	36.1	1901	NAKURU, KE	68.8	7	46.3	7	9999.9	0	999.9	0	18.6	7	5	7	9.9	999.9	78.8	*	51.4		0	I
63714099999	05/01/2021	-0.266667	36.1	1901	NAKURU, KE	69	7	49.1	7	9999.9	0	999.9	0	18.6	7	4.8	7	9.9	999.9	79.7	*	50		0	I
63714099999	06/01/2021	-0.266667	36.1	1901	NAKURU, KE	70	7	47.5	7	9999.9	0	999.9	0	18.6	7	2.7	7	14	999.9	80.1	*	54		0	I
63714099999	07/01/2021	-0.266667	36.1	1901	NAKURU, KE	67.1	7	47.2	7	9999.9	0	999.9	0	18.6	7	1.9	7	8	999.9	81	*	52.2		0	I
63714099999	08/01/2021	-0.266667	36.1	1901	NAKURU, KE	69.3	7	48.7	7	9999.9	0	999.9	0	18.6	7	4	7	9.9	999.9	82		51.8		0	I
63714099999	16/01/2021	-0.266667	36.1	1901	NAKURU, KE	72	5	51.1	5	9999.9	0	999.9	0	18.6	5	1.2	5	6	999.9	77.9	*	65.3	*	99.99	
63714099999	17/01/2021	-0.266667	36.1	1901	NAKURU, KE	68.8	8	52.9	8	9999.9	0	999.9	0	18.6	8	3.1	8	13	999.9	79.2	*	58.1	*	0	I
63714099999	20/01/2021	-0.266667	36.1	1901	NAKURU, KE	74.3	4	41.9	4	9999.9	0	999.9	0	18.6	4	2.5	4	9.9	999.9	83.8		64	*	0	I
63714099999	21/01/2021	-0.266667	36.1	1901	NAKURU, KE	67.5	8	47.8	8	9999.9	0	999.9	0	18.6	8	3.7	8	9.9	999.9	82		51.8		0	I
63714099999	22/01/2021	-0.266667	36.1	1901	NAKURU, KE	70.6	7	51.1	7	9999.9	0	999.9	0	18.6	7	3.6	7	15	999.9	77.9	*	55.4		0	I
63714099999	23/01/2021	-0.266667	36.1	1901	NAKURU, KE	67.9	8	52.5	8	9999.9	0	999.9	0	18.6	8	4	8	12	999.9	80.6	*	58.1		0	I
63714099999	24/01/2021	-0.266667	36.1	1901	NAKURU, KE	65.8	7	52.3	7	9999.9	0	999.9	0	18.6	7	5	7	15.9	999.9	78.8	*	50		99.99	
63714099999	25/01/2021	-0.266667	36.1	1901	NAKURU, KE	68.4	8	50.8	8	9999.9	0	999.9	0	18.6	8	5	8	15	999.9	81.5	*	52.2		0.04	G
63714099999	26/01/2021	-0.266667	36.1	1901	NAKURU, KE	68.7	8	47.9	8	9999.9	0	999.9	0	18.6	8	5	8	15	999.9	80.6	*	49.1		0	G
63714099999	27/01/2021	-0.266667	36.1	1901	NAKURU, KE	68.9	8	42	8	9999.9	0	999.9	0	18.6	8	4.4	8	12	999.9	82.4	*	46.4		0	I
63714099999	28/01/2021	-0.266667	36.1	1901	NAKURU, KE	68.1	8	46.2	8	9999.9	0	999.9	0	18.6	8	2.4	8	13	999.9	82.4	*	49.1		0	I
63714099999	29/01/2021	-0.266667	36.1	1901	NAKURU, KE	68	6	48.1	6	9999.9	0	999.9	0	18.6	6	2	6	7	999.9	80.6	*	50.9		0	I
63714099999	30/01/2021	-0.266667	36.1	1901	NAKURU, KE	68.8	8	45.6	8	9999.9	0	999.9	0	18.6	8	4.6	8	9.9	999.9	82.8	*	51.8		0	I
63714099999	31/01/2021	-0.266667	36.1	1901	NAKURU, KE	67.9	8	39.1	8	9999.9	0	999.9	0	18.6	8	4.9	8	12	999.9	83.3	*	48		0	I
63714099999	01/02/2021	-0.266667	36.1	1901	NAKURU, KE	67.2	8	36.2	8	9999.9	0	999.9	0	18.6	8	2.5	8	9.9	999.9	83.7	*	45.5		0	I
63714099999	02/02/2021	-0.266667	36.1	1901	NAKURU, KE	67.2	7	39.9	7	9999.9	0	999.9	0	18.6	7	1.9	7	8	999.9	81.9	*	47.8		0	I
63714099999	03/02/2021	-0.266667	36.1	1901	NAKURU, KE	69.3	8	50.3	8	9999.9	0	999.9	0	18.6	8	1.5	8	7	999.9	79.7	*	52		0	I

Figure 65: Sample data from NOAA-NCDC

To import GTS daily data from NOAA-NCEI;

- Select “Data Transfer” icon on the CLIMSOFT Welcome screen,
- Select “External Data” menu;
- Select “NOAA GTS” to open the dialog and browse the data file as shown in Figure 66 below.

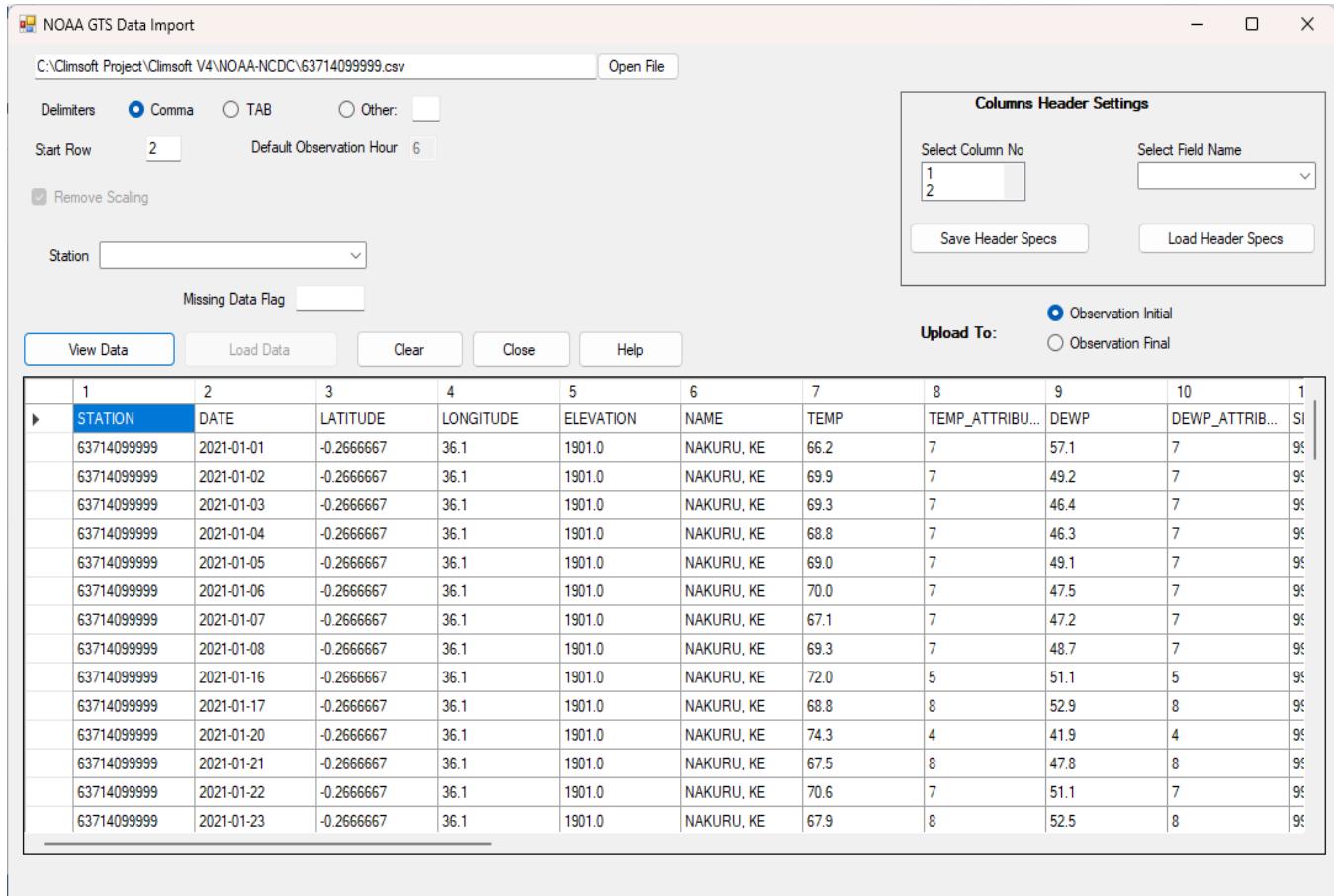


Figure 66: Importing data from a text file downloaded from NOAA-NCEI site

Notes on NOAA-NCEI data:

- b) Since the GTS data would have gone through QC at NOAA-NCEI, it may be transferred straight to the “**observationfinal**” table. However, if it is desired to be subjected to QC again then it should be transferred to the “**observationinitial**” table by checking on the option “**Observation Final**”.
- c) The required data can be downloaded from the site:
<https://www.ncei.noaa.gov/access/search/dataset-search>

8.9 Selecting Station and Element on the Import Dialog

Where Station and/or Element columns are missing in the file to be imported they should be provided in the import dialog. They are selected from Station and Element list boxes accordingly. These boxes allow selection by station and element names or by entering the station id or element code the press Enter Key respectively. See Figure 6a

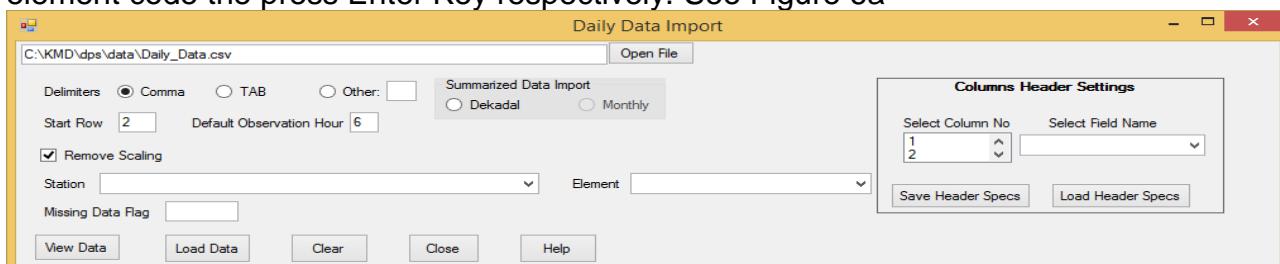


Figure 66a: Stations and Element Selection

9. Data Backup and Restore

Data backup and restore are essential operations in data management.

9.1 Data Backup

9.1.1 Data backup by station

Climsoft Version 4 has a facility for a complete backup of all the observation data in the “**observationfinal**” table by making individual backup files for each station.

This process is fast and minimizes the computer memory resources. In addition it provides a quick view of the list of backup files in Windows File Explorer with the relative amount of data for each station by examining the file sizes, without the extra effort of doing a detailed inventory report (Figure 67).

Name	Date modified	Type	Size
61980_backup.csv	25/03/2016 16:18	Microsoft Excel C...	1,846 KB
61986_backup.csv	25/03/2016 16:21	Microsoft Excel C...	1,771 KB
61988_backup.csv	25/03/2016 16:22	Microsoft Excel C...	1,772 KB
61989_backup.csv	25/03/2016 16:23	Microsoft Excel C...	334 KB
61990_backup.csv	25/03/2016 16:24	Microsoft Excel C...	1,762 KB
61995_backup.csv	25/03/2016 16:24	Microsoft Excel C...	1,365 KB
61997_backup.csv	25/03/2016 16:26	Microsoft Excel C...	105 KB
63729_backup.csv	25/03/2016 19:42	Microsoft Excel C...	764 KB
63733_backup.csv	25/03/2016 19:43	Microsoft Excel C...	928 KB
63756_backup.csv	25/03/2016 19:47	Microsoft Excel C...	1,077 KB
63791_backup.csv	25/03/2016 19:53	Microsoft Excel C...	1,390 KB
63801_backup.csv	25/03/2016 19:56	Microsoft Excel C...	670 KB
63810_backup.csv	25/03/2016 19:56	Microsoft Excel C...	5 KB
63832_backup.csv	25/03/2016 19:59	Microsoft Excel C...	870 KB

Figure 67: List of individual station backup files

The backup dialog shown in Figure 68 is accessed by clicking the “**Data Transfer**” icon on the Welcome screen, followed by clicking the menu item “**Backup**”.

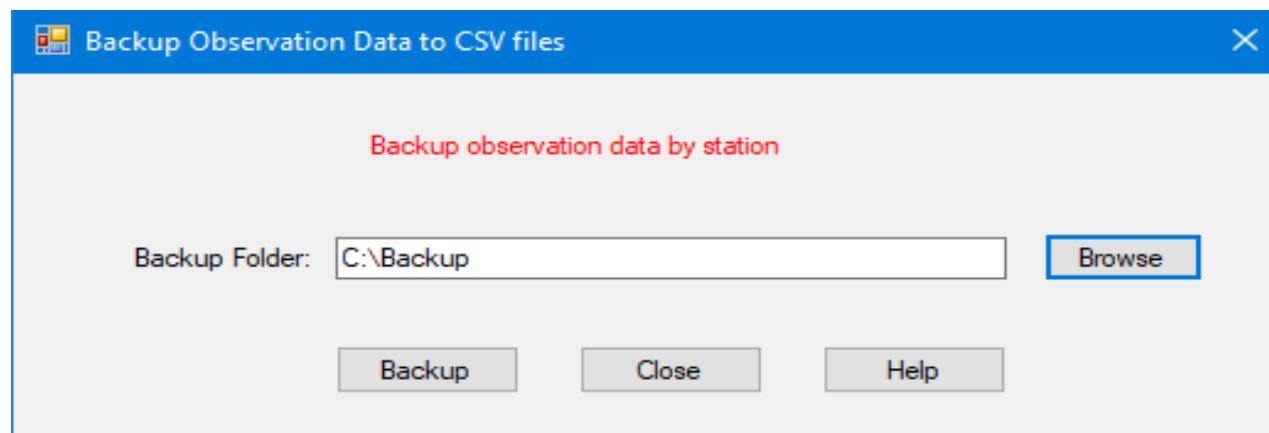


Figure 68: Data backup

Browsing for the backup folder from the database server, then click the “Backup” button, for the backup process to start. The progress of the backup process is displayed.

9.1.2 Complete database backup

In Climsoft Version 4, the recommended tool for backing up of the whole database is HeidiSQL. This is a graphical interface for managing databases that comes bundled with the MariaDB DBMS installation. HeidiSQL is easy to configure and use.

Launch HeidiSQL either from the desktop shortcut or from the Windows Start menu under MariaDB program group. This displays the “Session Manager” as shown in Figure 69.

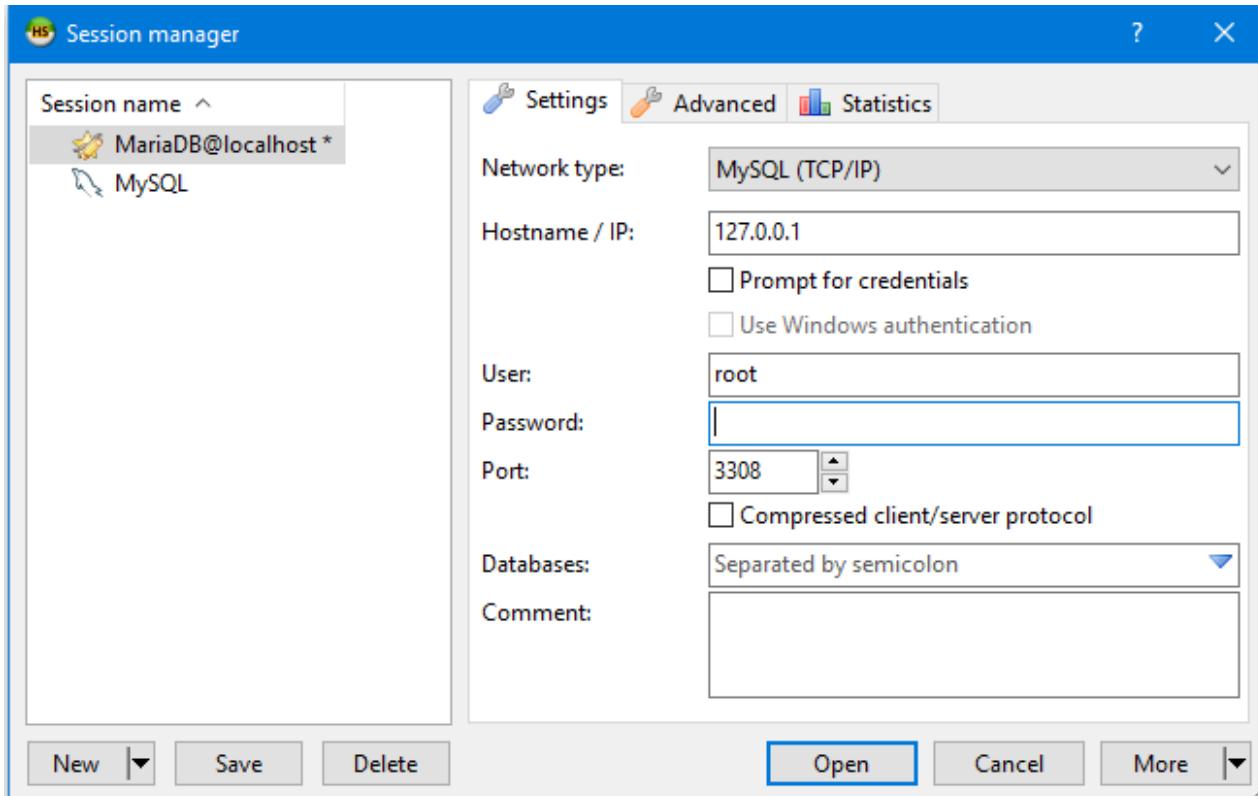


Figure 69: HeidiSQL Session Manager

The Session Manager in Figure 62 is to configure a connection to the MariaDB server. To setup a new connection, click on the “New” button on the bottom left corner of the dialog;

After editing the “Session” name on the left panel of the dialog, specify the connection details on the right panel of the dialog. The required details include the IP address of the computer (server) where MariaDB is installed, the Port number, the user name and password.

The Session Manager allows configuration of connections to more than one MariaDB installation on different computers. If MariaDB is installed on the local computer then the IP address should be “127.0.0.1” or “localhost” as shown in Figure 69.

Completing the required connection details then clicking the “Open” button (Figure 69), a screen appears with details of the database(s) and objects for the specified Port number, Figure 70.

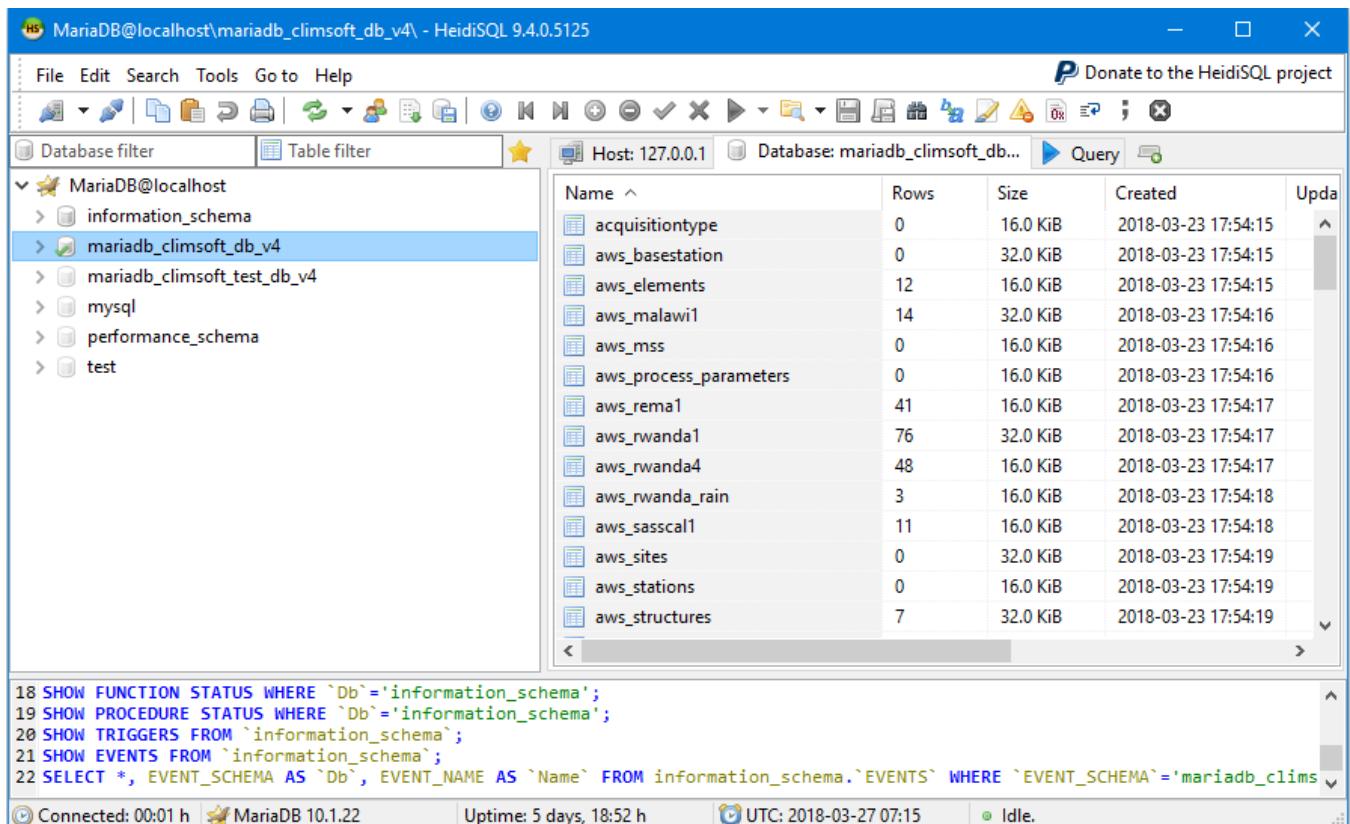


Figure 70: HeidiSQL interface showing database information

To carry out a complete backup of a required database, right click on the database name on the left panel of the dialog in Figure 70;

A pop-up menu appears, click on the menu item “**Export database as SQL**”; this displays a new dialog to specify details for the backup as shown on Figure71.

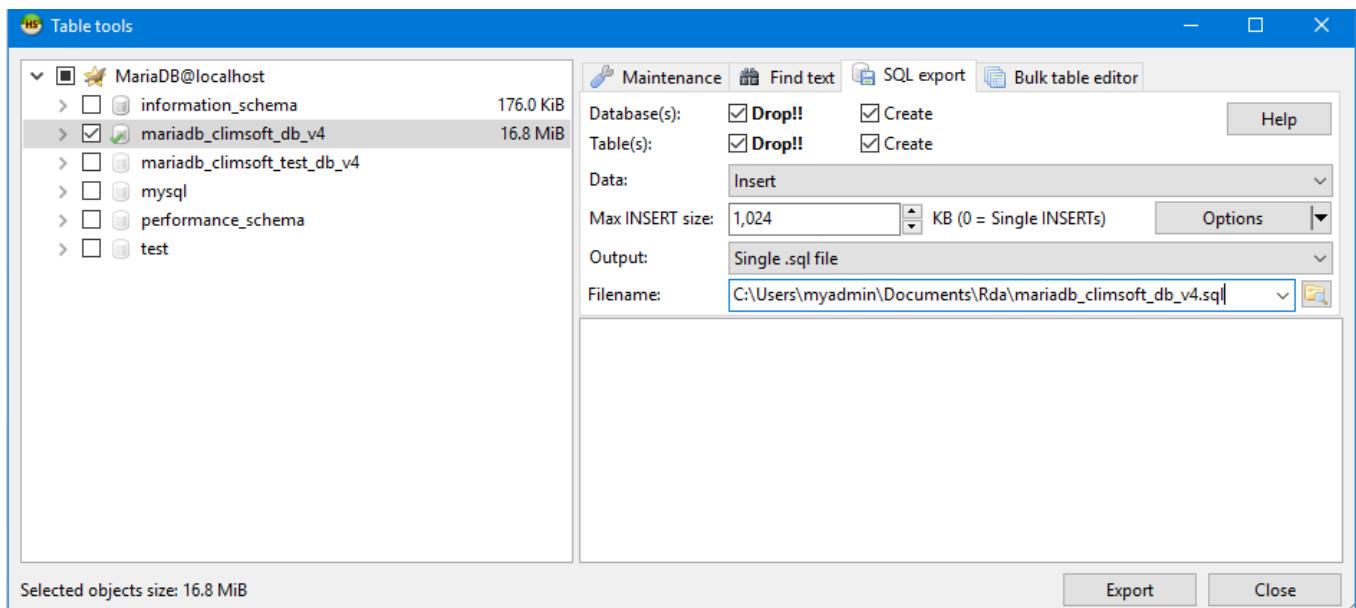


Figure 71: HeidiSQL Dialog for database backup

Click on the icon to the right of the filename to browse for the location and specify the filename for the backup.

To create a new database structure with all the tables and data, check all the boxes on the right panel and select “**INSERT**” on the “**Data**” dropdown list.

Click the “**Export**” button, then backup process starts and saves the backup file with the specified name (and the extension .sql), in the specified location.

To restore the database (script file) click on “**File**” then “**Load SQL file...**”. Select the backup script file then click “**Open**” on windows explorer dialog and follow the subsequent dialogs.

9.2 Data restore

9.2.1 Data restore by Station

The dialog for restoring data from individual station backup files is shown in Figure 72. This is accessed by clicking the icon “**Data Transfer**” on the Welcome screen followed by clicking on the menu item “**Restore**”.

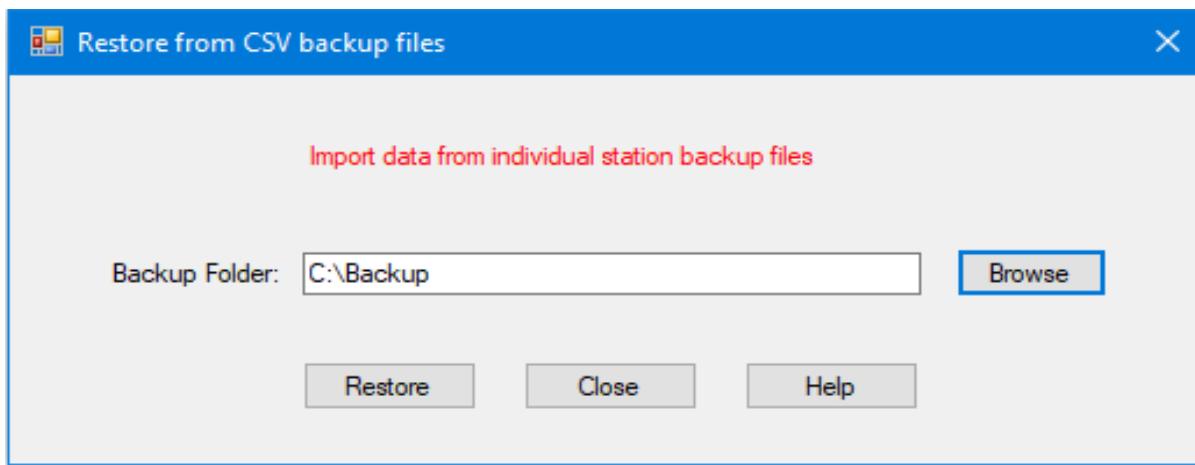


Figure 72: Data restore

Browsing for the backup folder, then click the “**Restore**” button. The data restore process starts, showing the progress of the restore process.

9.2.2 Complete Database Restore

To recreate and restore the entire database from a complete backup, run the script of the backup file following the steps similar to those for creating a new database in MariaDB as described under Topic 2, section 2.3 (Creating Climsoft Database in MariaDB and First Login). It is important to specify the exact name of the backup file in place of the name of the script file used for creating Climsoft Version 4 database at the first installation.

10. Climate Products

10.1 Standard Products

Climsoft version 4 provides a number of standard products which produce commonly required reports or diagrams using data contained in the “*observationfinal*” table. Products are obtained as follows.

From the **Welcome** Dialog, click on the icon **Climate Products** or select **Products** on the main menu. The resulting dialog is shown in Figure 73.

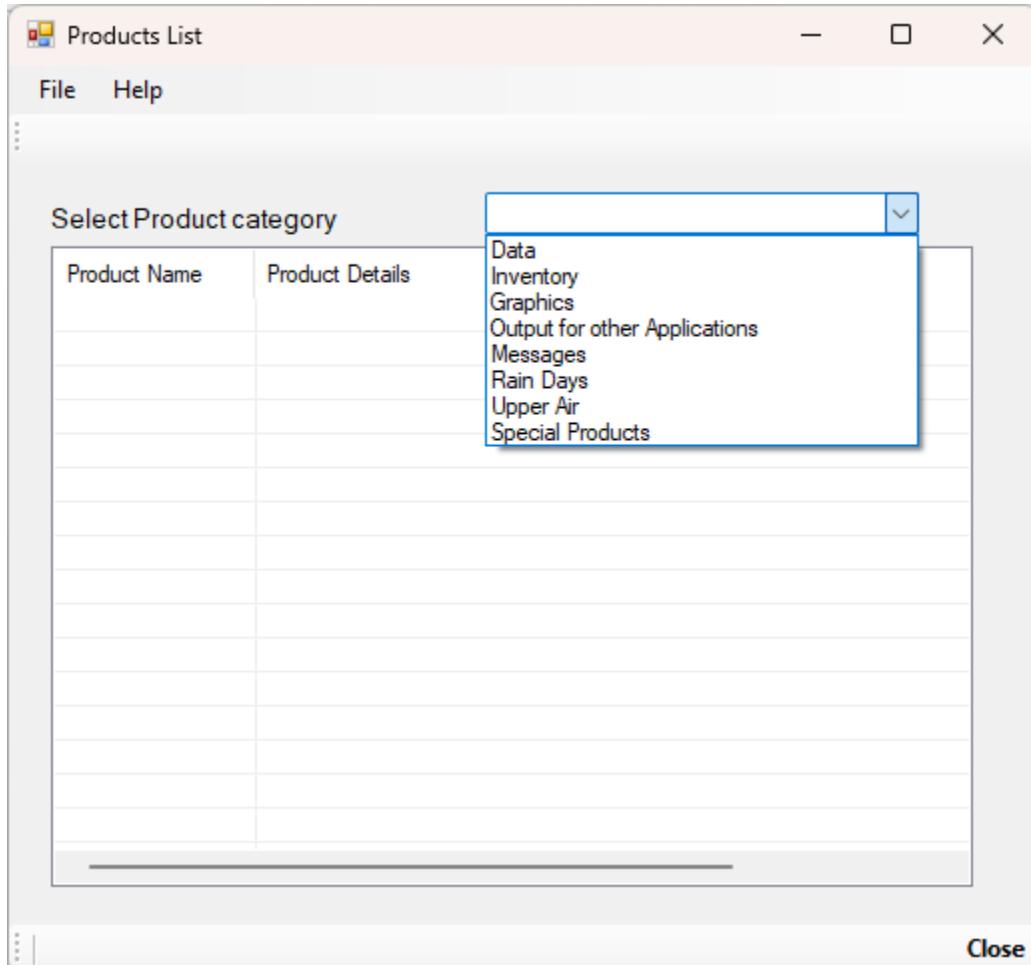


Figure 73: Products category list

The categories of the products are listed after clicking on the list box. When a product category is selected then all products under that category are then listed.

For instance if category **Data** is selected, the products list under that category will be as shown in Figure 74;

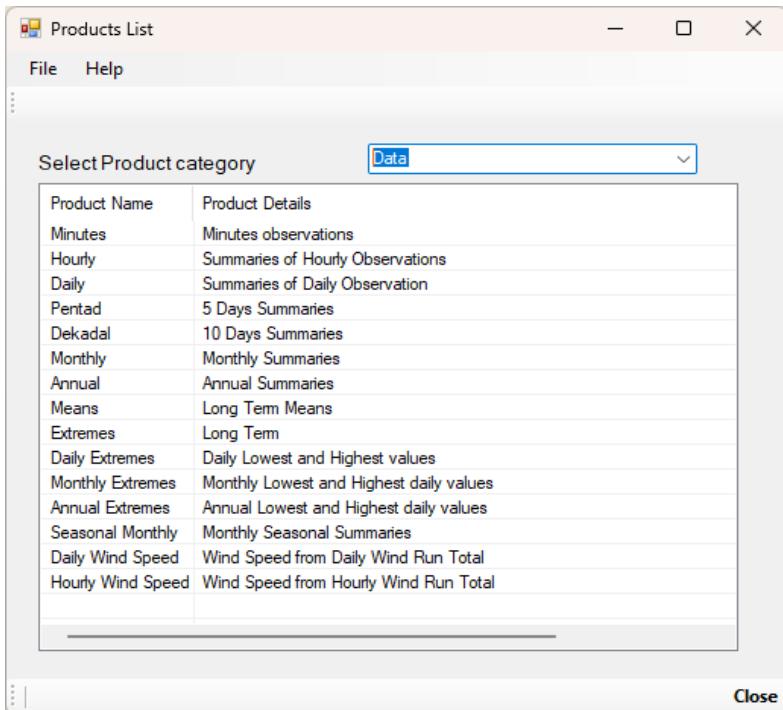


Figure 74: Data Product list

Details of different products type are listed in **Table 3**:

No	Products Category	Product Types	Details
Data		Minute	Minutes observations
		Hourly	Summary of hourly observations
		Daily	Summary of daily observations
		Pentad	5 Days summary
		Dekadal	10 Days summary
		Monthly	Monthly summaries
		Annual	Annual summaries
		Means	Long term means
		Extremes	Long term extremes (i.e. highest, lowest, dates of occurrences)
		Daily Extremes	Daily Lowest and Highest values
		Monthly Extremes	Monthly Lowest and Highest values
		Annual Extremes	Annual Lowest and Highest values
		Seasonal Monthly	Monthly Seasonal Summaries
		Daily Wind Speed	Wind Speed from Daily Wind Run Total
		Hourly Wind Speed	Wind Speed from Hourly Wind Run Total
Graphics		Windrose	Windrose picture
		TimeSeries	Time Series Chart
		Histograms	Histograms Chart
Inventory		Inventory	Details of Data Records
		Missing Data	Inventory of Missing Data
		Stations Records	Time Series Chart for total Observing Stations
		Yearly Elements Observed	Yearly Time Series Chart per Station
		Monthly Elements Observed	Monthly Time Series Chart per Station
Messages	CLIMAT	CLIMAT	CLIMAT Messages
Output for other Applications		Instat	Daily data for Instat
		Rclimdex	Daily data for Rclimdex
		CPT	Data for CPT
		GeoCLIM Monthly	Monthly Data for GeoCLIM

No	Products Category	Product Types	Details
		GeoCLIM Dekadal	Dekadal Data for Geoclim
		GeoCLIM Daily	Daily Data for Geoclim
		CDT Dekadal	Dekadal Data for CDT
		CDT Daily	Daily Data for CDT
		Climate Station	Data for Climate Station Tool
	Rain Days	Dekadal, Monthly and Annual	Counts of rain days with a specified threshold value
	Upper Air	Daily, Monthly and Annual	Summaries for upper air observations at standard levels
	Special Products	Mean Water Level	Hydrological Mean Water Level

Table 3: Climate Products.

Once the product type is selected, a dialog appears from where details of the desired product are specified. For instance if **Monthly** product is selected the dialog obtained is as shown in **Figure 75**.

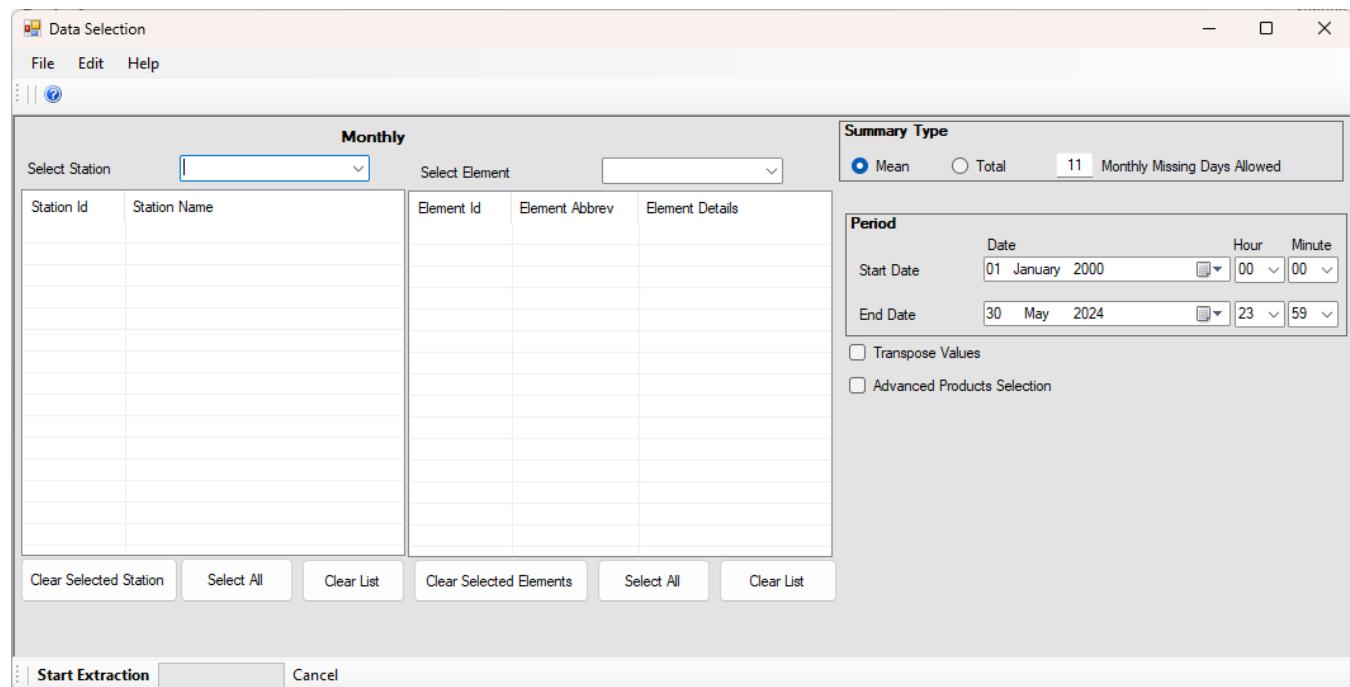


Figure 75: Data selection dialog

The **Station (s)** and **Element (s)** are selected from the respective list boxes each one at a time. Deletion of undesired selections can be carried out for one item or the entire list using the commands provided at the bottom of each box.

The relevant **Summary Type** and **Period** are then selected. The command “**Start Extraction**” is used to produce the selected product.

The **Period** specifies the time range for the selected product. Default period is from *01/01/2000* to the *current date*.

The “**Transpose Values**” box if checked, the products will be displayed in a horizontal layout where date components (days, dekads or months) become the column headers for the data values.

The “Advanced Products Select” box if checked, a set of stations under a specified group are selected and listed on the Stations panel. All those stations will then be included in the extracted product. The station groups are based on the metadata descriptions such as; *Type* (Qualifier), *Authority*, *Admin region*, *Drainage basin* and a *specified Geographical* location. For instance if under the Qualifier option SYNOPTIC is selected then all synoptic stations will automatically selected and listed on the Station view box

Figures 76(a), 76(b), 76(c) and 76(d) below give examples of data products output;

Monthly TMax and TMin

StationID	Lat	Lon	Elev	Year	Month	TMPMAX	TMPMIN
8635000	3.11	35.61	505	2000	1	36.66	20.65
8635000	3.11	35.61	505	2000	2	37.92	20.38
8635000	3.11	35.61	505	2000	3	37.78	24.01
8635000	3.11	35.61	505	2000	4	37.31	25.59
8635000	3.11	35.61	505	2000	5	36.53	25.99
8635000	3.11	35.61	505	2000	6	34.91	24.81
8635000	3.11	35.61	505	2000	7	34.07	24.29
8635000	3.11	35.61	505	2000	8	34.41	24.57
8635000	3.11	35.61	505	2000	9	35.58	25.03

Figure 76(a): Monthly products

Extreme Values

Station	Element	Lat	Lon	Elev	Lowest	Highest
ELDORET METEOROLOGICAL STATION	TMPMAX	0.53	35.28	2120	3.1	39
ELDORET METEOROLOGICAL STATION	TMPMIN	0.53	35.28	2120	2.1	23.1
EMBU METEOROLOGICAL STATION	TMPMAX	-0.5	37.45	1494	11.1	32.6
EMBU METEOROLOGICAL STATION	TMPMIN	-0.5	37.45	1494	8.7	19.8
MERU METEOROLOGICAL STATION	TMPMAX	0.08	37.65	1524	10.1	30.9
MERU METEOROLOGICAL STATION	TMPMIN	0.08	37.65	1524	6.8	21.1
NAROK METEOROLOGICAL STATION	TMPMAX	-1.1	35.86	1585	11.9	27.9
NAROK METEOROLOGICAL STATION	TMPMIN	-1.1	35.86	1585	7.3	18.5

Figure 76(b): Extreme Values

Extreme Maximum Values

Station	Element	Day	Month	Year	MaxValue
NAROK METEOROLOGICAL STATION	TMPMAX	3	1	1980	27.9
NAROK METEOROLOGICAL STATION	TMPMIN	5	1	1999	18.5
MERU METEOROLOGICAL STATION	TMPMAX	14	3	1986	30.9
MERU METEOROLOGICAL STATION	TMPMIN	28	2	1995	21.1
EMBU METEOROLOGICAL STATION	TMPMAX	23	3	2009	32.6
EMBU METEOROLOGICAL STATION	TMPMIN	12	4	1992	19.8
ELDORET METEOROLOGICAL STATION	TMPMAX	15	9	1977	39
ELDORET METEOROLOGICAL STATION	TMPMIN	14	8	1998	23.1

Figure 76(c): Extreme Maximum Values and Date of Occurrence

Extreme Minimum Values

Station	Element	Day	Month	Year	MinValue
NAROK METEOROLOGICAL STATION	TMPMAX	13	7	1997	11.9
NAROK METEOROLOGICAL STATION	TMPMIN	4	1	1999	7.3
MERU METEOROLOGICAL STATION	TMPMAX	19	7	1996	10.1
MERU METEOROLOGICAL STATION	TMPMIN	24	8	2001	6.8
EMBU METEOROLOGICAL STATION	TMPMAX	9	8	2010	11.1
EMBU METEOROLOGICAL STATION	TMPMIN	29	8	1992	8.7
ELDORET METEOROLOGICAL STATION	TMPMAX	29	2	1988	3.1
ELDORET METEOROLOGICAL STATION	TMPMIN	5	1	2000	2.1

Figure 76(d): Extreme Minimum Values and Date of Occurrence

10.2 Data Products for Other Applications

10.2.1 Data for CPT

CPT-PRECIP-Mar-May.txt - Notepad					
File	Edit	Format	View	Help	
STN	67965050	67991020	67755030		
67775050		67774010			
LAT	-20.02	-22.22	-17.62	-17.92	-17.83
LON	28.62	30.00	27.33	31.10	31.02
1961	-999.0	-999.0	-999.0	-999.0	224.0
1962	-999.0	-999.0	-999.0	-999.0	89.8
1963	-999.0	-999.0	-999.0	-999.0	101.8
1964	-999.0	-999.0	-999.0	-999.0	19.9
1965	-999.0	-999.0	-999.0	-999.0	27.5
1966	-999.0	-999.0	-999.0	-999.0	226.4
1967	-999.0	-999.0	-999.0	-999.0	110.1
1968	-999.0	-999.0	-999.0	-999.0	59.3
1969	-999.0	-999.0	-999.0	-999.0	273.8

Figure 77: Output data for CPT

10.2.2 Data for GEOCLIM

Country	Name	Source	Latitude	Longitude	Elevation	ID	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Zimbabwe	HARARE BELVEDERE	-999	-17.83	31.02	1471	67774010	1961	25.31	25.94	26.77	26.80	26.40	22.51	21.43	22.49	27.60	30.46	25.66	27.31
Zimbabwe	HARARE BELVEDERE	-999	-17.83	31.02	1471	67774010	1962	26.14	26.77	26.27	25.52	22.39	24.02	21.83	24.79	27.79	30.57	27.33	24.04
Zimbabwe	HARARE BELVEDERE	-999	-17.83	31.02	1471	67774010	1963	25.94	23.64	25.39	24.14	22.19	21.10	22.41	24.26	27.07	28.96	27.48	25.92
Zimbabwe	HARARE BELVEDERE	-999	-17.83	31.02	1471	67774010	1964	25.76	26.68	28.68	26.94	23.06	21.72	20.16	23.20	26.81	29.29	27.44	25.19
Zimbabwe	HARARE BELVEDERE	-999	-17.83	31.02	1471	67774010	1965	24.92	26.68	26.06	26.12	23.02	22.00	22.01	24.22	25.38	26.75	27.07	27.29
Zimbabwe	HARARE BELVEDERE	-999	-17.83	31.02	1471	67774010	1966	27.25	25.21	25.68	24.60	23.78	21.24	21.95	24.48	27.31	29.23	28.46	27.73
Zimbabwe	HARARE BELVEDERE	-999	-17.83	31.02	1471	67774010	1967	25.72	25.70	25.64	26.51	23.55	21.87	19.96	22.42	25.95	28.93	28.11	27.01
Zimbabwe	HARARE BELVEDERE	-999	-17.83	31.02	1471	67774010	1968	28.32	25.96	27.03	25.79	24.45	21.15	22.91	25.46	27.62	30.86	25.15	26.22
Zimbabwe	HARARE BELVEDERE	-999	-17.83	31.02	1471	67774010	1969	25.94	27.34	25.55	25.97	23.18	22.35	21.62	23.72	27.39	27.98	28.39	24.68
Zimbabwe	HARARE BELVEDERE	-999	-17.83	31.02	1471	67774010	1970	27.07	26.74	27.35	25.56	25.36	21.72	23.13	24.93	29.06	29.25	26.93	26.88

Figure 78: Output data for GEOCLIM

10.2.3 Data for Instat

1	Y1961	Y1962	Y1963	Y1964	Y1965	Y1966	Y1967	Y1968	Y1969	Y1970
41	35.8	0	0	0	0.3	0	0	0	0	2.3
42	0	3.6	8.1	0	0	1.8	15.5	14.2	0	0
43	7.9	6.4	19.6	6.4	0	5.3	19.6	4.3	0	0
44	3.6	4.3	53.8	7.4	1.5	5.3	9.7	6.4	0	0
45	0	0	9.4	3	12.4	8.6	22.9	4.6	1.3	0
46	63.2	24.4	11.7	0	3	0	3.6	4.8	18.3	0
47	11.7	12.4	8.9	46.5	0	0	49.3	2	7.1	0.3
48	0	2.3	102.1	2.3	0	1	1	1	0	3
49	0	1.3	3.8	0	0.5	0	0	27.2	0	10.7
50	0	12.7	0	0	1.8	3.6	0	0	0	0
51	0	0	0.5	58.4	0	57.2	1	0	1	0
52	0	1	18.8	1	0	10.9	0	0	0	0
53	0	1.5	15.5	0	0	7.4	0	0	3.3	0
54	2	5.8	0.3	0	0	15	0	0	5.1	0
55	26.2	0	0.8	0	0	10.9	0.3	0	0	0
56	0.5	7.9	3.8	0	0	1.8	0.3	0	0	6.1
57	1	0	24.4	0	0	26.2	18	0	4.6	0.5
58	0	3	0.3	0	2.8	18	0.5	0	0	0.5
59	16.8	7.9	0.3	0	0	12.2	57.9	0	0	0.5
60	8.9	0	0	0	0	6.1	34.8	0.3	0	0
61	9988	9988	9988	0	9988	9988	9988	0	9988	9988

Figure 79: Output data for Instat

10.2.4 Data for Rclimdex

67774010_Rclimdex.txt - Notepad					
File	Edit	Format	View	Help	
1962	1	1	1.50	27.90	16.10
1962	1	2	0.00	26.70	16.20
1962	1	3	0.00	27.90	13.10
1962	1	4	0.00	28.40	12.80
1962	1	5	0.00	29.60	14.00
1962	1	6	0.00	29.20	15.50
1962	1	7	0.50	28.40	15.20
1962	1	8	5.30	28.40	17.00
1962	1	9	0.00	28.70	16.10
1962	1	10	30.20	27.20	16.30
1962	1	11	31.20	27.40	16.00
1962	1	12	9.10	25.10	16.20
1962	1	13	33.30	23.10	16.30
1962	1	14	15.70	23.60	16.30
1962	1	15	2.50	25.50	15.80
1962	1	16	2.30	26.80	17.80
1962	1	17	6.10	23.20	16.10
1962	1	18	0.80	25.70	16.30
1962	1	19	0.00	27.40	17.40
1962	1	20	3.80	29.10	16.90
1962	1	21	0.00	27.50	16.40
1962	1	22	0.80	24.00	14.40
1962	1	23	1.30	22.70	13.90
1962	1	24	13.00	21.40	15.70
1962	1	25	3.60	25.30	15.90
1962	1	26	11.90	25.30	16.70
1962	1	27	17.50	26.20	15.70
1962	1	28	2.30	22.30	16.30
1962	1	29	1.00	23.80	14.70
1962	1	30	1.80	25.10	15.40
1962	1	31	0.00	27.30	17.10

Figure 80: Output data for Rclimdex

10.3 Windrose Plot

Windrose is plotted after selecting “**Graphics**” from the list of climate products category shown in Figure 73 above;

The next step is to choose “**Windrose**” from the list, followed by the station. It is recommended that only one station is selected for each windrose plot. The system selects the wind speed and direction elements automatically. Specify the period range for the data to be used for the windrose plot.

Click “**Start Extraction**” to generate the windrose plot as shown in Figure 81.

Before the windrose picture is generated, a message pops up with the question, “*Is the wind data from AWS?*” This is because wind data from AWS has a different element code from that of manned station.

Climsoft uses a third party application called WRPlot to produce the windrose picture. This application is a free software but requires a licence that must be renewed annually.

It is important to check that WRPlot was installed as part of the Climsoft installation and the licence for the application was registered. If WRPlot has not yet been installed, it can be installed using the setup file and the first licence file available in the “**Bin**” subfolder of the Climsoft installation folder.

To renew the license visit the Lakes Environmental website at <https://www.weblakes.com/products/wrplot/registration.html>. Once you register your details and apply for the activation code, it will be sent to your email shortly.

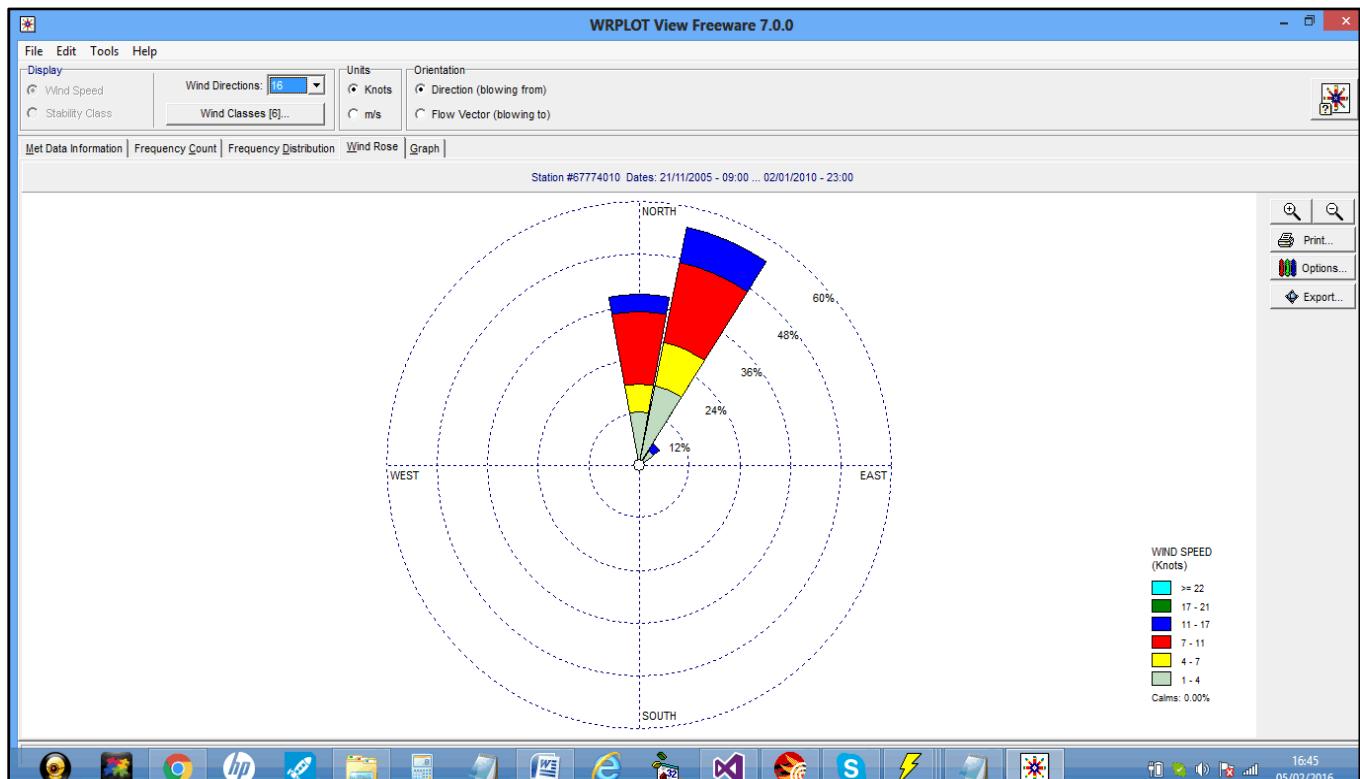


Figure 81: Windrose plot

10.4 Plotting Charts

Simple and basic charts can be plotted through the charts menu. There are two types of charts that can be produced namely, **Time Series** and **Histograms**.

The charts are produced through the same procedures used in other products. It is recommended that each chart be plotted for data from 1 station only.

After Extracting data required for the chart, a plotting dialog will be displayed from where the required chart details can be provided.

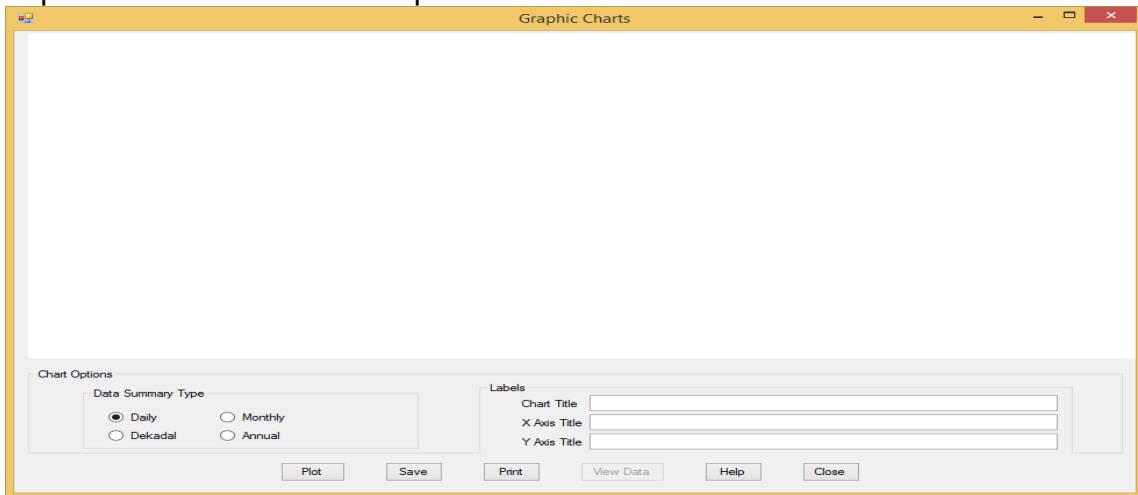


Figure 82: Charts Plotting Dialog

For example to plot a Histogram chart, for monthly temperatures (Tmax and Tmin) from Wilson Airport, Kenya for the year 1988 do the following:

- (i) Select the option **Monthly**,
- (ii) Click the button **Plot** and obtain the chart below.
- (iii) The plotted chart can be formatted for **Labels**, **Colours** and **Axis Interval** values as shown in Figure 83.

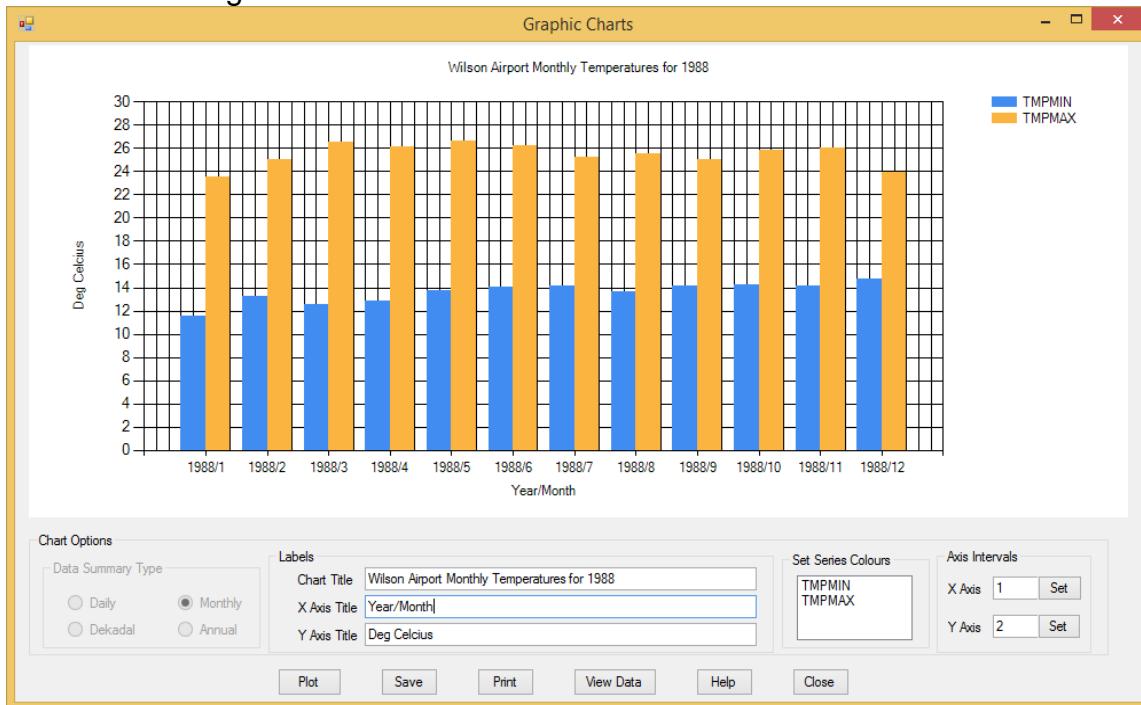


Figure 83: Temperatures Histograms

Similarly a Histogram chart for daily rainfall from Wilson Airport, Kenya for the period 2005-2014 can be plotted as below.

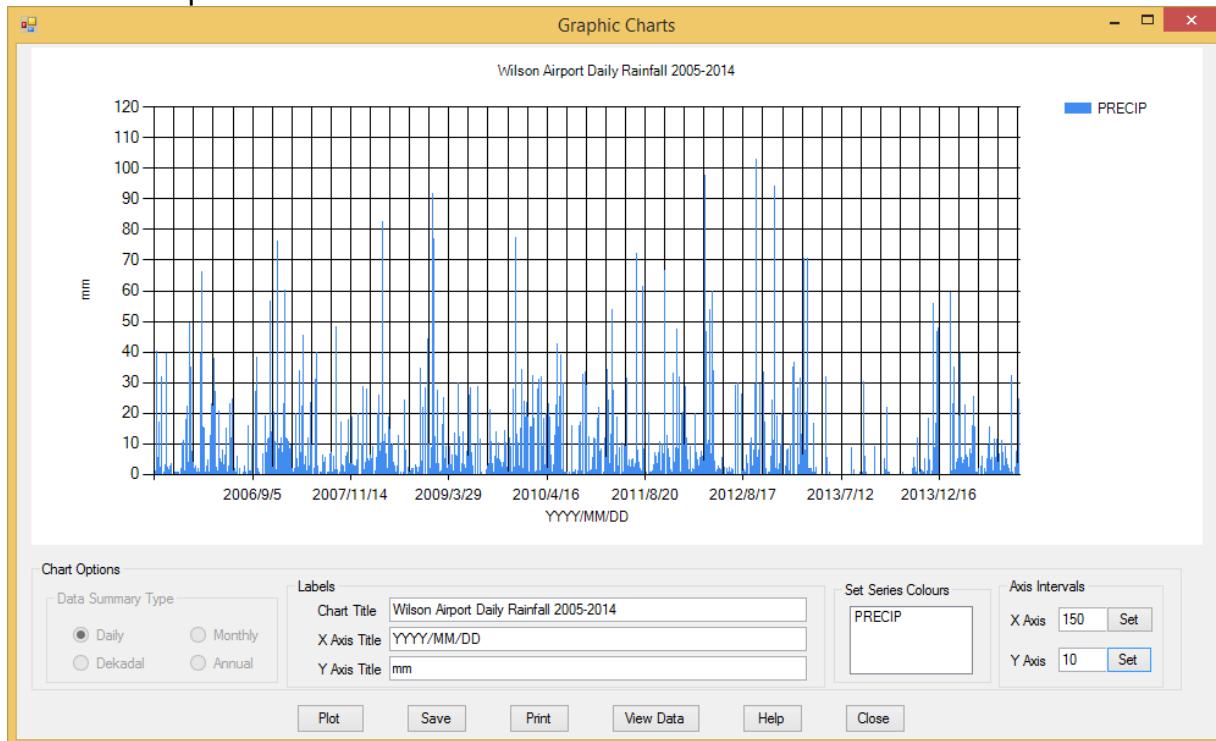


Figure 84: Rainfall Histogram

Managing the Chart dialog

In order to have a presentable chart that can be used in the intended purposes, the following formatting can be done:

Labels

Labels that clearly describe the chart should be typed in the correct boxes. They will appear on the chart area as the typing continuous;

Series colours

Clicking on any of the listed series names a colour palate dialog appears from where a suitable colour can be selected.

Axis Intervals

The suitable intervals for both X-Axis and Y-Axis should be entered into the appropriate boxes so that the data is clearly interpreted.

Commands

Save - Saves the chart picture as a file in the desired graphic format e.g., JPEG, PNG, WMF etc.

Print - Prints the chart picture through the default printer,

View data – Click to view and export the data used in plotting the chart

Help - Click to learn more about the current chart,

Close – Closes the dialog

10.5 Inventory Products

The inventory product retrieves details of the climatic elements that have been recorded at a particular station. When you click on the menu item **Products -> Inventory** or the icon **Climate Products -> Inventory** on the **Welcome** dialog, the following dialog is displayed:

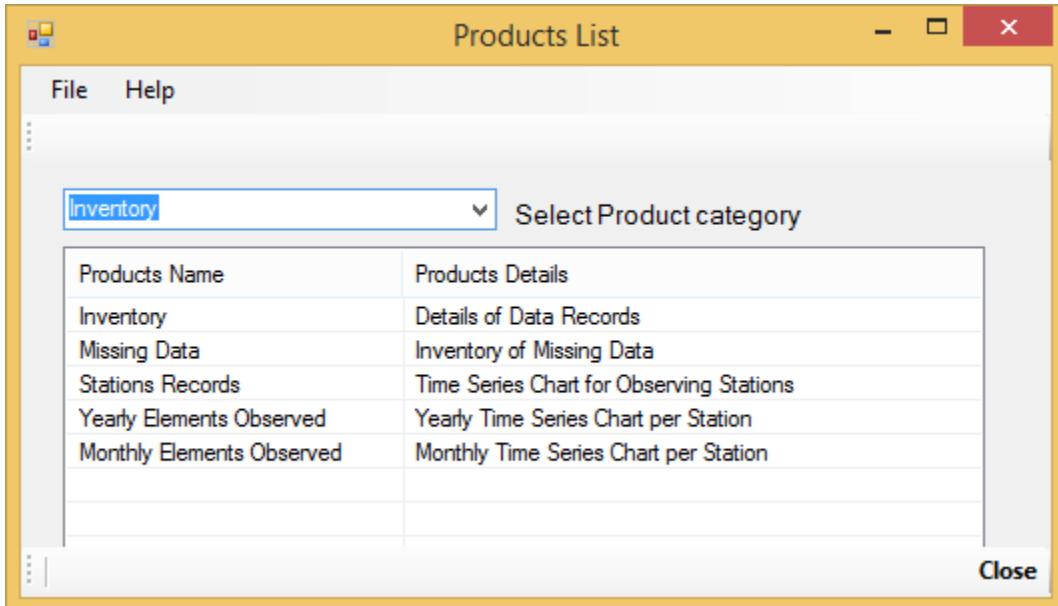


Figure 85: Inventory Products dialog

There are 5 types of outputs that can be obtained from the **Inventory** product. They are;

- (i) **Details of Data Records** - Gives a tabulated output where a missing observation is represented by **M** and available observation by **X**. The procedure searches the database for the appropriate information and produces an Excel Spreadsheet as shown in **Figure 87**.
- (ii) **Inventory of Missing Data** – Gives the total number of missing observation records for a selected parameter in a given period of time. The output is displayed in graphical form as shown in **Figure 87a**.
- (iii) **Time Series Chart for Observing Stations** – Produces a time series chart for yearly total stations whose data has been archived in the database as shown in **Figure 87b**.
- (iv) **Yearly Elements Observed** – Produces a time series chart for total observations per year for the selected elements from a given station. See **Figure 87c**
- (v) **Monthly Elements Observed** – Produces a time series chart for total observations per month for the selected elements from a given station. See **Figure 87d**.

To produce any of these inventories select the required station(s) and element(s) from their respective list boxes as shown in **Figure 87e**.

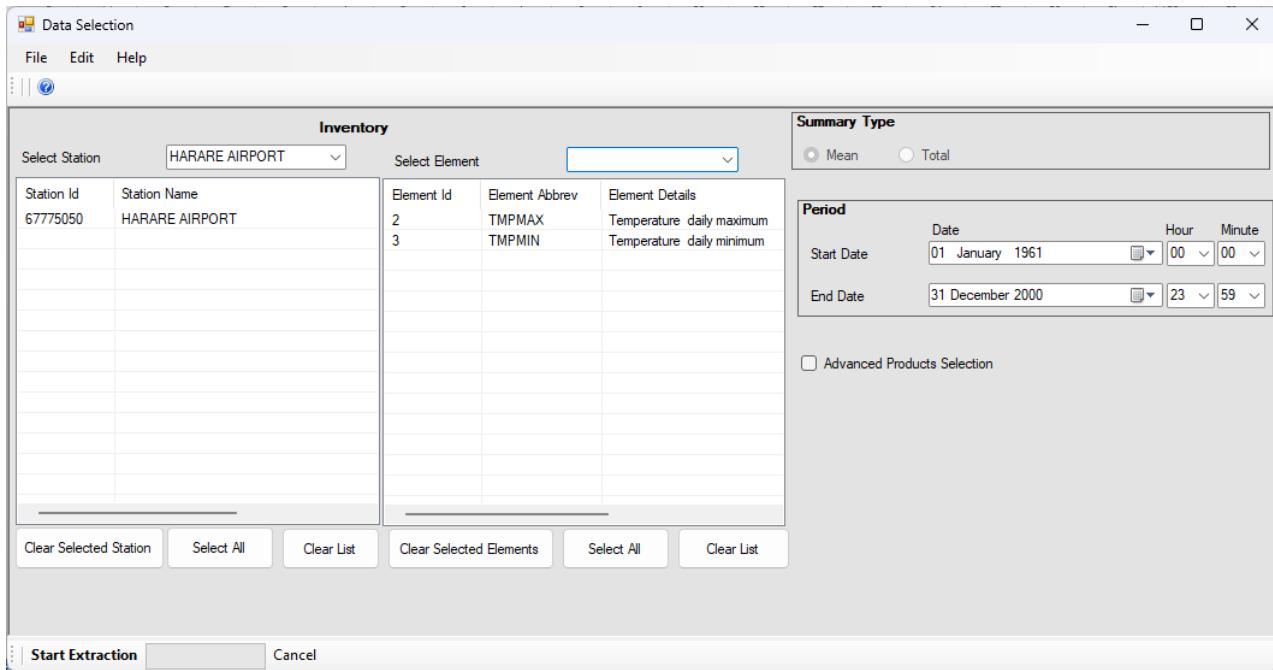


Figure 86: Input selection dialog for Inventory Products

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	ALAM	AN	AO	AP
1	Station_ID	Station_Name	Element_Code	Lat	Lon	Elev	Year	Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Available	Missing
2	67775050	HARARE AIRPORT		2	-17.92	31.1	1497	2000	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	31	0						
3	67775050	HARARE AIRPORT		2	-17.92	31.1	1497	2000	2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	29	0						
4	67775050	HARARE AIRPORT		2	-17.92	31.1	1497	2000	3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	31	0						
5	67775050	HARARE AIRPORT		2	-17.92	31.1	1497	2000	4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	30	0						
6	67775050	HARARE AIRPORT		2	-17.92	31.1	1497	2000	5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	31	0						
7	67775050	HARARE AIRPORT		2	-17.92	31.1	1497	2000	6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	30	0						
8	67775050	HARARE AIRPORT		2	-17.92	31.1	1497	2000	7	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	31	0						
9	67775050	HARARE AIRPORT		2	-17.92	31.1	1497	2000	8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	31	0						
10	67775050	HARARE AIRPORT		2	-17.92	31.1	1497	2000	9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	30	0						
11	67775050	HARARE AIRPORT		2	-17.92	31.1	1497	2000	10	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	31	0						
12	67775050	HARARE AIRPORT		2	-17.92	31.1	1497	2000	11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	30	0						
13	67775050	HARARE AIRPORT		2	-17.92	31.1	1497	2000	12	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	31	0						
14	67775050	HARARE AIRPORT		3	-17.92	31.1	1497	2000	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	31	0						
15	67775050	HARARE AIRPORT		3	-17.92	31.1	1497	2000	2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	29	0						
16	67775050	HARARE AIRPORT		3	-17.92	31.1	1497	2000	3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	31	0						
17	67775050	HARARE AIRPORT		3	-17.92	31.1	1497	2000	4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	30	0						
18	67775050	HARARE AIRPORT		3	-17.92	31.1	1497	2000	5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	31	0						
19	67775050	HARARE AIRPORT		3	-17.92	31.1	1497	2000	6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	30	0						
20	67775050	HARARE AIRPORT		3	-17.92	31.1	1497	2000	7	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	31	0						
21	67775050	HARARE AIRPORT		3	-17.92	31.1	1497	2000	8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	31	0						
22	67775050	HARARE AIRPORT		3	-17.92	31.1	1497	2000	9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	30	0						
23	67775050	HARARE AIRPORT		3	-17.92	31.1	1497	2000	10	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	31	0						
24	67775050	HARARE AIRPORT		3	-17.92	31.1	1497	2000	11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	30	0						
25	67775050	HARARE AIRPORT		3	-17.92	31.1	1497	2000	12	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	31	0						

Figure 87: Inventory of Data Records

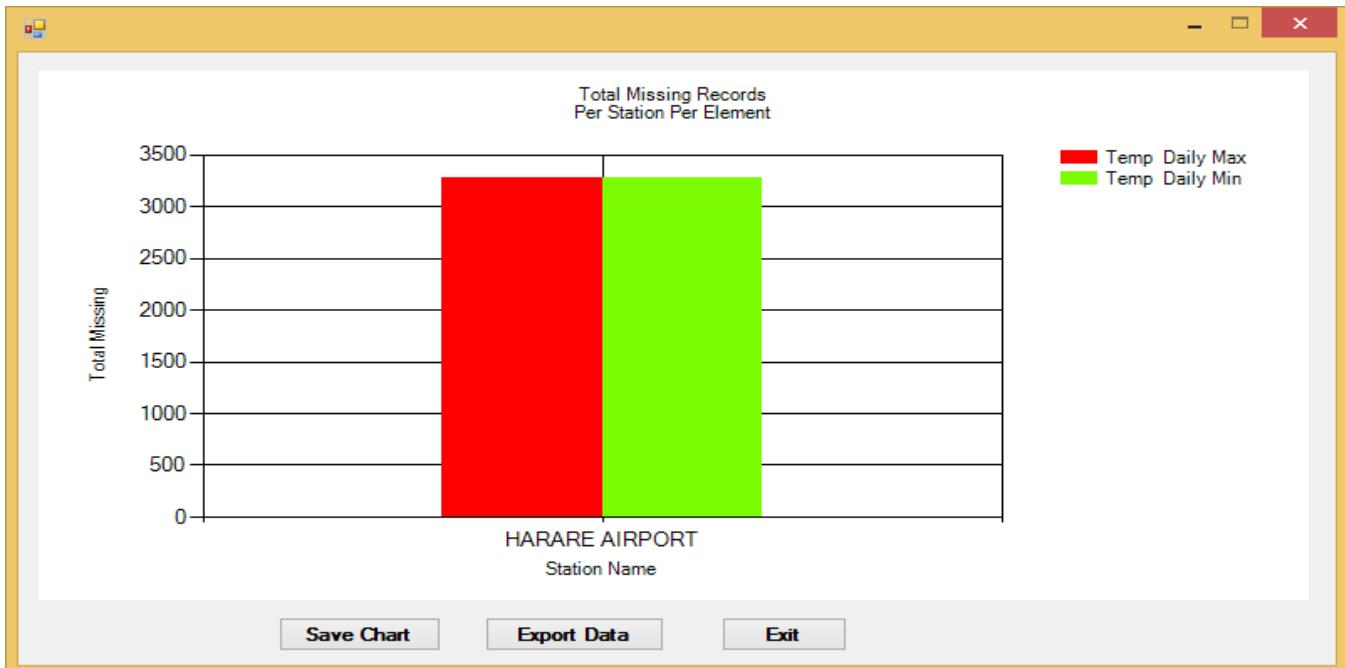


Figure 87a: Total missing data records

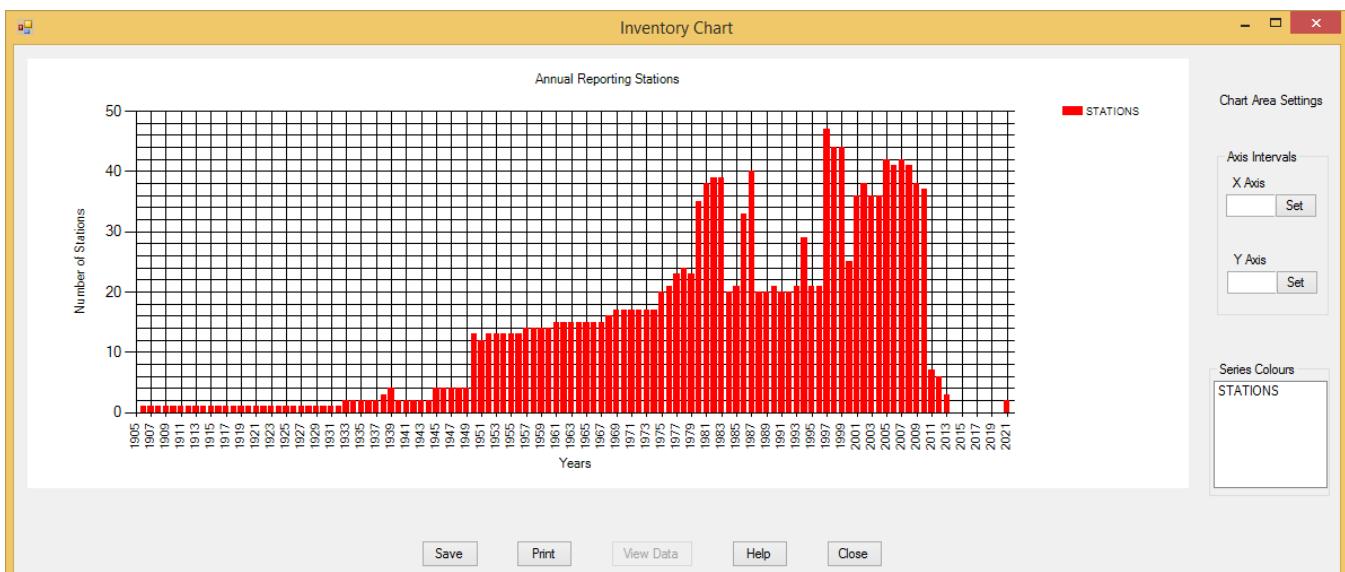


Figure 87b: Total annual reporting stations

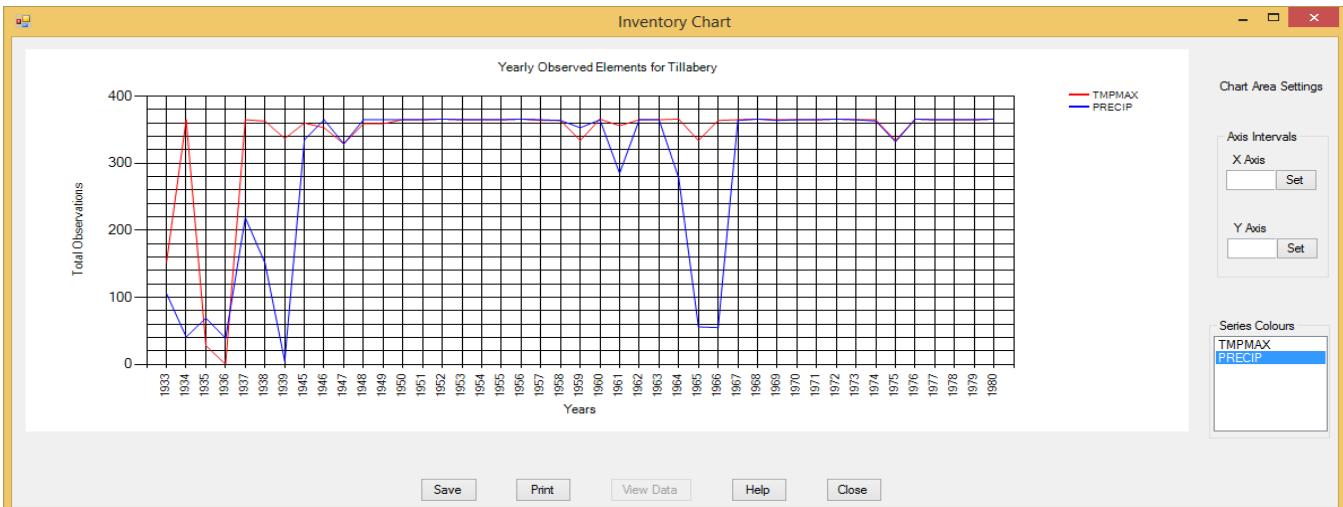


Figure 87c: Total annual observed station elements

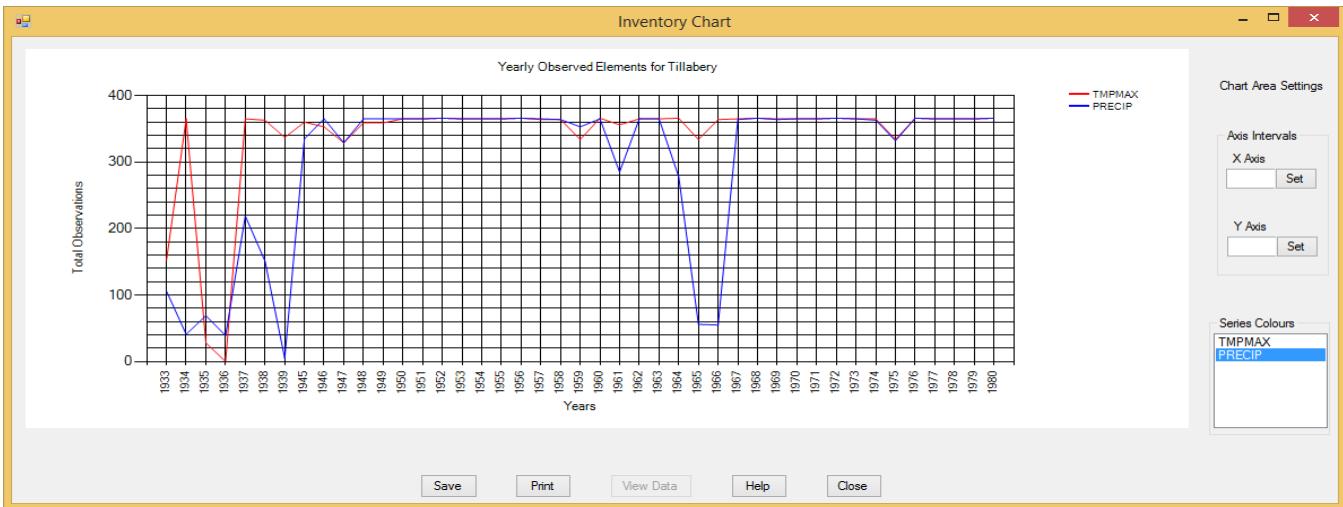


Figure 87d: Monthly observed station elements

10.6 Products from Upper Air Observations

Dialog for products from Upper Air observations is obtained as follows:

From the **Welcome** Dialog, click on the icon **Climate Products** or select **Products** on the **main menu** to obtain the products category dialog as shown in **Figure 73**. From the listed items Click on **Upper Air** to obtain the list of the available Upper Air data summaries as shown in **Figure 88**.

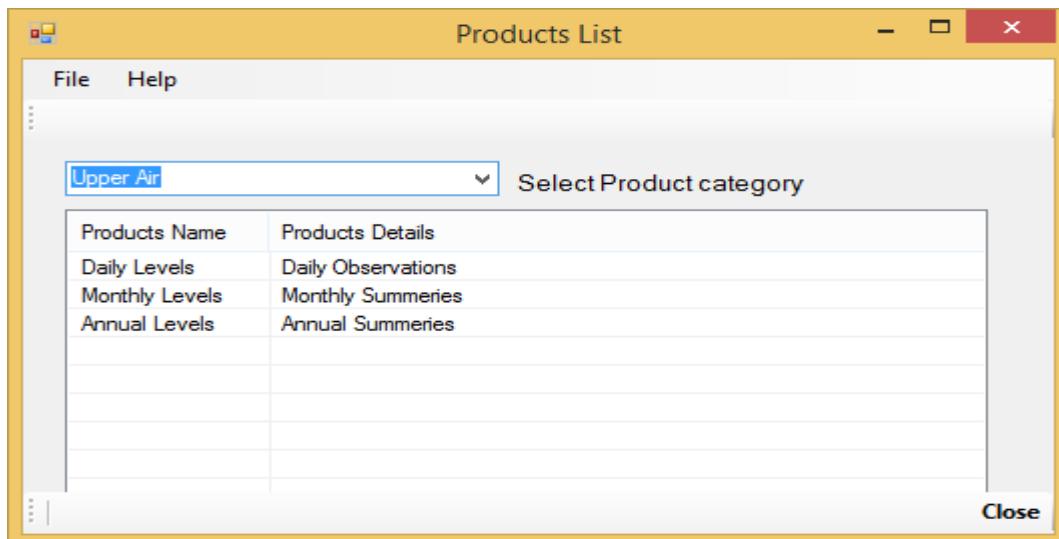


Figure 88: List of Upper Air data summaries

If any of listed products say **Monthly Levels** is selected (click) the following dialog is obtained.

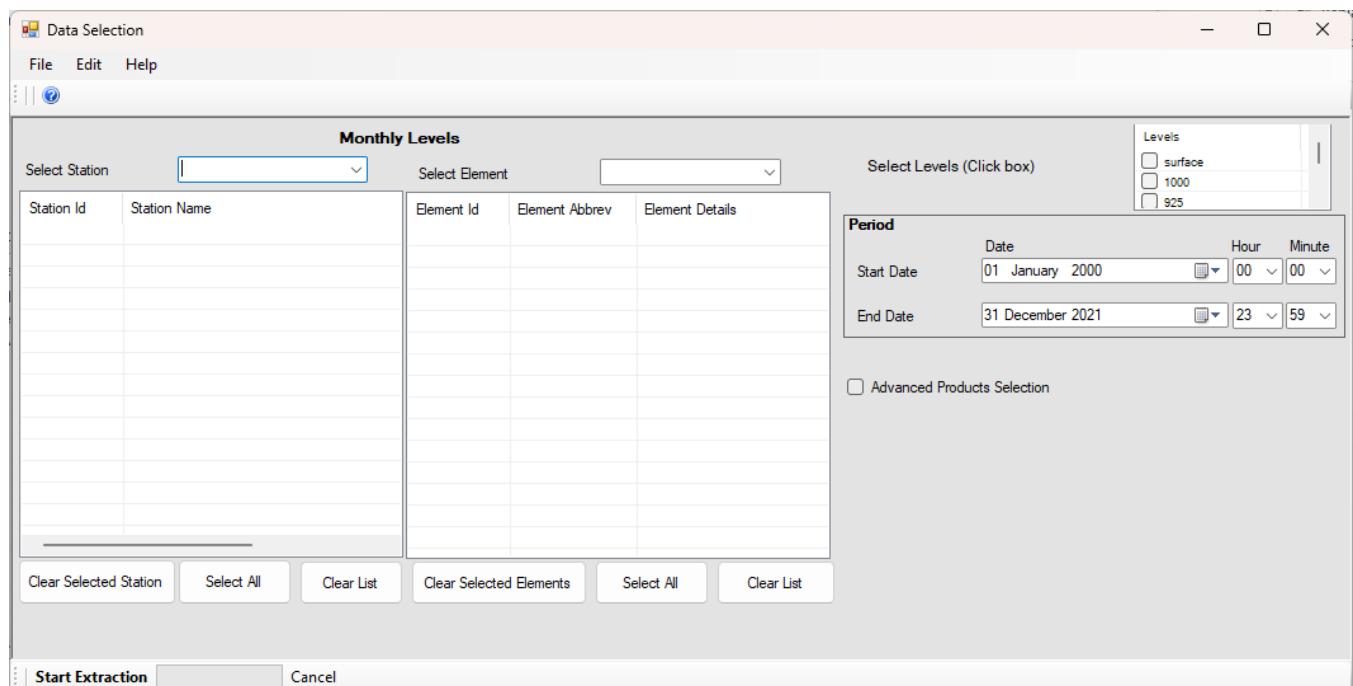


Figure 88a: Dialog for Monthly Upper Air data summaries

The dialog shown in **Figure 88a** is similar to those for surface observations but with an additional list of upper air standard pressure levels. Any number of levels may be selected as necessary.

Note that without selecting any Level no product will be obtained.

10.7 CLIMAT Messages

CLIMAT message can be encoded from quality controlled data that has been uploaded to the final table of Climsoft database.

Dialog for encoding CLIMAT messages is obtained as follows:

From the **Welcome** dialog follow the menu

Climate Products => Messages => CLIMAT. The dialog shown in Figure 88b is then obtained

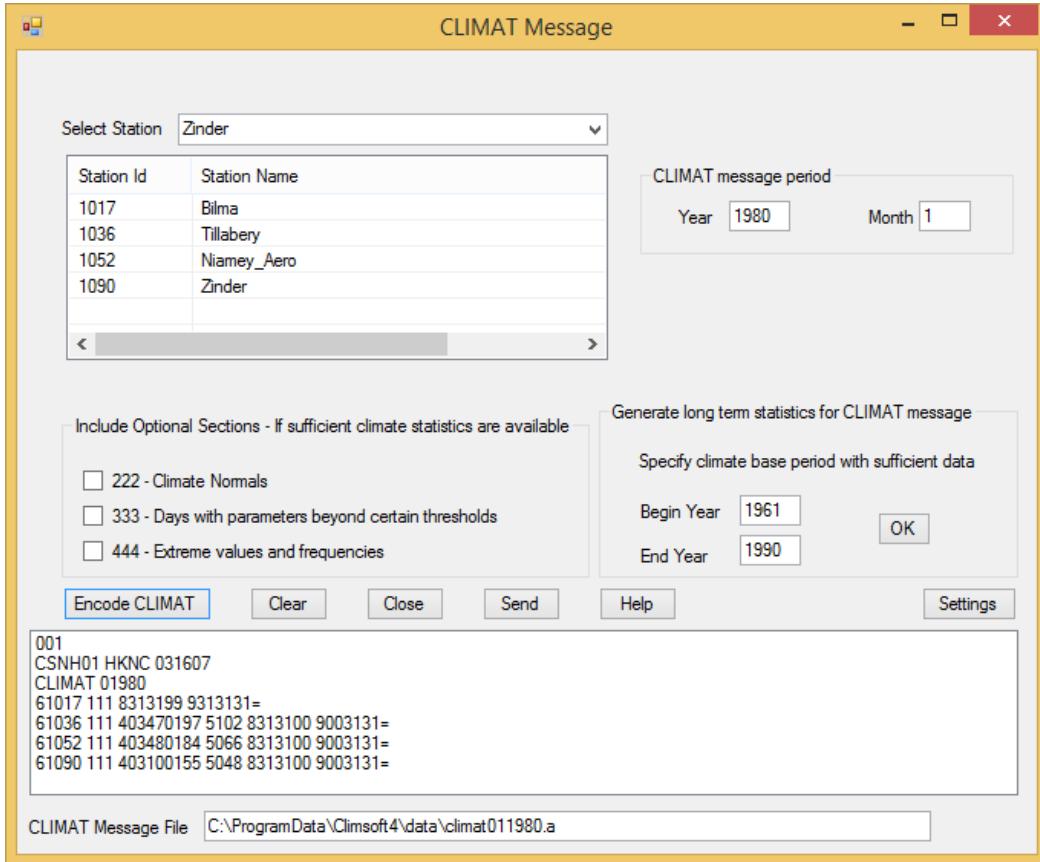


Figure 88b: Dialog for encoding CLIMAT message

The dialog is used as follows:

- (i) **Select Stations** – Stations whose CLIMAT message is required should be selected from the drop down list by clicking one station at a time. A station can also be selected by entering its *station id* then pressing ENTER key. The selected stations will be listed in the view list. Note that only stations with WMO identifications will be available for selection.
- (ii) **CLIMAT message period** – When the dialog opens the period is set to the previous month of the current date. It is assumed that data for the previous month has been processed and ready for encoding. However, month for the required message should be correctly set.
- (iii) **Climate statistics base period** – *Begin Year* and *End Year* of the period with sufficient data to compute the climate statistics should be entered. A minimum of 30 years and the latest period defined by WMO is recommended. On Clicking **OK** button the statistics for the selected period will be computed and stored in the database. It's not necessary to compute them again unless base period has been updated.
- (iv) **Optional Sections** – If required any of these sections can be included in the message when selected. Note **Section 222** requires that sufficient data to compute normals for the specified base period is available.
- (v) **Command buttons**
 - i. **Encode CLIMAT** – Starts the encoding process according to the selections made.

- ii. **Clear** – Clears all the input including the produced CLIMAT message
- iii. **Close** – Closes the dialog
- iv. **Send** – Sends the the encoded message to the message switching server for GTS transmission.
- v. **Help** – Gives a guide on how to use the dialog
- vi. **Settings** – Opens the dialog through where the required settings for CLIMAT message encoding are done. Only users with administrative privileges can open and operate the Settings dialog
- (vi) **CLIMAT Message File** – Encoded CLIMAT message will be saved in the indicated file. It's a text file that can be sent via email as an attachment or its text copied and pasted into the message body of and email.
- (vii) **CLIMAT message encoding settings** – The Settings button opens the Settings dialog as shown in **Figure 88c**. The dialog has two tabs; **Parameter** and **FTP** for setting the element codes for data used in CLIMAT encoding and details of the server where the mesage will be sent respectively. The dialogs for these settings are easy to follow

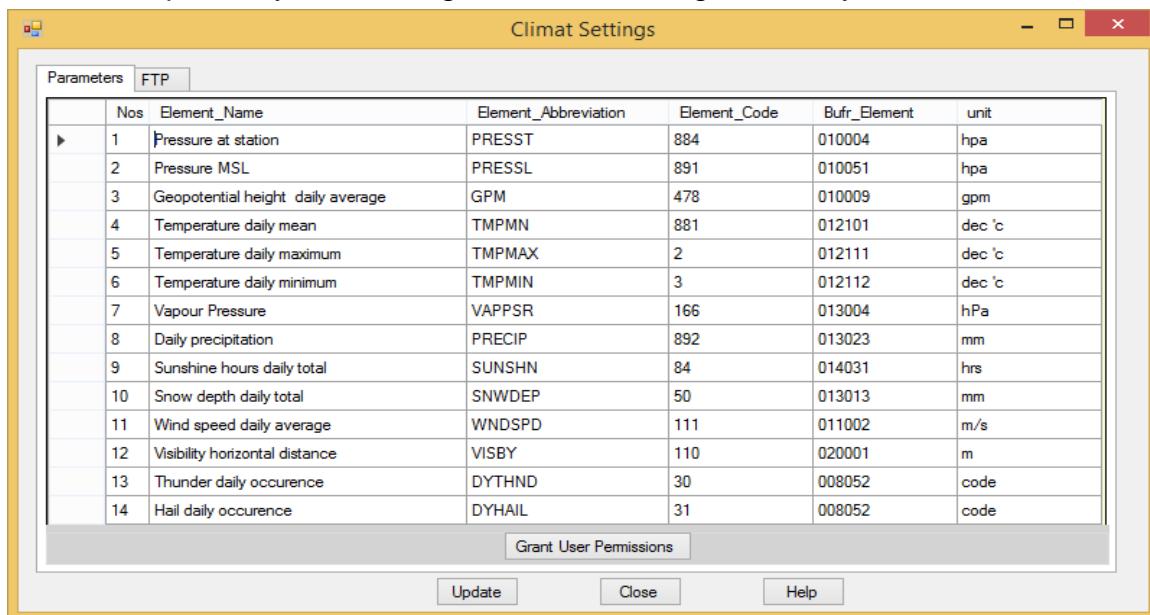


Figure 88c: CLIMAT message **Parameters** (elements) settings

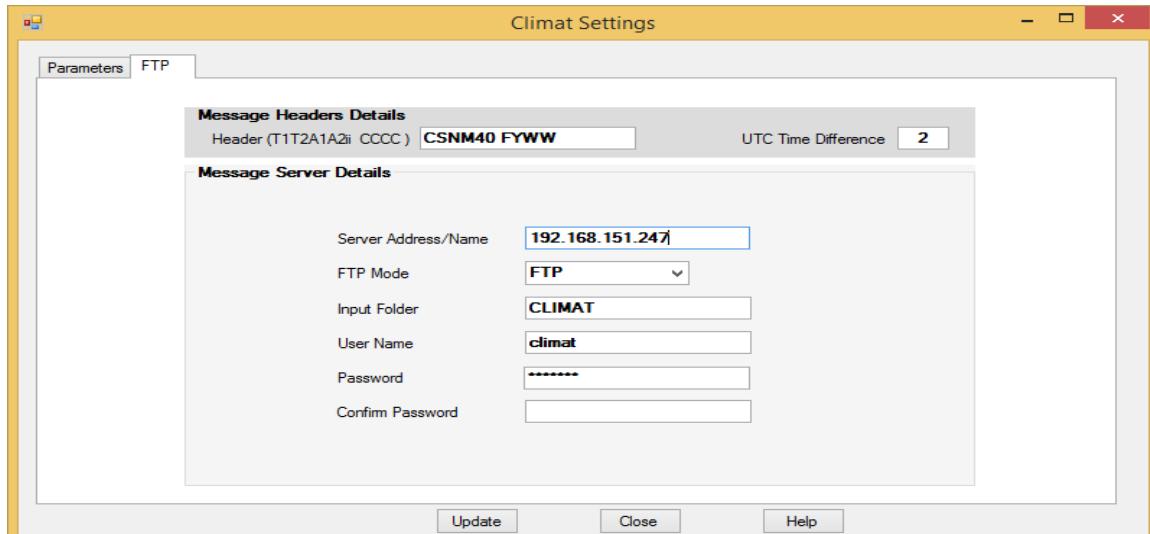


Figure 88d: CLIMAT message **FTP** settings

11. AWS Real Time Data Operations

This operation starts from the **Welcome** form dialog. Click the icon **AWS Real Time Processing** to obtain the main dialog for Real Time Automatic Weather Station (AWS) data operations (Figure 89).

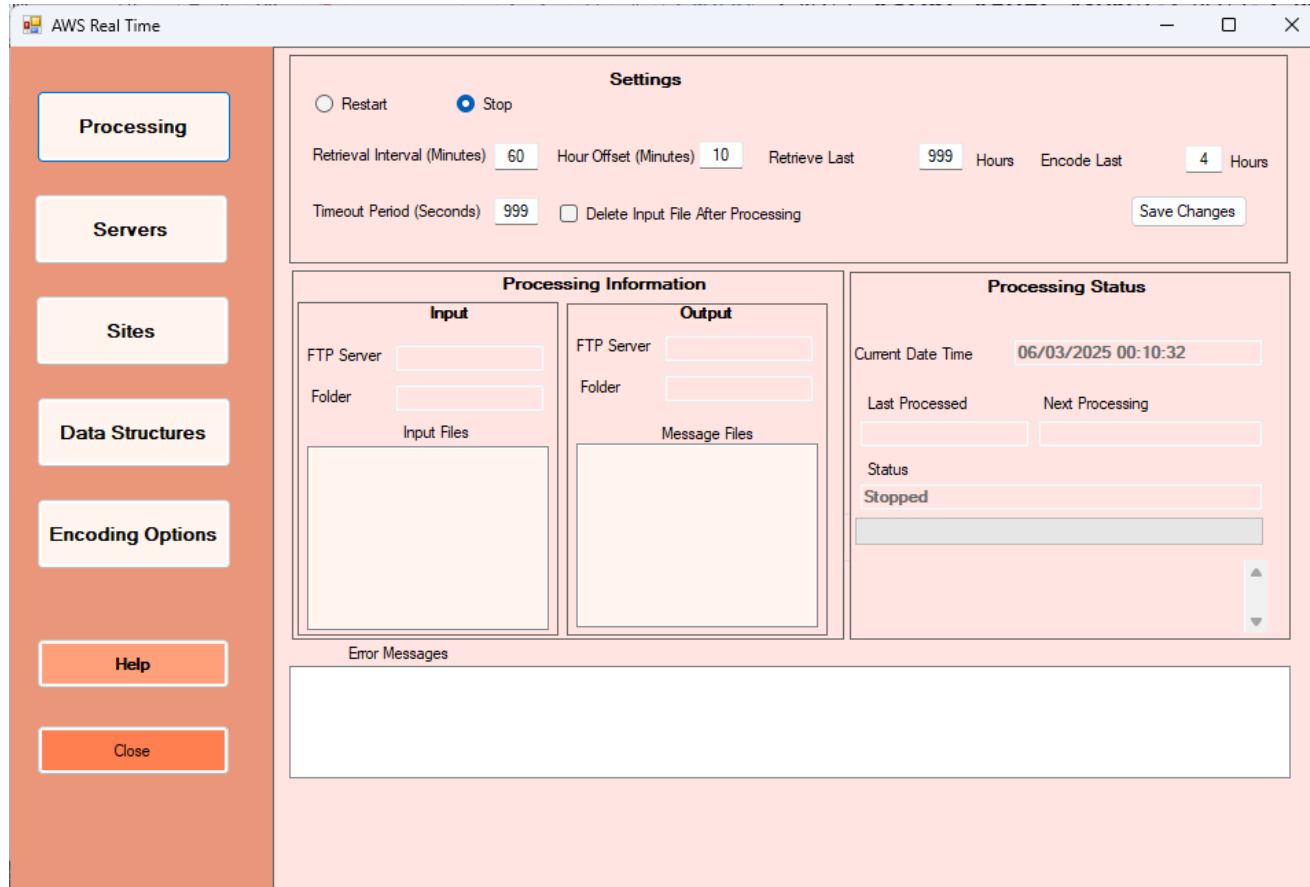


Figure 89: AWS real time processing settings dialog

Follow the steps below to configure Climsoft for automatic processing AWS data.

11.1 Server Settings

Click the command “**Servers**” then **Base Station** tab to obtain dialog shown in Figure 90.

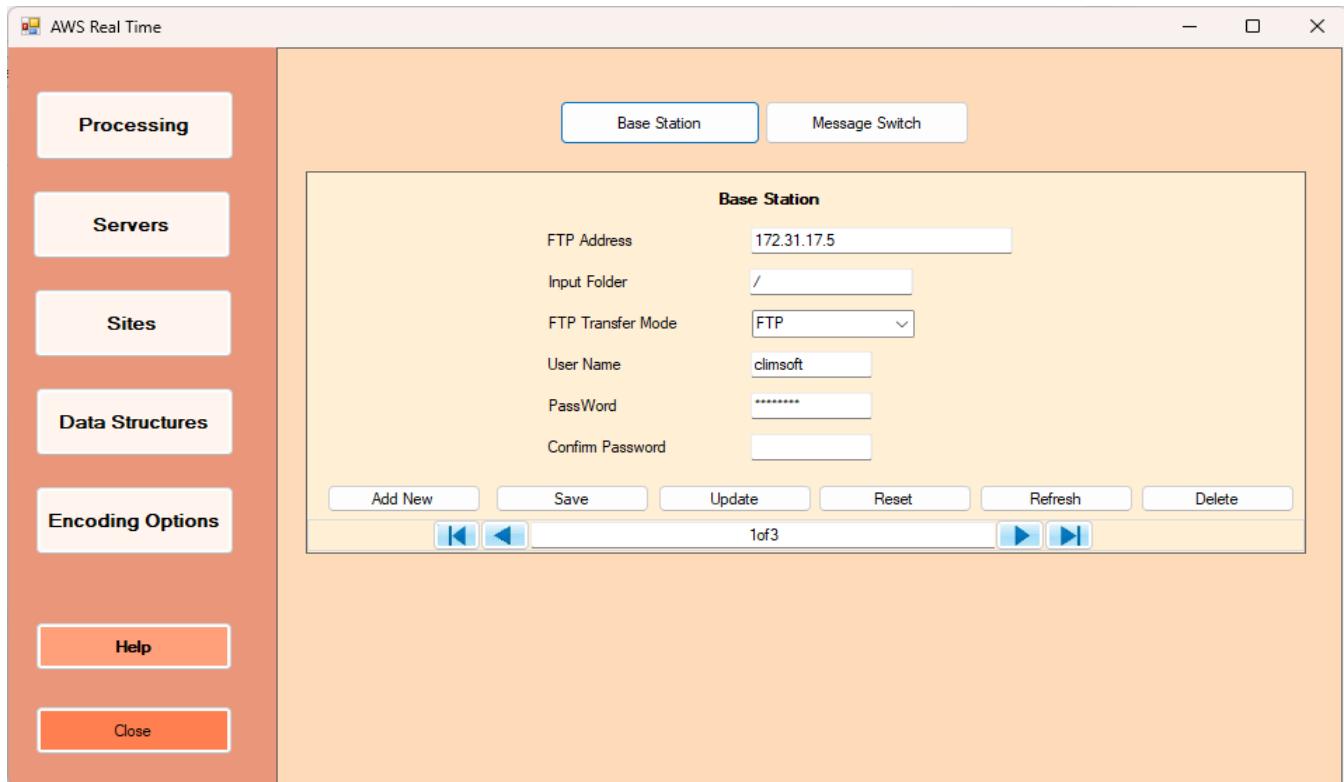


Figure 90: AWS server settings

These settings are for the servers that play the roles of **AWS base station** and **message switching system** that connects to the Global Telecommunication System (GTS). The commands “**Base Station**” and “**Message Switching**” are used to switch between the two server settings. Details required should be obtained from the respective servers’ administrators and then entered. Multiple servers can be configured where AWS sites are connected to different base station servers.

Click **Save** to effect the changes.

The details should be entered as follows;

FTP Server Address – The FTP address e.g. **40.73.196.133** or the server network name;

Input Folder:

This is the subfolder in the FTP home directory of the server where data are located in the case of the **AWS base station** or where it will be copied to in the **message switching system**. If the subfolder is not in the root, the relative path should be indicated in according to the operating system rules. For example; **AWS\input** in windows and **AWS/input** in Unix/Linux;

FTP Data Transfer Mode

This is the login method allowed for data transfer by the target server. MS Windows based servers allow use of FTP. Some Linux based servers prefer the use of more secure data transfer methods such as SFTP. The method indicated by the target server should be entered here;

User Name – Login name used to logon into the server,

Password – Password for the user name provided,

Confirm Password – The entered password to be confirmed. The Password is not saved until correctly confirmed.

11.2 Sites Settings

The stations whose data is to be processed are configured as follows;

- Click the command **Sites** to give the dialog in Figure 91,

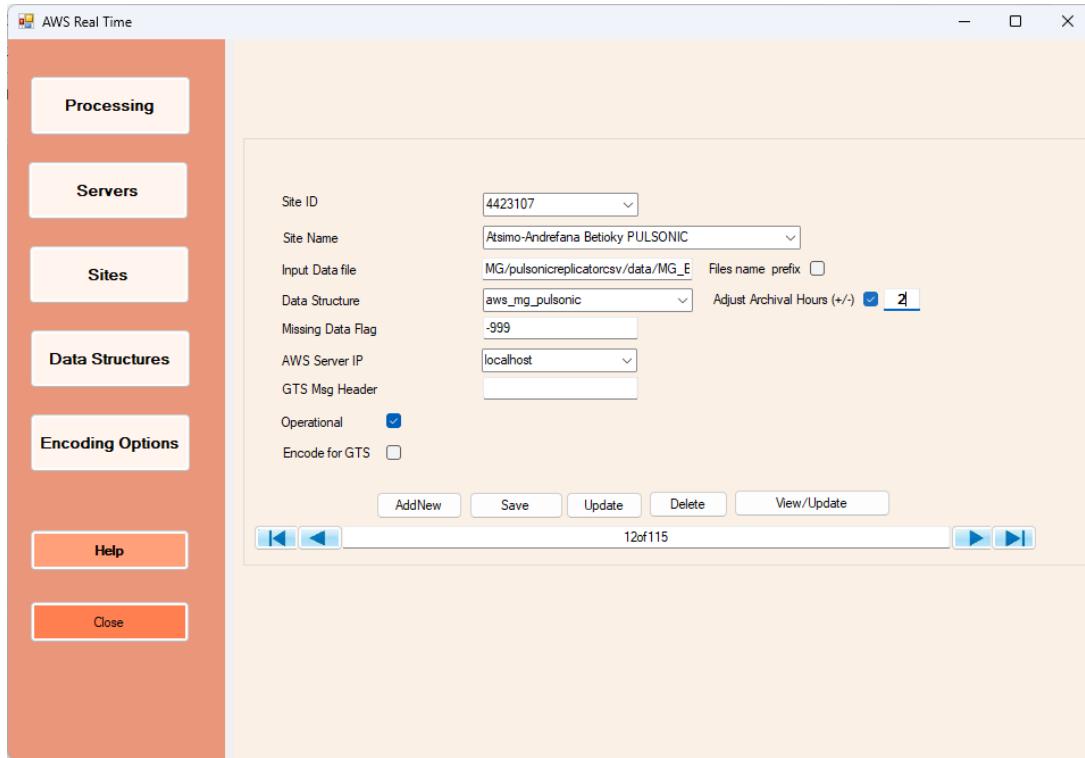


Figure 91: AWS server settings

Site details:

- **Site ID or Name** as provided by the Met Service or obtained from **WMO Vol A** if already listed there,
- **Input Data file** is the name of text file in the AWS base station containing data for the station listed in that current record. It should be ensured that the name matches the station's AWS data file,
- **Files name prefix** if the data is in multiple files with a common prefix, the box before the "File name prefix" should be checked and the prefix filled in the text box. Otherwise, this should not be checked.

In some special cases where filenames have date components, a date structured *file name prefix* may be used to select files with observations for a day, month or year. For instance for a date structured filename such as **000001202008290000.txt** the prefix will be entered as follows:

yyyymmdd – To select all files for the current day's observations

yyyymm – To select all files for the current month's observations

yyyy – To select all files for the current year's observations

For a filename such as **000001-2020-08-29-00-00.txt** the prefix will be entered as follows:

yyyy-mm-dd – To select all files for the current day's observations

yyyy-mm – To select all files for the current month's observations
yyyy – To select all files for the current year's observations

- **Data Structure** is the name of the structure for the data output file in the AWS base station server. This is created by the user and should correspond to the data being transferred. Details on how to undertake this task are listed in Section 11.3.2,
- **Missing Data Flag** is the value that represents missing data from the specified AWS server. This value will be obtained from files in the base station server;
- **AWS Server IP** is the IP address or host name of the server;
 - **GTS Msg Header** is the Global Telecommunication System message header (e.g. HKNC for Nairobi) in case AWS Data are meant for sharing with others countries through the regional or global centres,
 - **Operational** if a site has been created in the Climsoft database but has no operational AWS installed the box **Operational** should be unchecked,
 - **Encode for GTS** if a site has been created in the Climsoft database but does not send AWS to GTS, the box **Encode for GTS** should be unchecked.

Commands:

- To create new station in the database click **Add New**, enter all the details then click **Refresh**,
- **Update** is used to save changes made on the details of an existing station,
- **Delete** is used to remove the current station from the database,
- **View/Update** enables viewing the sites in a table view. Editing can be done from there.

11.3 Data Structure Settings

Click the command **Data Structures** to obtain the dialog for updating or adding new AWS data structures used by Climsoft.

Select any of the existing data structures e.g. `aws_toa5_mg2` from the list box. Details of that structure are displayed as shown in Figure 92. Any desired changes will be done on the table. The changes made will be saved automatically.

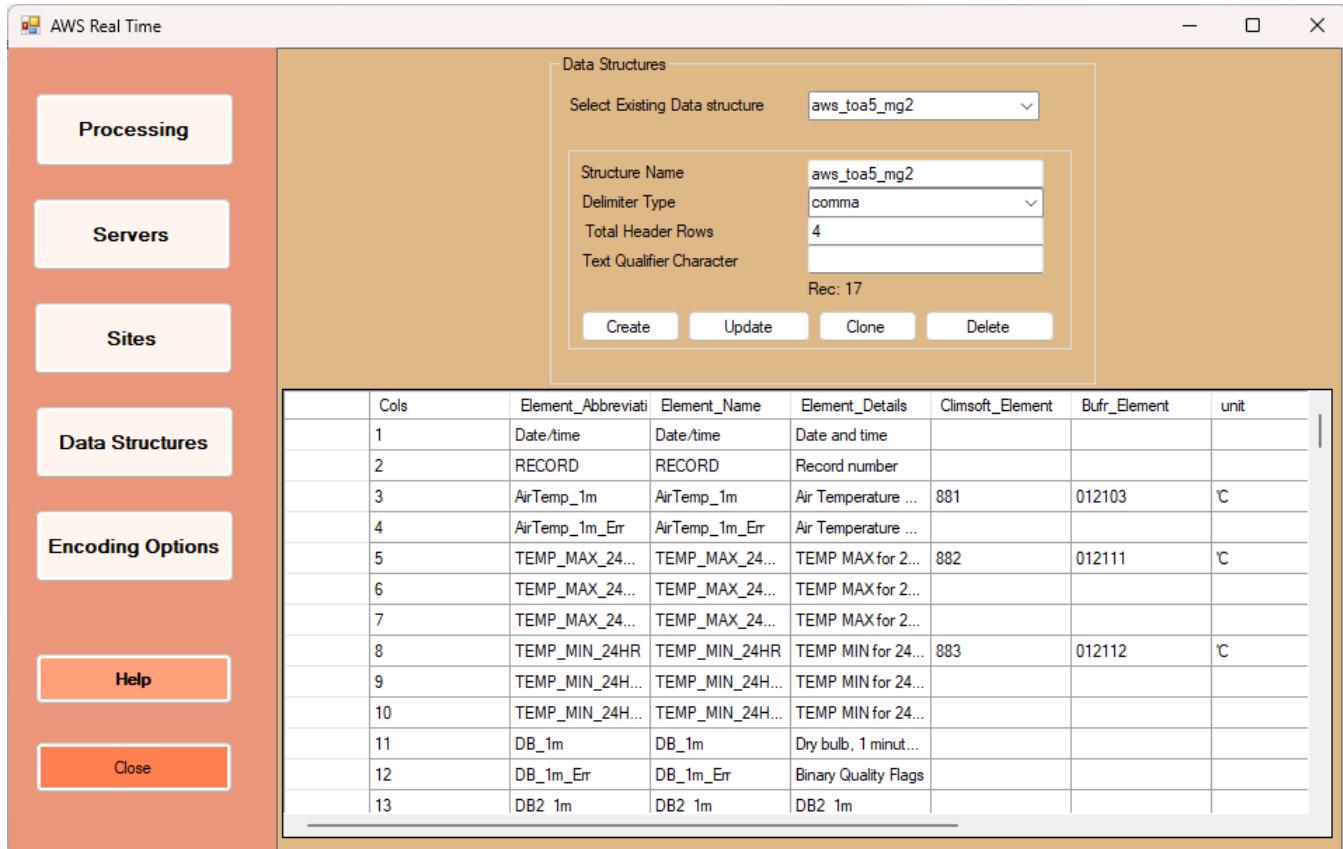


Figure 92: AWS data structure settings

To carry out the task of data structure settings, basic skills in BUFR and Climsoft elements are necessary. Configuration of the data structure is done as follows;

11.4 Updating existing structures

Changes can be made as may be desired. Real time processing of AWS data is based on structure of the data.

This includes;

- (iv) **Updating Bufr_Element** – Only those elements whose BUFR element descriptors are entered will be encoded into BUFR messages. In case a new sensor is added and new observation started, its BUFR descriptor should be included. BUFR descriptors can be found in **WMO BUFR Table B**,
- (v) **Updating Climsoft_Element** – If an observation from any AWS element requires to be archived in Climsoft database, its Climsoft element code should be included. Climsoft element codes are contained in **obselement** table in the Climsoft database,
- (vi) **Adding observation elements (record)**

To add a new element (a new sensor may be installed or activated) in the same structure, scroll on the table to the end of list and enter the details in the blank record. The values will be saved automatically,

(vii) Delete Record

Select the record by clicking at the left most cell of the record. It will become highlighted. Then press **Delete** key on the keyboard. The record will be deleted without any warning.

- (ix) **Structure Name, Delimiter Type, Total Header Rows and Text Qualifier Character** may also be updated where necessary. In this case click **Update** to save changes.

11.5 Creating a new structure

Data from different AWS sites may come with different file structures. All the different data structures should be created in Climsoft and allocated a name so that the received data is correctly mapped in the database. After studying the structure of a data file from a given site it is easy to create its structure in Climsoft as follows;

Study and understand the new AWS input text file. Suggest an appropriate name for the new structure then enter the details in the text boxes in **Figure 93** as follows;

- (xi) **Structure Name** – Name under which the structure will be known,
- (xii) **Delimiter Type** – The character that separates data values e.g., Tab, comma etc. Select from the list,
- (xiii) **Total Header Rows** – The number of header rows above the observation values,
- (xiv) **Text Qualifier Character** – Where a character is used to qualify text values e.g. “, then it should be entered here.

Click the command button **Create**. A table is then displayed as shown in **Figure 90a**, from where details for the data columns in the AWS input file can be entered.

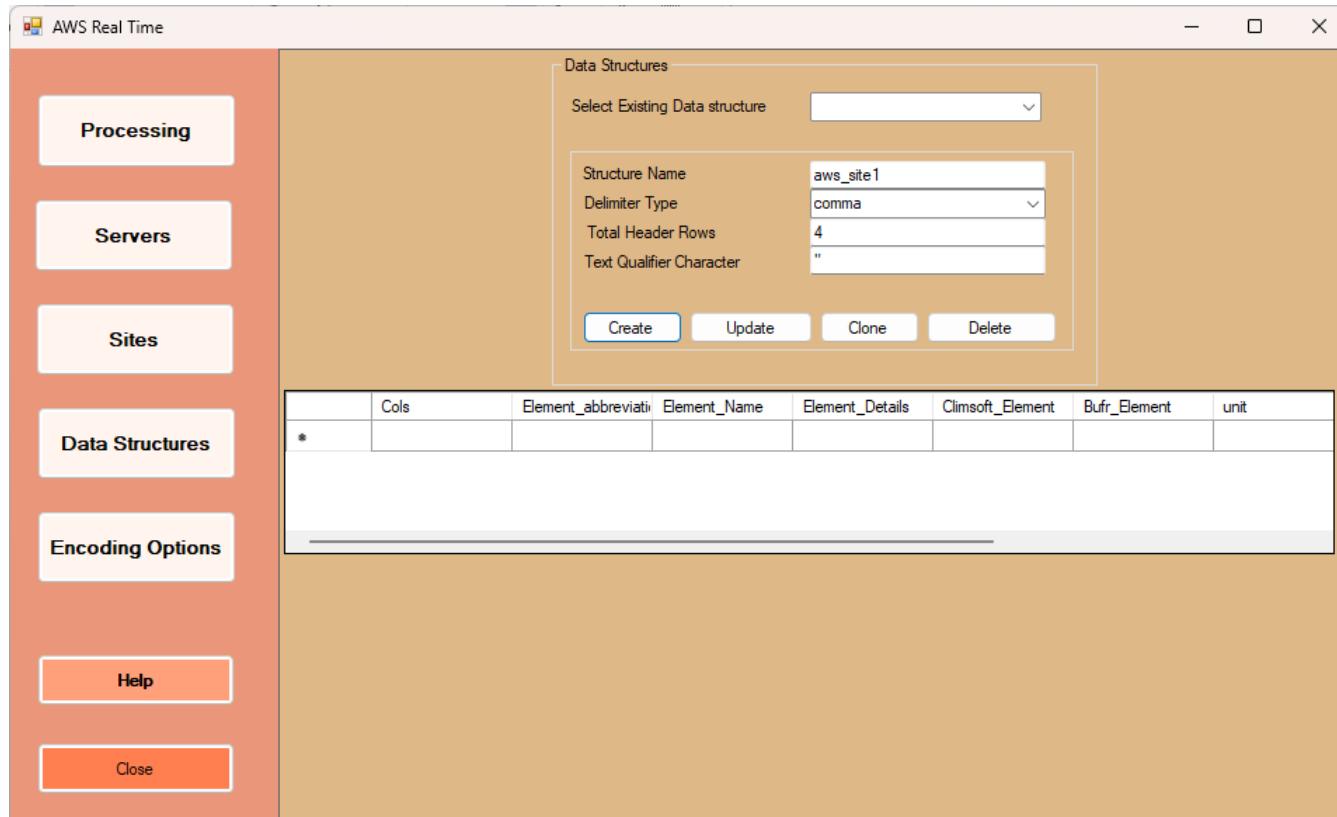


Figure 93a: Dialog for creating a data structure

Enter the necessary details in the table. Details of each data column in the input file should be entered as a record (row) in the table. The first column should have value 1 in field **Cols**. All the details of the data should be entered in the different fields of that record (row). The next row should similarly start with value 2 in the field **Cols**. This procedure is followed until each column

of the data from the output text file is described in this table. Information required in each record is as follows;

- **Cols** - Position (1,2...) of the column (from the left side) describing the data in the file,
- **Element_abbreviation** – Abbreviation for the name describing data in the column.

Users are free to use any abbreviation that conveniently describes the data except for the column with date and time values. The following abbreviations **SHOULD** be strictly used while abbreviating the date and time in the circumstances described below;

Date/time - Date and time are in one column e.g. **21/03/2000 12:30:00**

Date - Date is in a column of its own e.g. **21/03/2000**.

Time - Time is in different column from Date e.g **12:30:00**

yyyy - Year is in a column of its own e.g. **2000**

mm - Month is in a column of its own e.g. **03**

dd - Day is in a column of its own e.g. **21**

hh - Hour is in a column of its own e.g. **12**

nn - Minute is in a column of its own e.g. **30**

ss - Second is in a column of its own e.g. **00**

yyyymmddhhnnss -Date and time has this structure e.g. **20000321123000**

ddmmyyyyhhnnss -Date and time has this structure e.g. **21032000123000**

- **Element Name** – An appropriate name should be entered,
- **Climsoft_Element** and **Bufr_Element** to correspond with the Climsoft and BUFR Element codes as described in their manuals respectively. Where no value is put in these fields, data in the affected column will not be processed for Climsoft archival or TDCF encoding accordingly.
- **Unit** – This is the unit of measurement of the values in the column. If the unit cannot be determined, it is left blank,
- **Lower_Limit** and **Upper_Limit** – These values are used for Quality Control purposes so that Climsoft can flag outlier values for confirmation at a later time,
- **Obsv** – Nothing to be entered in this field. It is used by Climsoft when processing the observation data.

Figure 93b shows data from an AWS text output file whose format is CSV with the character “,” as the text data qualifier.

```

["TIMESTAMP","RECORD","WS_1m","WS_1m_Err","WD_1m","WD_1m_Err","WS_2m","WS_2m_Err","WD_2m","WD_2m_Err","WS_10m","WS_10m_Err"]
1/9/2015 00:00:00,180925,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 01:00:00,180985,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 02:00:00,181045,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 03:01:00,181106,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 04:00:00,181165,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 05:00:00,181225,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 06:00:00,181285,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 07:00:00,181345,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 08:00:00,181405,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 09:00:00,181465,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 10:00:00,181525,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 10:59:00,181584,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 12:00:00,181645,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 13:00:00,181705,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 14:00:00,181765,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 15:00:00,181825,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 16:00:00,181885,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 17:00:00,181945,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 18:00:00,182005,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 19:00:00,182065,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990

```

Figure 93b: AWS Output Text File

11.6 Coding Settings

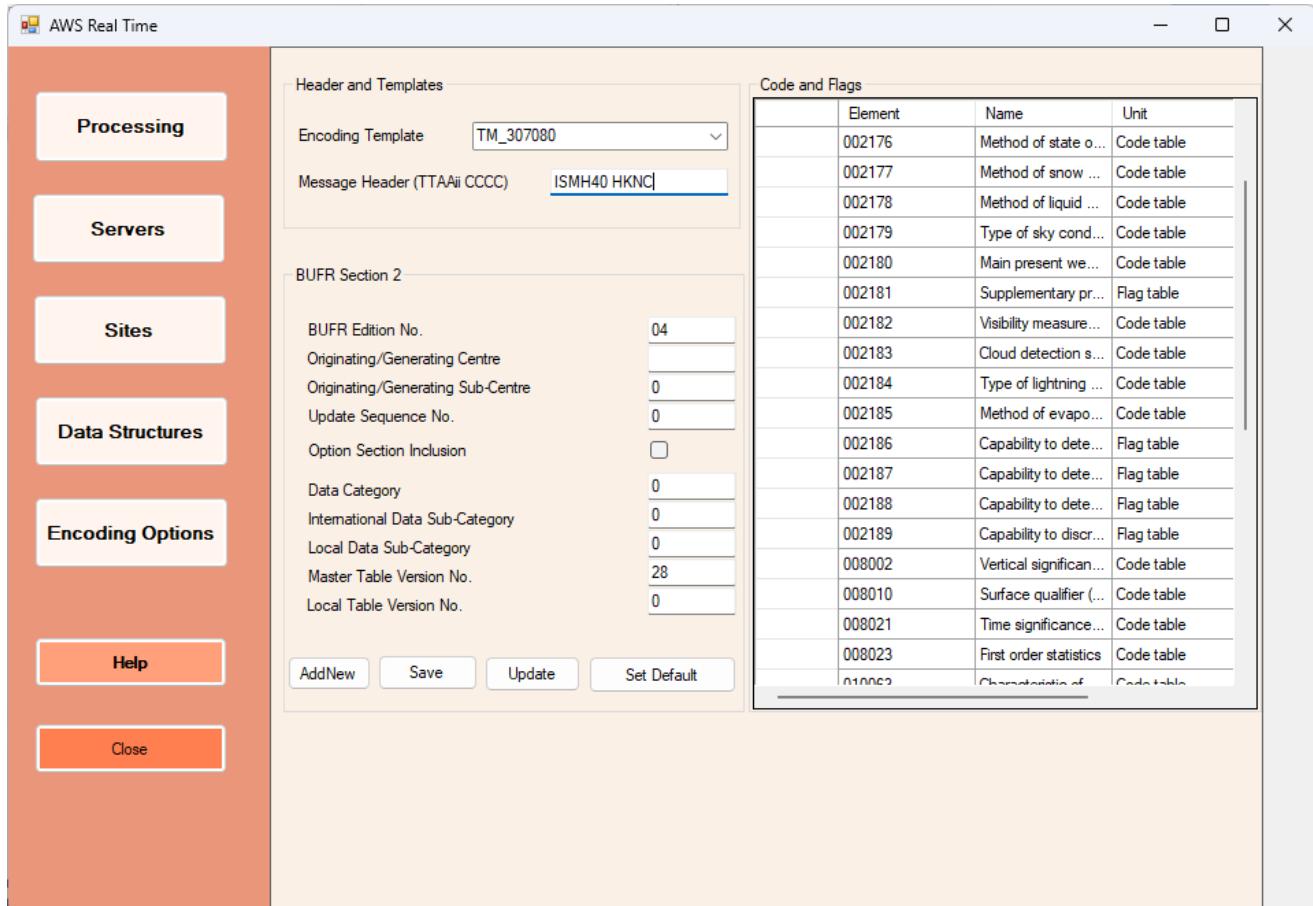


Figure 94: Dialog for setting TDCF message parameters

The dialog in Figure 94 shows the settings required in BUFR message encoding. Most of the default values are automatically set at installation, but some are set by the user to meet the requirements for a particular NMHS. To undertake these settings knowledge of **Table Driven**

Code Forms (TDCF) is necessary. *WMO Manual on Codes* is the main reference used for setting up the values here.

11.7 Data Acquisition and Processing Dialog

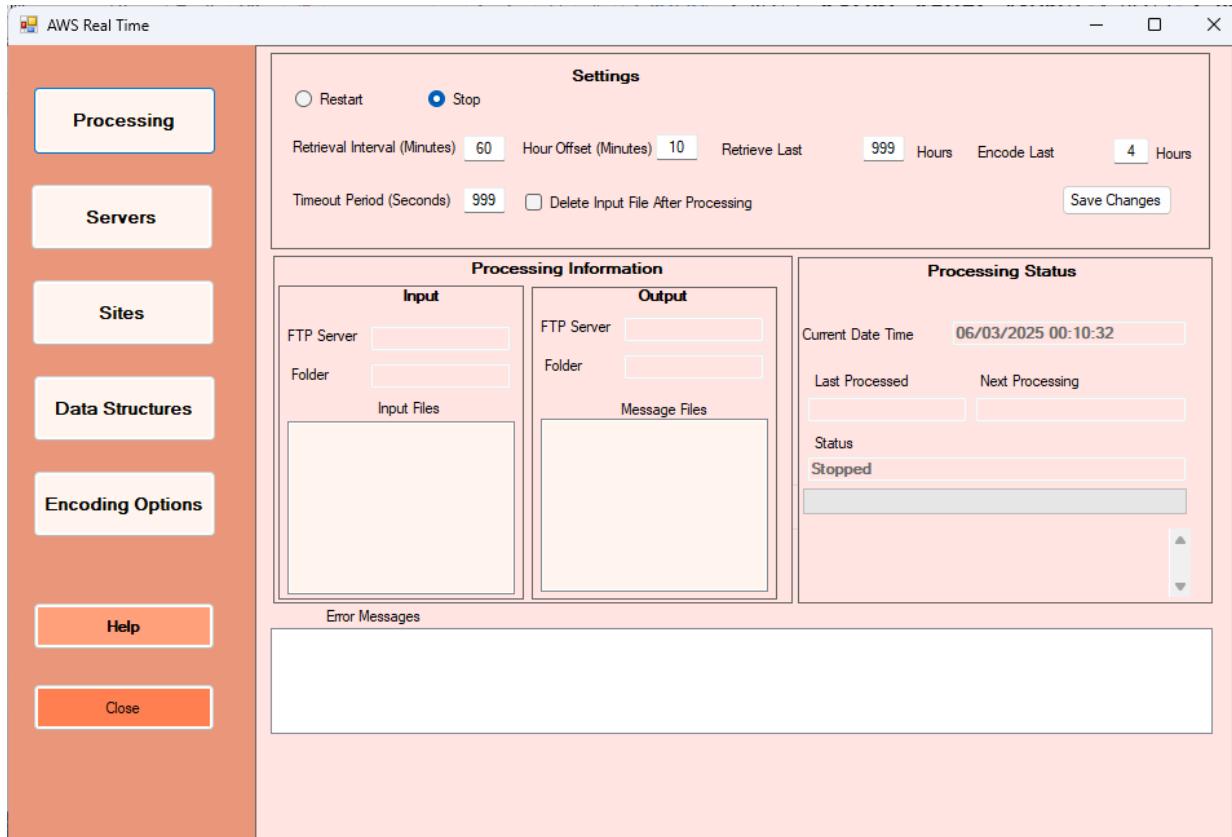


Figure 95: Dialog for Data Acquisition and processing

The AWS data processing is controlled from the dialog shown in **Figure 95** and the information on the processing status is displayed. Before the process is started it is important that the user understands the role of each control shown in the dialog. Details are as follows;

Controls Details

- **Settings:**
 - **Restart** – Starts/Restarts the processing schedule,
 - **Stop** – Stops the processing schedule,
 - **Retrieval Intervals** – The frequency in minutes at which data will be retrieved from AWS server and processed. Where encoding is required for Synoptic messages the interval will be entered as 180 minutes.
 - **Hour Offset** – Time delay in minutes to start encoding after the time set for data downloading from AWS data logger,
 - **Timeout Period** – The longest period in seconds that attempts to connect to the AWS server can be made before timing out the connection. If no time out period is desired a value of **999** should be entered. But in that case there is a risk of holding the process

indefinitely if connection is not achieved at all. If connection speed is the cause of the delay then a reasonable time out period should be entered e.g. 60 seconds.

- **Delete Input File After Processing** - When checked, the files containing AWS data, will be deleted from the base AWS server after processing,
- **GMT Diff +/-** – The time difference between GMT and the time for the AWS data. A positive difference may not require entering a + sign but a negative one is mandatory,
- **Save Changes** – Updates the changes made.
- **Processing information**
 - **Input FTP Server** - AWS Base station from where data is retrieved for processing,
 - **Input Files** – List of the retrieved AWS text files,
 - **Output FTP Server** – Message Switching System to where encoded messages have been sent,
 - **Output Folder** – Folder containing output files,
 - **Message Files** – List of the encoded and transmitted files.
- **Processing Status**
 - **Current Date and Time** – Computer clock time. It should always be correctly set,
 - **Retrieve last** – Hours of data to be retrieved for encoding at each encoding interval,
 - **Last Processed** – Date and time of the previous encoding process,
 - **Next Processing** – Date and Time of the next encoding process,
 - **Status** – The current activity.
- **Error Messages**

Errors encountered during processing are listed here together with their time of occurrence. They are also logged into a file named **aws_error** located in the subfolder **data** in the path “C:\ProgramData\Climsoft4”.

12. Paper Image Archiving

Images of scanned paper records can be archived in Climsoft and later retrieved when required. The operation starts by first creating the metadata for the paper image archives then the folder where the image files will be archived. The archived image files may occupy large amount of storage space hence it is necessary to choose a folder where sufficient space is available. The folder may reside in the local server or in a network connected server or Network Attached Storage (NAS). Where the archiving is done on network folder it is recommended that it be mapped as a drive on the local server for convenience of accessing the image files.

The procedures for creating paper archive metadata are as follows;

From the **Welcome** form click on the icon **Metadata Information** then on the tab **Paper Archive** in the **Metadata Information** dialog and subsequently obtain the dialog shown in **Figure 96**.

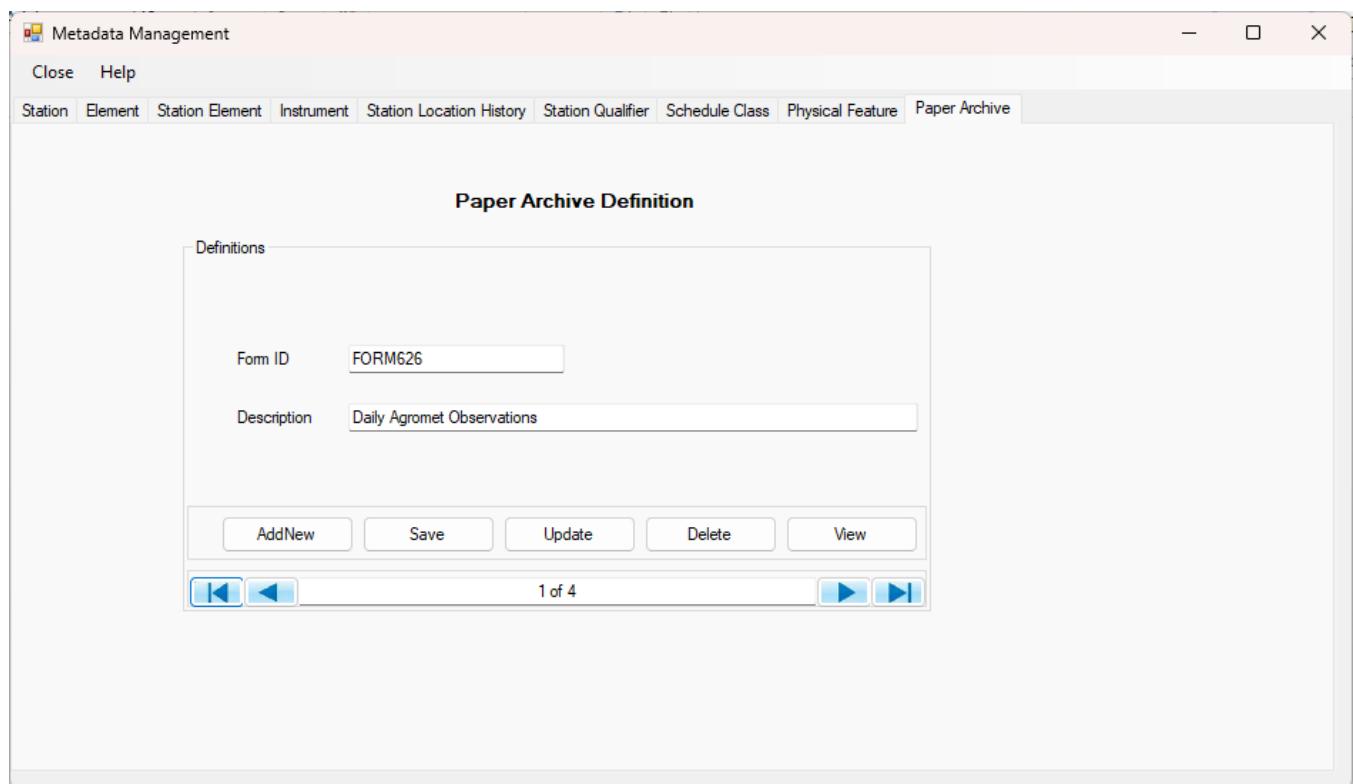


Figure 96: Dialog for creating paper archive metadata

- Click **AddNew** button to clear the form and enter details of a new metadata record,
- The metadata to be entered are the **Form ID** which is the identification allocated by the NMHS for that particular paper form. Details of the type of data contained in that form are entered in the **Description** box,
- Click **Save** button to save the metadata record,
- Other commands used are as follows;
 - **Update** – Saves changes made on a metadata record,
 - **Delete** – Removes a metadata record from the database if no image has been archived under that Form ID,
 - **View** – Displays all the metadata records in a tabular form.

It is required that the location (full path) for archiving the image files be configured in the general settings of Climsoft. Follow the steps below to achieve that;

- From the main bar of **Welcome** dialog click **Tools -> General Settings** and browse the records until the “**Setting Description**“ box displays the value; “**Folder for Paper Archive image files**”. See **Figure 97**,

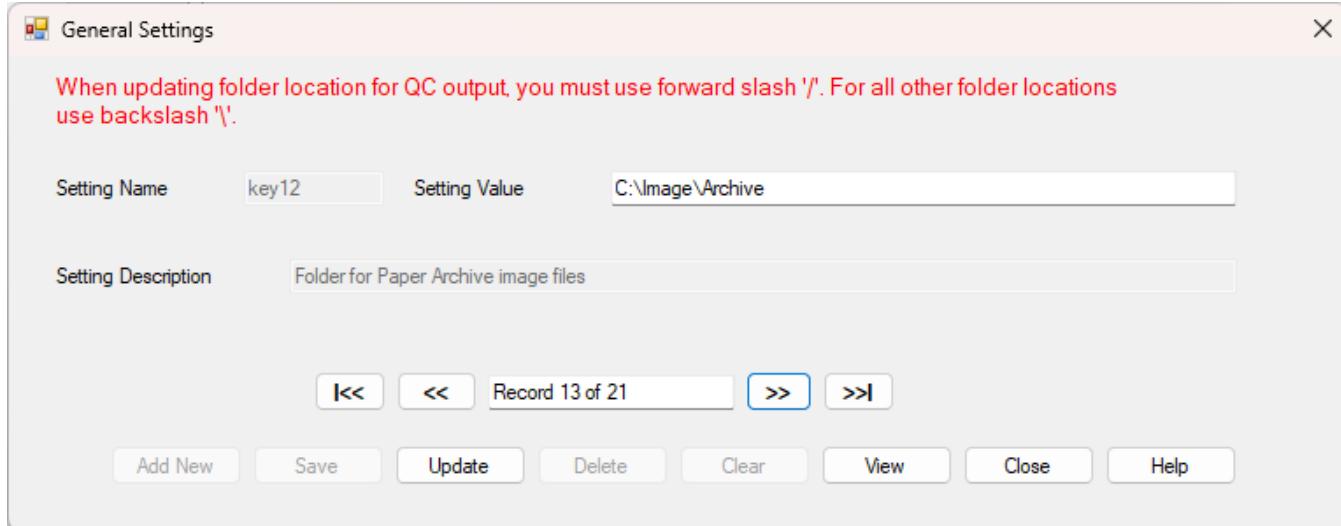


Figure 97: General Setting Dialog

- Type the full path of the folder to be used for the image files e.g. **C:\PaperArchive\Images** then click the **Update** button. If the path specified does not exist it will be created once the process of image archiving starts. When no folder has been setup archiving will still be possible but in a default folder that is in the path of the Climsoft installation. A message will be provided to that effect until the folder has been changed from the default.

12.1 Archiving Images

The filenames for the archived images are structured such that they describe the data contained in the image. Therefore, Climsoft maintains a standard filename structure for the archived image files. Image files having the standard filename structure are archived straight away while the others first required to be renamed before archiving. The following sections describe how images with different filename structures are archived.

12.2 Archiving Images with Standard Filename Structure

The Climsoft standard image filename is structured as; **StnID-FormId-YYYYMMDDHH**. The filename components are described as follows;

- StnID** – Station identification code for the station whose data is contained in that image,
- FormId** – Identification code for the paper form as described in the metadata,
- YYYYMMDDHH** – Date, time and other special descriptions for the image as follows;
 - YYYY**=Year, **MM**=Month in 2 digits, **DD** = Day of the month in 2 digits,
 - If the image contains daily data for the whole month **DD**=Last day of that month, and **HH**=Hour for the daily observations e.g. 06,
 - If the image contains hourly or synoptic data for one day **HH**=00,
 - If one particular observation is contained in different pages hence different image files then **HH** will instead be used as page numbers in 2 digits starting with 01.

The procedure for archiving images with standard filename structure is as follows;

- (i) From the **Welcome** dialog, click on the icon **Paper Archive** to obtain the dialog shown in **Figure 98**,
- (ii) Click on the explorer button and select the folder containing images to be archived. All image files in that file will then be listed as shown in the dialog,
- (iii) Uncheck the boxes for the image files that are not required.
- (iv) Click the command **Archive** to complete the process.

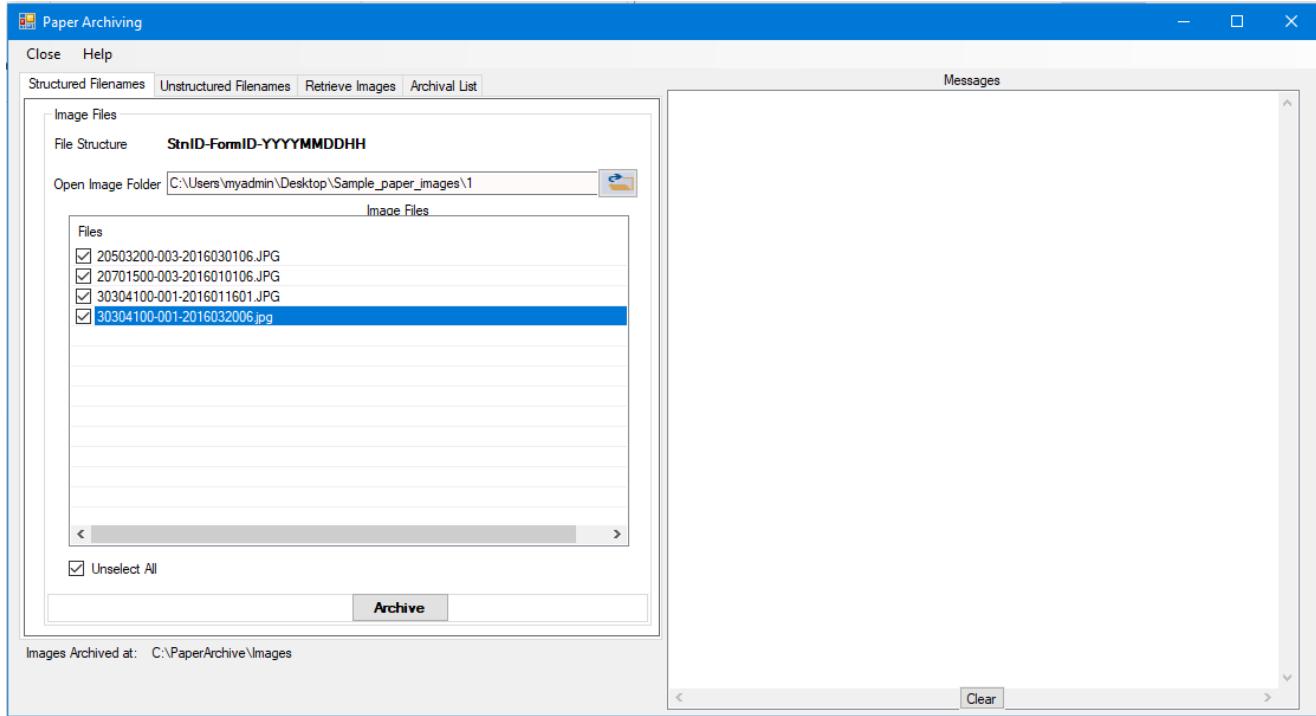


Figure 98: Archiving images with standard filename structure

12.3 Archiving Images without Standard Filename Structure

From the Paper Archive dialog shown in Figure 98 click the tab “**Unstructured Filenames**” to obtain the dialog shown in **Figure 99**:

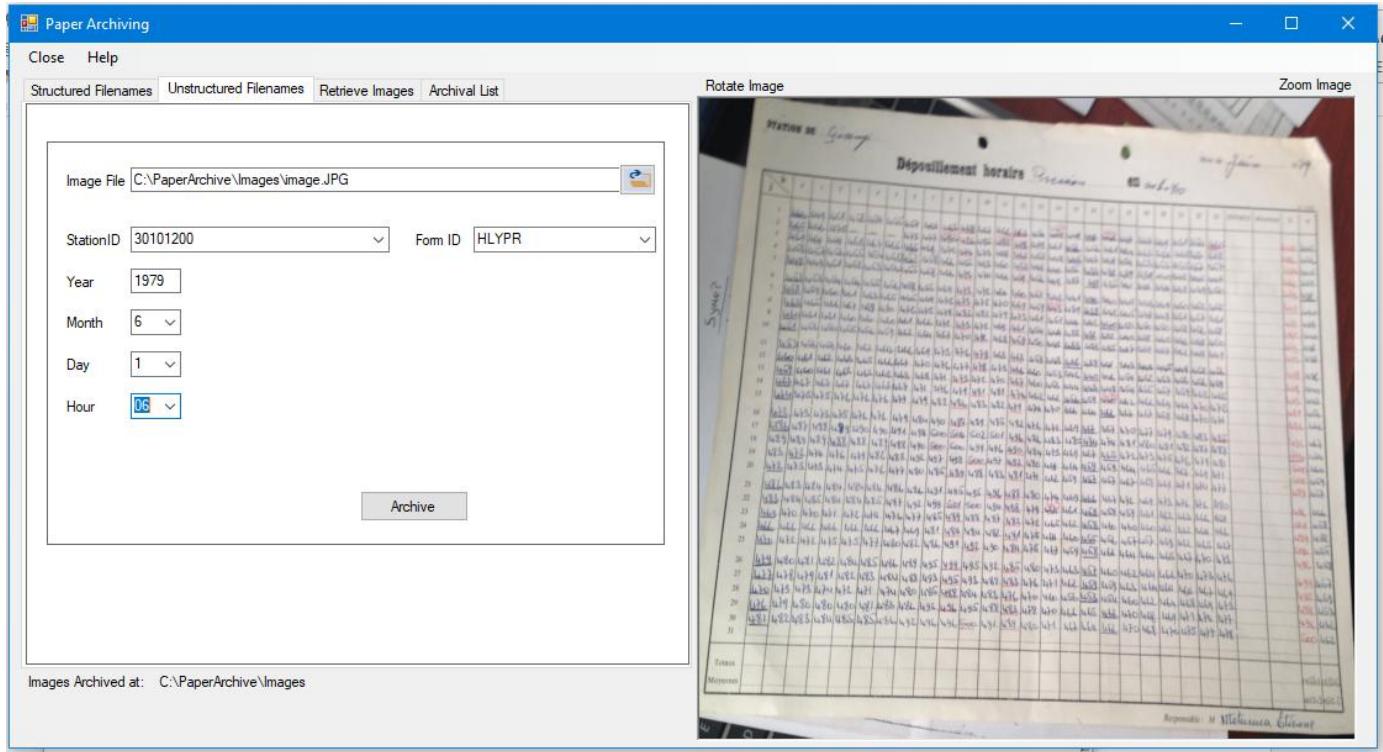


Figure 99: Dialog for archiving images with unstructured file names

- (i) Use the explorer button to select, open the image file and the image gets displayed as shown above.
- (ii) Enter the details for the content of that image in their respective boxes in the dialog,
- (iii) The image may be rotated or zoomed so that the details are clearly seen.
- (iv) Click **Archive** to structure the filename and archive the image,
- (v) Repeat the process for all the images to be archived.

12.4 Retrieving and Viewing Archived Images

Through Climsoft, records of the archived images can be browsed, opened, updated or deleted. Images saved in pdf format can also be viewed but through a pdf reader. To perform these tasks follow the procedures below;

From the Paper Archiving dialog click the tab “**Retrieve Images**” to obtain the dialog shown in **Figure 100**;

- (i) Browse through the records as desired,
- (ii) Edit the records where necessary and click “**Update**” to save the changes,
- (iii) Select the “**View Image**” to open or view the image for the current record.

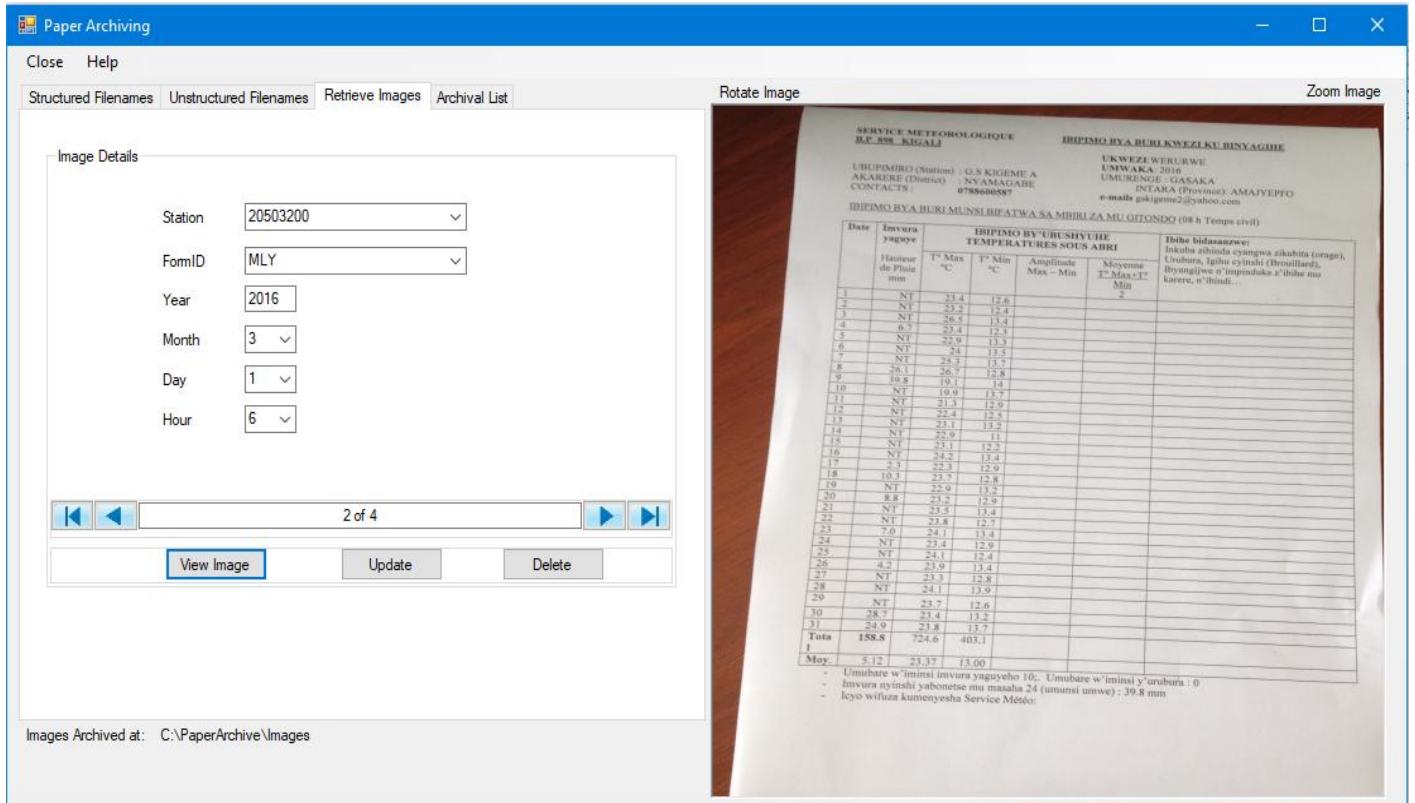


Figure 100: Retrieved archived image

12.5 Viewing a List of Archived Image Files

To view the list of archived image files, click on the “Archival List” tab to open the dialog shown in Figure 101. Click on any image file from the list to have the archived image displayed.

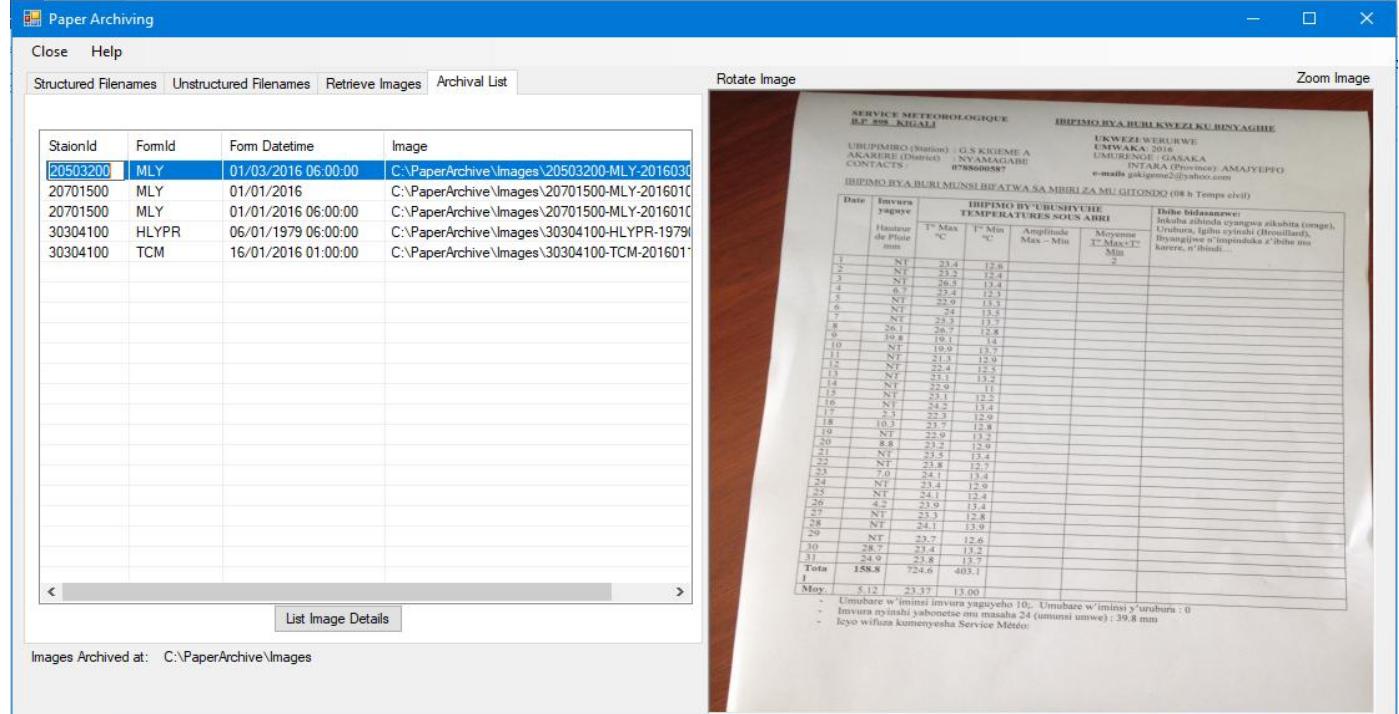


Figure 101: View the list of archived images

13. TDCF Synoptic data Encoding Operations

13.1 Form for Synoptic data key entry and encoding

Climsoft provides key entry form for synoptic observations. The form also facilitates encoding and sending the encoded messages to the message switch server for forward transmission to GTS. The structure of the form is shown in **Figure 102**.

Station Identifier	KAMEMBE AERO	Year:	2017	Month:	12	Day:	12	Hour:	6
Station Level Pressure-Po	8765	Vertical Significance 1	6	PresentWx	6				
Pressure Reduced to MSL-P		Cloud Amt Lvl1-N1	1	PastWx1	7				
3hr Pressure Change-P3	1	Cloud Type Lvl1-C1	7	PastWx2	4				
3hr Pressure Characteristic	4	Cloud Ht Lvl1-HsHs1	1200	Tmax	290				
24hr Pressure Change-P24	5	Vertical Significance 2		Tmin	180				
Standard Pressure Level -a	850	Cloud Amt Lvl2-N2		Grass Min Temp	180				
Geopotential Height-hhh	1542	Cloud Type Lv2-C2		Evaporation	50				
DryBulb Temp-TTT	235	Cloud Ht Lvl2-HsHs2		SSS-24Hr	61				
Wetbulb Temp-TwTwTw	211	Vertical Significant 3		SSS-1Hr	35				
DewPoint Temp-TdTdTd	200	Cloud Amt Lvl3-N3		Precip-24Hr	200				
Relative Humidity-U	75	Cloud Type Lvl3-C3		Precip-3Hr	12				
Horizontal Visibility-VV	40000	Cloud Ht Lvl3-HsHs3		Wind Direction-dd	120				
Low Cloud Hght-h	78	Vertical Significance 4		Wind Speed -fff	8				
Total Cloud Cover - N	6	Cloud Amt Lvl4-N4		Insolation - Rad	232				
Vertical Significance	8	Cloud Type Lvl4-C4							
Low Lvl Clouds Amount-Nh	6	Cloud Ht Lvl4-HsHs4							
Low Lvl Clouds Type-CL	15								
Medium Lvl Clouds Type-CM	24								
High Lvl Clouds Type-CH	33								

Buttons at the bottom: Add New, Save, Update, Delete, Clear, View, TDCF, Close, Help, Upload. The 'Upload' button is highlighted in green. A sequencer field shows 'seq_month_day_synoptime'.

Figure 102: Synoptic Data for many elements for one observation time - TDCF Form

Rules for entering data in the Synoptic forms with the aim of encoding into TDCF messages can be obtained from: *WMO manual on codes, Code tables, TDCF Templates and Common tables*. Data is then entered as follows:

- (i) **Pressure Data** – In Hpa and multiplied by 10 to remove the decimal point,

They are:

- Station Level Pressure (SLP)
- Seal Level Pressure (MSL). To be entered as missing in stations above 500 M altitude and ;
- Pressure Change (3Hr and 24Hr) – To be entered as missing when not observed

- (ii) **Three (3) Hr pressure change characteristic** - Code figure to be entered as described in the Manual on Codes.

- Code figure 2 shall be used for positive tendency;

- Code figure 7 for negative tendency; and
 - Code figure 4 for no change
- (iii) **Standard Pressure** Level – In Hpa as a whole number and NOT multiplied by 10 e.g. 850
- (iv) **Geopotential Height** – In whole number of geopotential metres (gpm),
- (v) **Temperatures** – In degree Celcius and multiplied by 10 to remove the decimal point,
- They are:
- Dry bulb - observed at synoptic hours,
 - Wet bulb - observed at synoptic hours,
 - Dew point - observed at synoptic hours,
 - Minimum - recorded at the hour for daily data observations e.g. 06Z,
 - Maximum – recorded daily but the hour varies with NMHS e.g. 18Z,
 - Grass minimum – recorded at the same hour with minimum temperature,
- (vi) **Relative Humidity** – In whole number of percentages,
- (vii) **Visibility** – In meters rounded into tens,
- (viii) **Total Cloud Cover** – Oktas. Climsoft will encode value into percentage of total cloud cover,
- (ix) **Vertical Significance** – Code figure for the appropriate vertical significance,
- (x) **Low level Cloud Amount (Nh)** – Code figure for the amount of lowest cloud level,
- (xi) **Cloud Base Height (h)** – Height in tens of metres for the base lowest cloud level,
- (xii) **Low Level Cloud Type (CL)** – Code figure for Low Level clouds type,
- (xiii) **Medium Level Cloud Type (CM)** – Code figure for Medium Level clouds type,
- (xiv) **High Level Cloud Type (CH)** - Code figure for High Level clouds type,
- (xv) **Individual Cloud Layers** – Vertical significance, amount, type and height of individual cloud layers that qualify to be considered should be entered in their appropriate boxes in the order they occur. When less than 4 layers are reported the remaining boxes should be left untouched or flag value M be used,
- (xvi) **Present Weather, Past Weather (1) and (2)** – Code figure for the appropriate weather description,
- (xvii) **Evaporation** – Kgm/M-2 multiplied by 10 to remove decimal point,
- (xviii) **24hr Sunshine** – Number of hours multiplied by 10 to remove decimal point,
- (xix) **1Hr Sunshine** – Number minutes in whole numbers,
- (xx) **3hr Rainfall** – Amount accumulated for the last 3 hrs in Kgm/M-2 multiplied 10 to remove decimal point,
- (xxi) **24Hr Rainfall** – Amount accumulated for the last 24hrs in Kgm/M-2 multiplied 10 to remove decimal point,
- (xxii) **Wind Direction** – Degree from True North in whole numbers,
- (xxiii) **Wind Speed** – M/S multiplied by 10 to remove decimal point,
- (xxiv) **Radiation** – MJ/M-2 multiplied by 100 to remove decimal point.

13.2 TDCF Settings

From Synoptic key entry form, click the button **TDCF** then the tab **Settings** to obtain the dialog shown below:

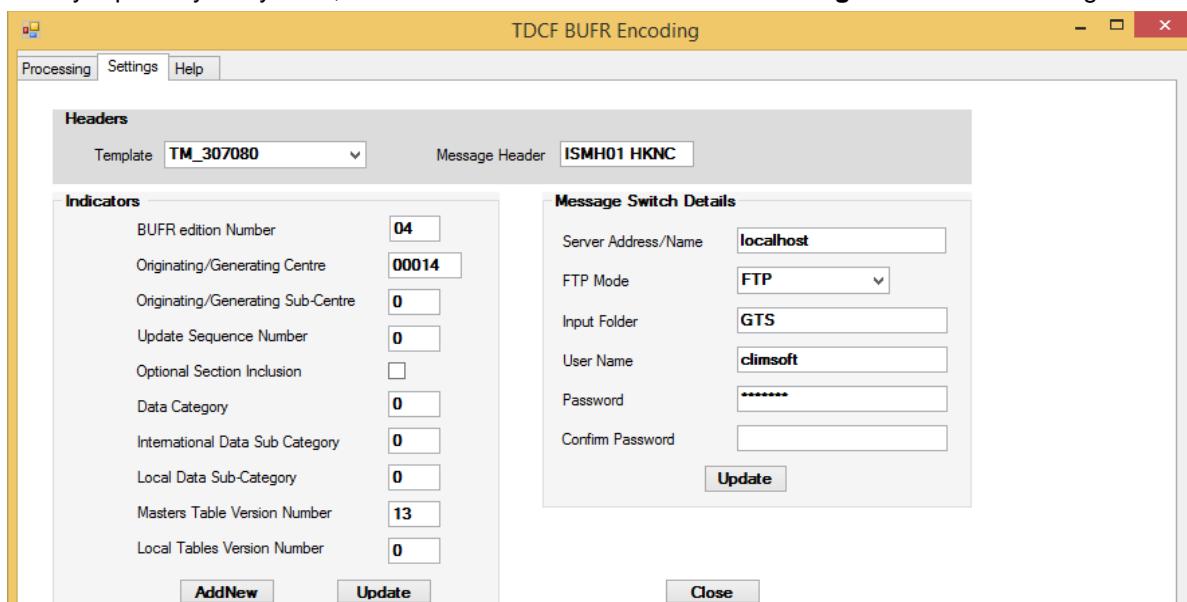


Figure 103: TDCF Settings

The settings in the dialog shown in **Figure 103** need to be in place before the encoding and sending of messages is done. To successfully configure Climsoft for this operation basic knowledge on WMO Table Driven Code Forms (TDCF) is required. Visit the WMO site for more details. The most useful reference documents are;

- (i) WMO manual on codes,
- (ii) Code tables,
- (iii) TDCF Templates and Common tables.

On the dialog select the right encoding template from the list box **Template** and enter the message header according to the data type ($T_1T_2A_1A_2ii$) and originating center (CCCC). Enter the Message Switching System (AMSS) details where the messages will be routed to. Click **Update** to save changes in each case.

13.3 Climsoft TDCF Encoding in BUFR

When data entry for the synoptic hour is finished and TDCF settings as described in section **13.2** done, click the button **TDCF** to obtain the TDCF processing dialog shown in **Figure 104**.

Station and date for the current key entry record will then be displayed in their appropriate text boxes. Confirm whether that is the observation that is intended for encoding. If not then select the correct station and dates. **Note that the encoded message will include data for all stations that have been observed on the same date and time.**

Click **Encode** button to encode the data into BUFR codes that will be displayed as shown in **Figure 104**. The encoded message binary file will be saved in the file shown in the text box “Encoded Message File”.

Click **Send** button to send the binary file to message switching server for forward transmission to GTS. You can also view the content of your message from the text (csv) file by clicking the button **View Descriptors**.

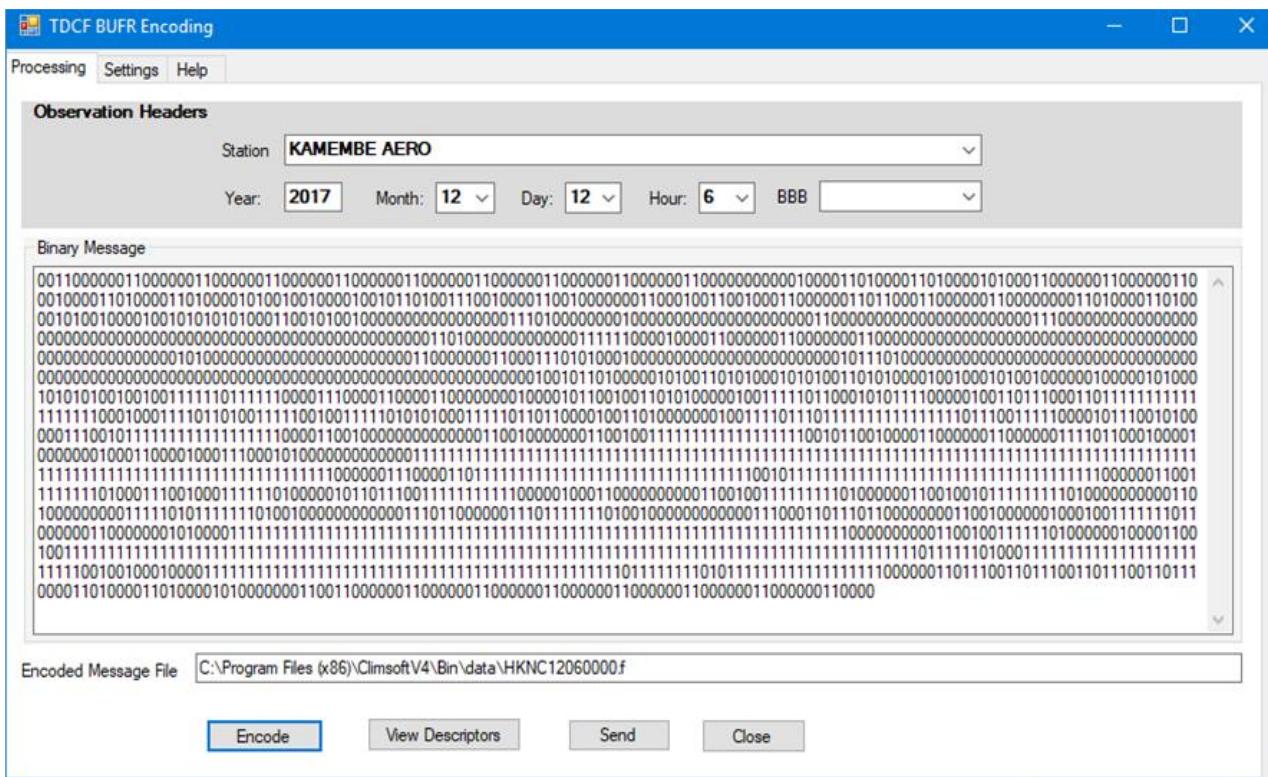


Figure 104: TDCF Processing

14. Climsoft Versions Upgrade

Whenever a new version of Climsoft is released, an upgrade setup file is provided to help users upgrade their earlier versions. This is different from setup file for new installation. The upgrade file is run on all client computers that already had Climsoft installed and is currently operational.

The Climsoft installation and upgrade setup files can be downloaded from the link: <https://www.met-elearning.org/course/view.php?id=58#section-2>. An upgrade setup file looks like **ClimsoftV422_upgrade.exe** where V22 means it will upgrade the Climsoft installation to version 4.2.2.

The following paragraphs describe how a Climsoft installation can be upgraded.

14.1 Upgrading Climsoft Interface

- (i) Download the upgrade setup file and copy it in to a folder that can be easily located;
- (ii) Close any Climsoft session running in the client computer;
- (iii) Run the upgrade setup file as a Windows administrator to start the upgrade wizard as shown in Figure 105;

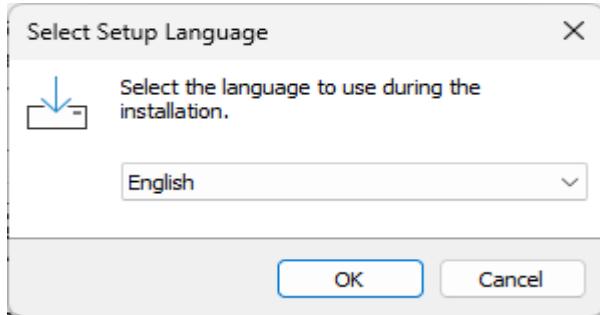


Figure 105: Climsoft version upgrade

- (iv) Choose the language to be used in the wizard dialogs. The default language is *English*;
- (v) The wizard dialogs are very intuitive and easy to follow. Ensure that the path where Climsoft was installed is correctly selected e.g. *C:\Program Files (x86)\ClimsoftV4*;
- (vi) The final dialog will be as shown in Figure 106:

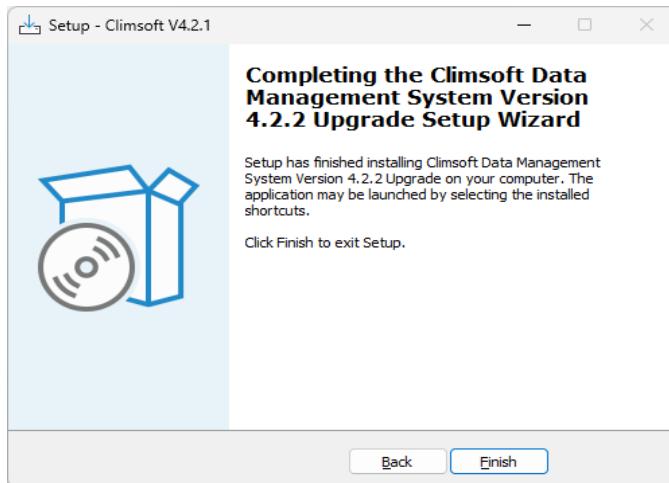


Figure 106: Climsoft version upgrade

- (vii) Click **Finish** to complete the process.
- (viii) This process should be repeated in all Climsoft client desktops that have older versions.

14.2 Upgrading Climsoft Database

Where the version upgrade involves changes in the database, an SQL script is included in setup file which requires to be run immediately after upgrading the interface. During the upgrade process the script file is copied into the “**Dbase**” folder of Climsoft installation path. The script file name is ***mariadb_climsoft_db_v4_all.sql***. This script file is run to upgrade the database in the server as follows:

- (i) Start Climsoft from any client desktop after it has been successfully upgraded to the latest version. The version number is shown on the splash screen during the start process;
- (ii) From Welcome dialog click **Tools => Update db with Script File** as shown in Figure 106

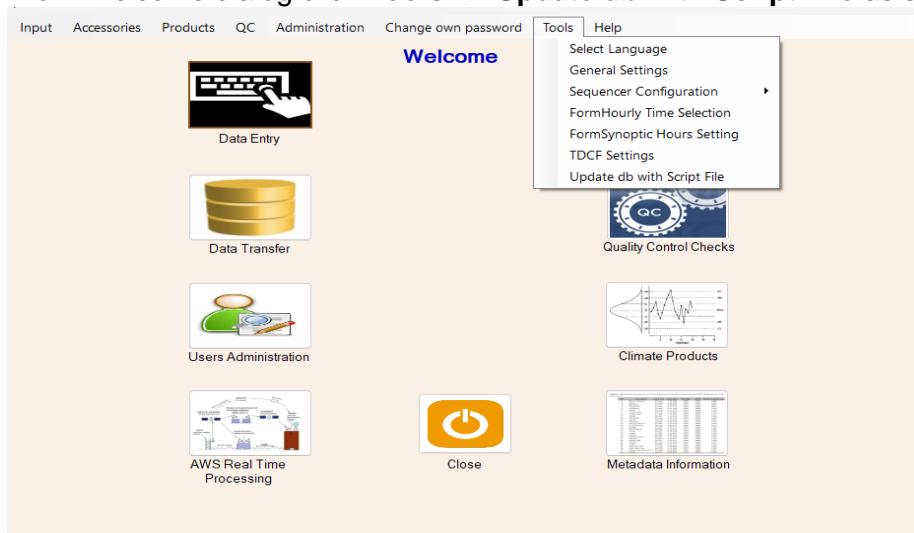


Figure 106: Climsoft version upgrade Menu

- (iii) Select the script file and click **Open** as shown in Figure 107;

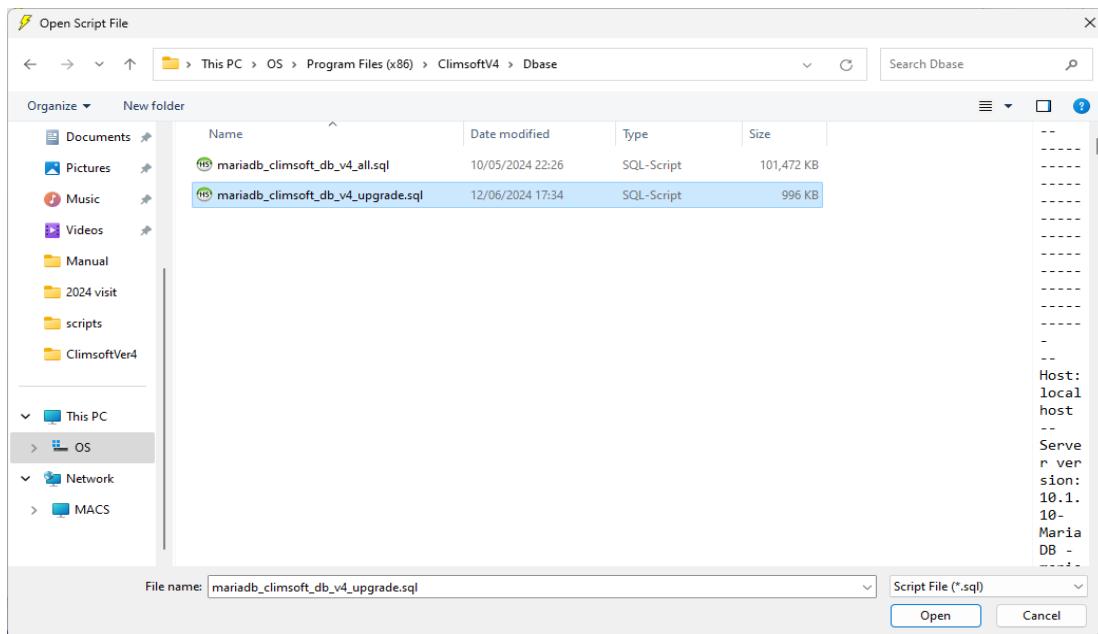


Figure 107: Climsoft version upgrade script file opening

- (iv) Wait for the message “**Finished updating the database**”. Click **Open** to complete the process.

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