



CLIMSOFT VERSION 4 USER MANUAL



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March 2021*

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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, 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 and Windows 10;
- 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 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.

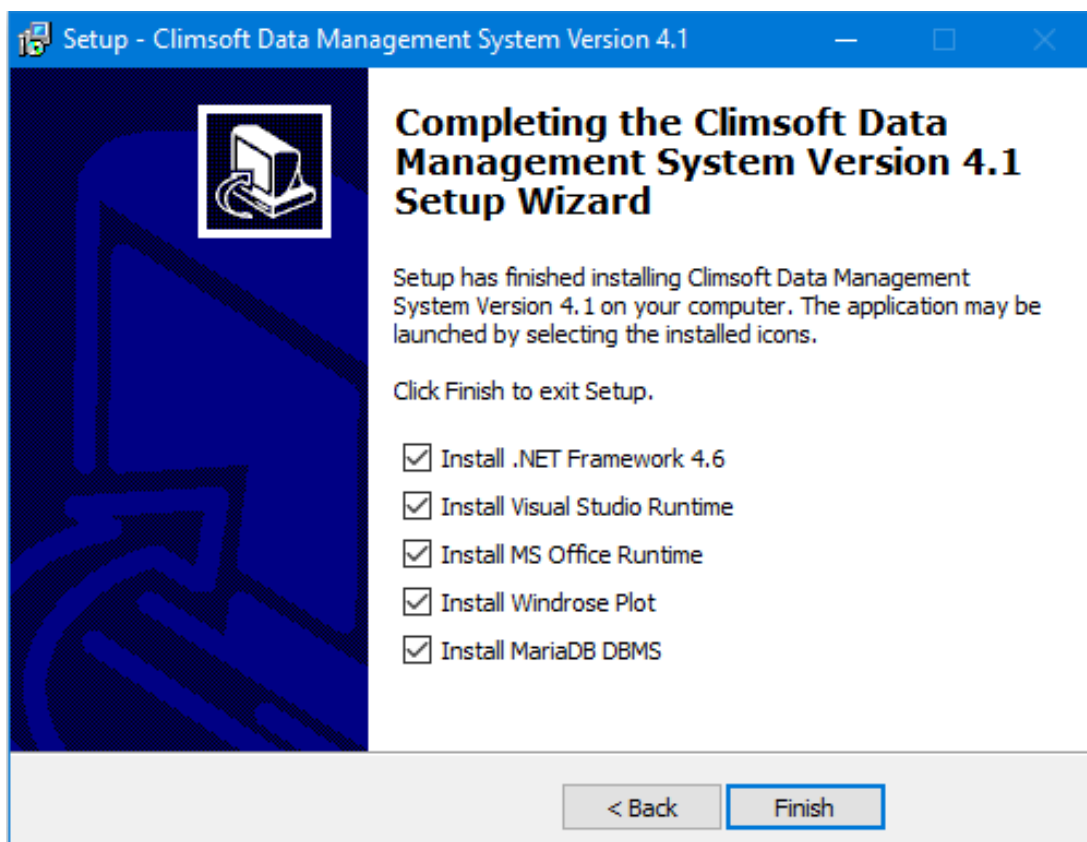


Figure 1(a): Installation of additional applications

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 very low 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:

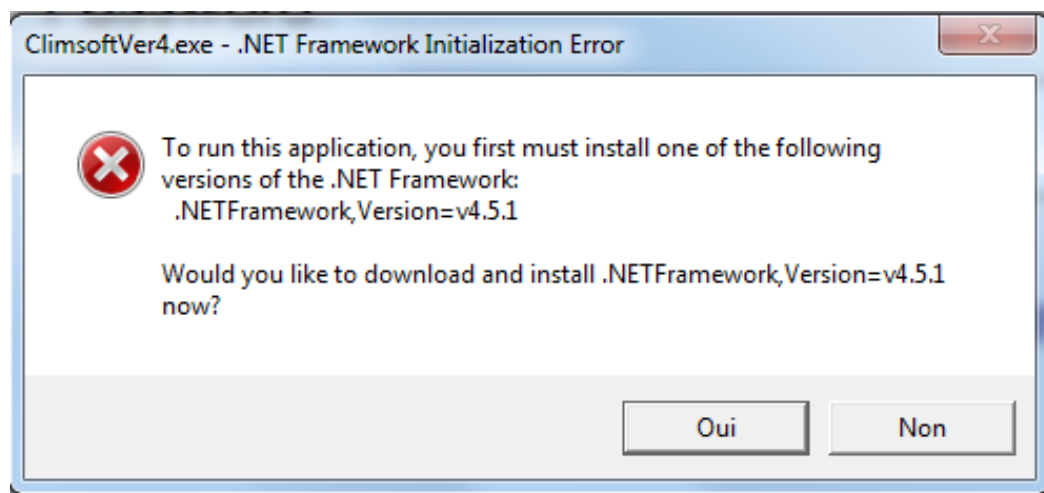


Figure 1(b): Dot Net Framework Initialisation Error

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. Figure 1(b) displays the dialog with a warning that a newer version of Microsoft Visual C++2010 Redistributable has been detected on your machine, in this case, click the Close button to continue with the installation of the next application.

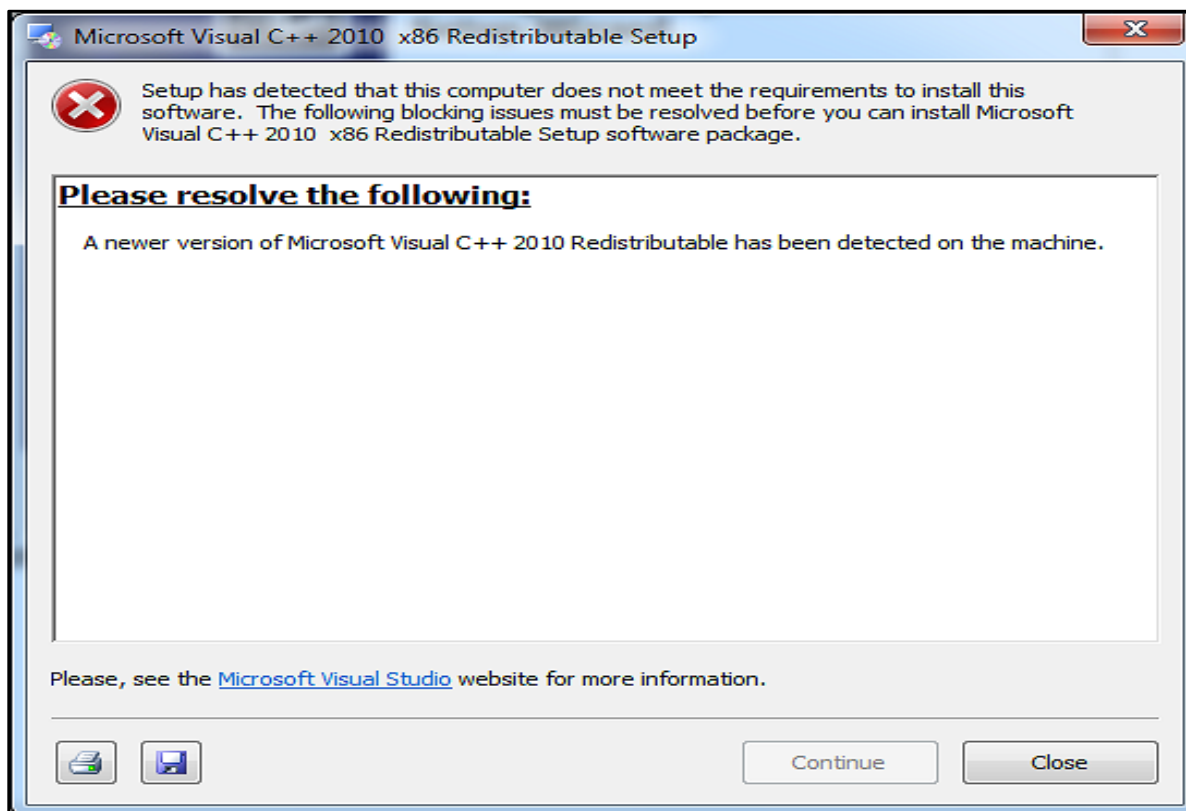


Figure 1(c): Warning about newer version of Visual Studio Runtime

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 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/](http://www.weblakes.com/). This URL is also provided on the "About" box of the WRPlot application.

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 10.x)** as shown 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.

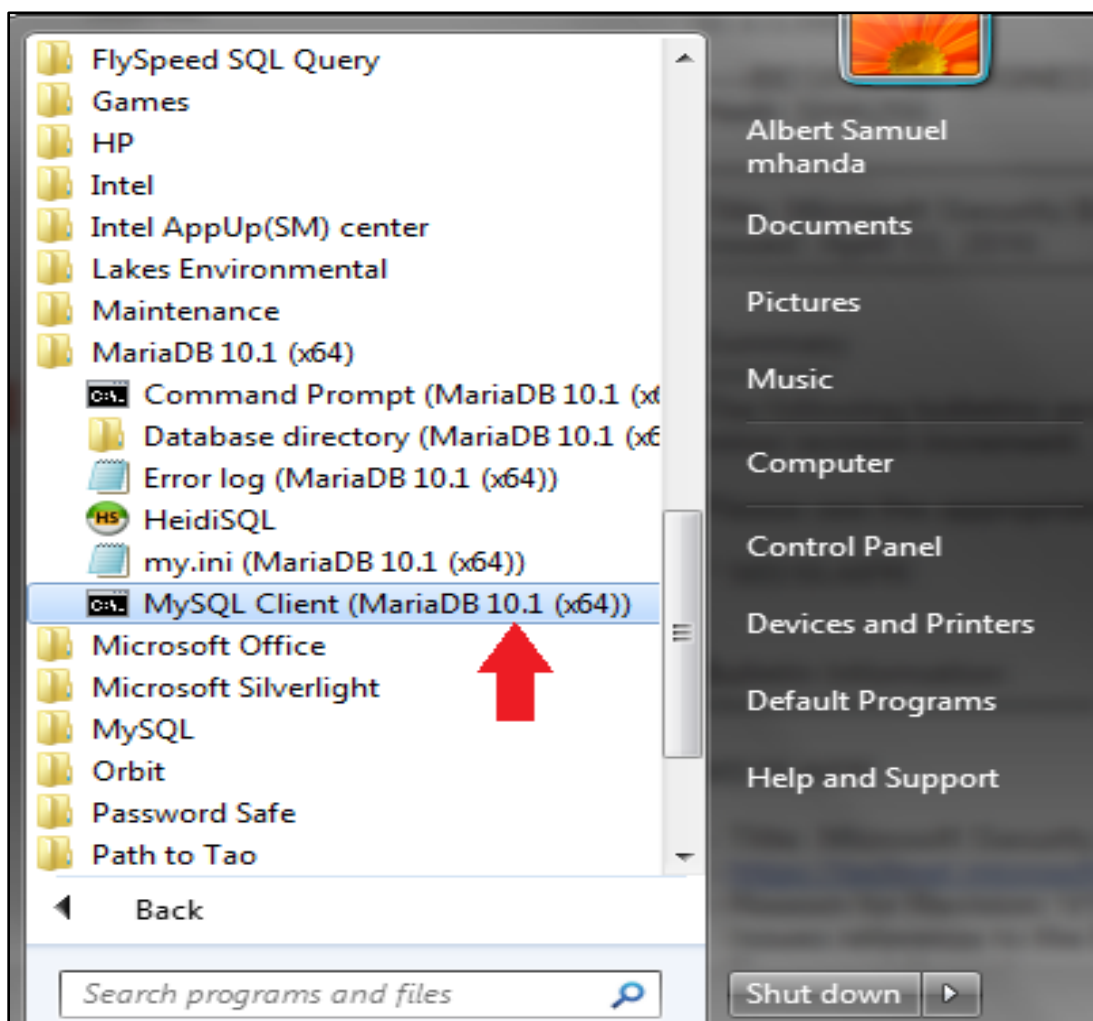


Figure 2: Launching the MariaDB Client

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

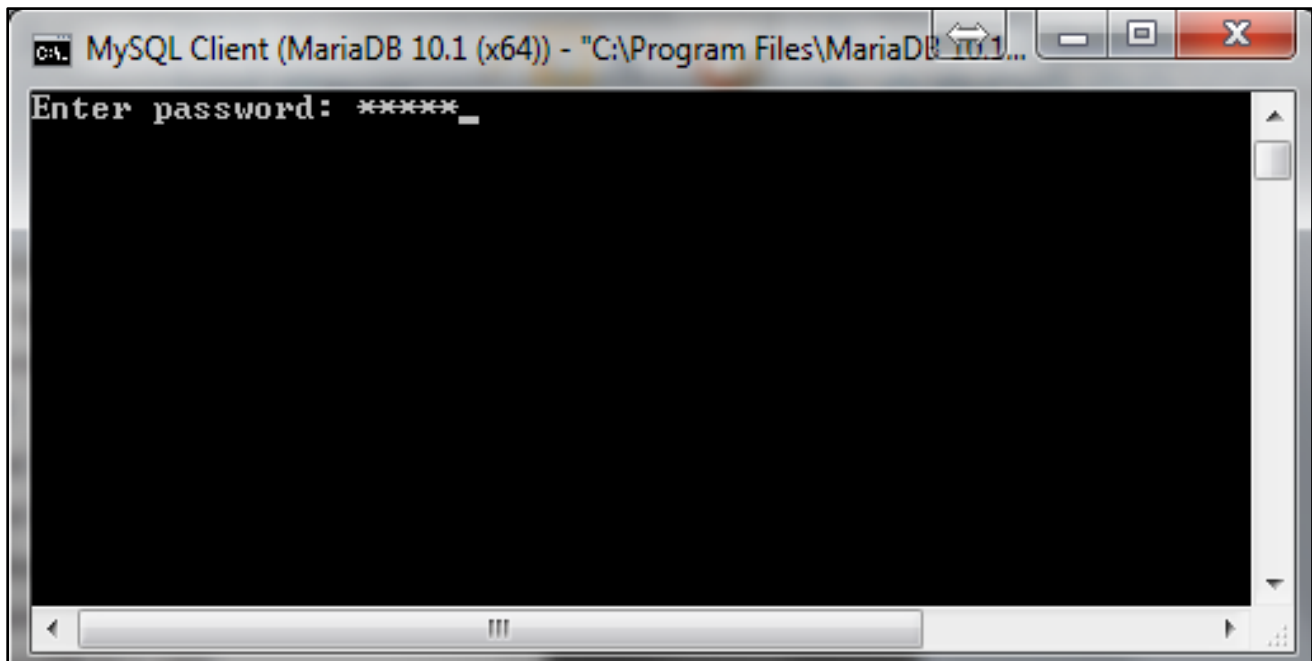


Figure 3: Entering the password on the MariaDB Client Prompt

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.

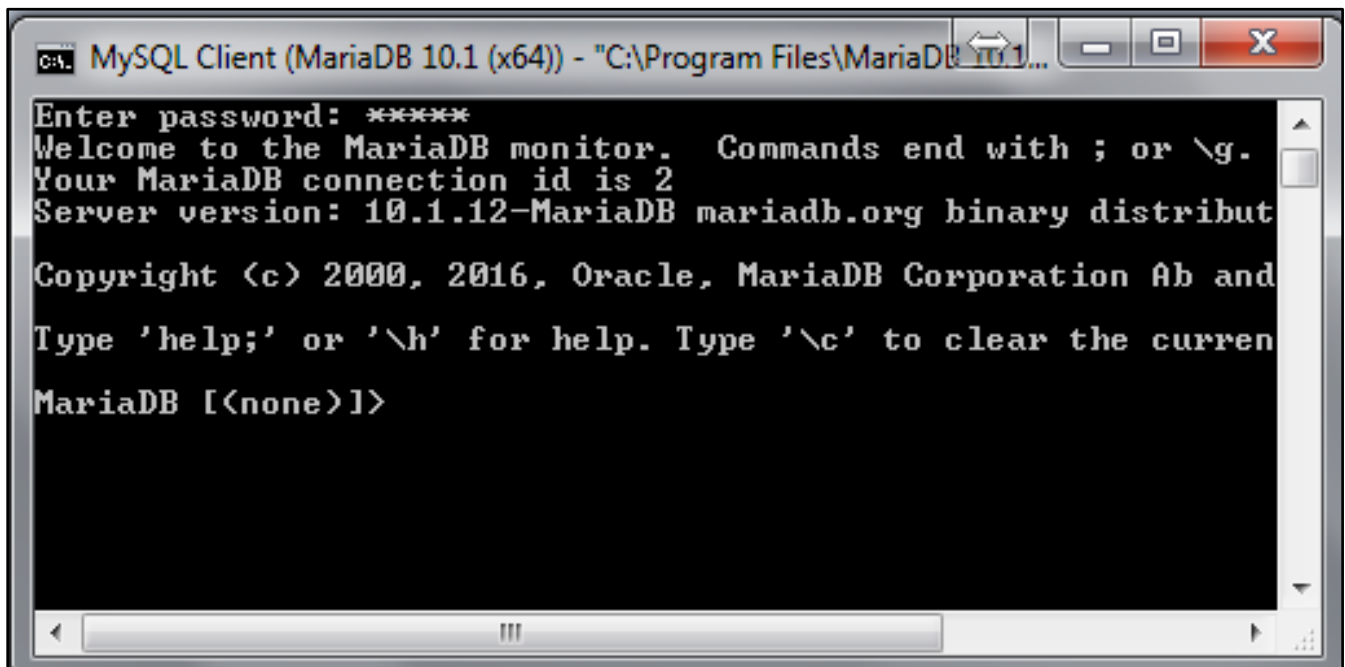


Figure 4: MariaDB Prompt after entering correct password

- (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 on 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 testing purpose (**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 in MariaDB Client Prompt and press the **Enter Key**. The 2 Climsoft databases will then listed together with other database schemas that come with MariaDB;

2.4 Setup Users permission to Climsoft folder and sub folders

The settings described in sections 2.4 and 2.5 apply to Climsoft versions up to 4.1.4. In the higher Climsoft versions settings permissions to Climsoft folder are no longer required. Dialogs in section 2.5 have also been modified as shown in section 2.6

Those using Climsoft versions 4.1.4 and earlier are strongly recommend to setup access permissions to Climsoft installation folder and sub-folders as described in the following paragraphs:

By default, Climsoft is installed in a protected Windows folder i.e.: **“C:\Program Files”** or **“Program Files (X86)”** for a 64-bit version of Windows”.

Climsoft users will require permission to update Climsoft configuration file that is located in the **“Bin”** sub folder of the Climsoft installation folder.

For instance if the installation path is: C:\Program Files” or “Program Files (X86)” for a 64-bit version of Windows” then the “write permission” should be set to the sub folder “climsoftv4” and its subfolders located at **“C:\Program Files”** or **“Program Files (X86)”** for a 64-bit version of Windows” as follow:

Step1: Go to **“C:\Program Files”** or **“Program Files (X86)”** for a 64-bit version of Windows”;

Step 2: Right click on subfolder **“climsoftv4”** and select **“Properties”** then **“Security”**;

Step 3: In the dialog that follows, select the users or group of users that will be running Climsoft;

Step 4: Click on **Full Control** box then **“Apply”** and **OK** (Figure 5);

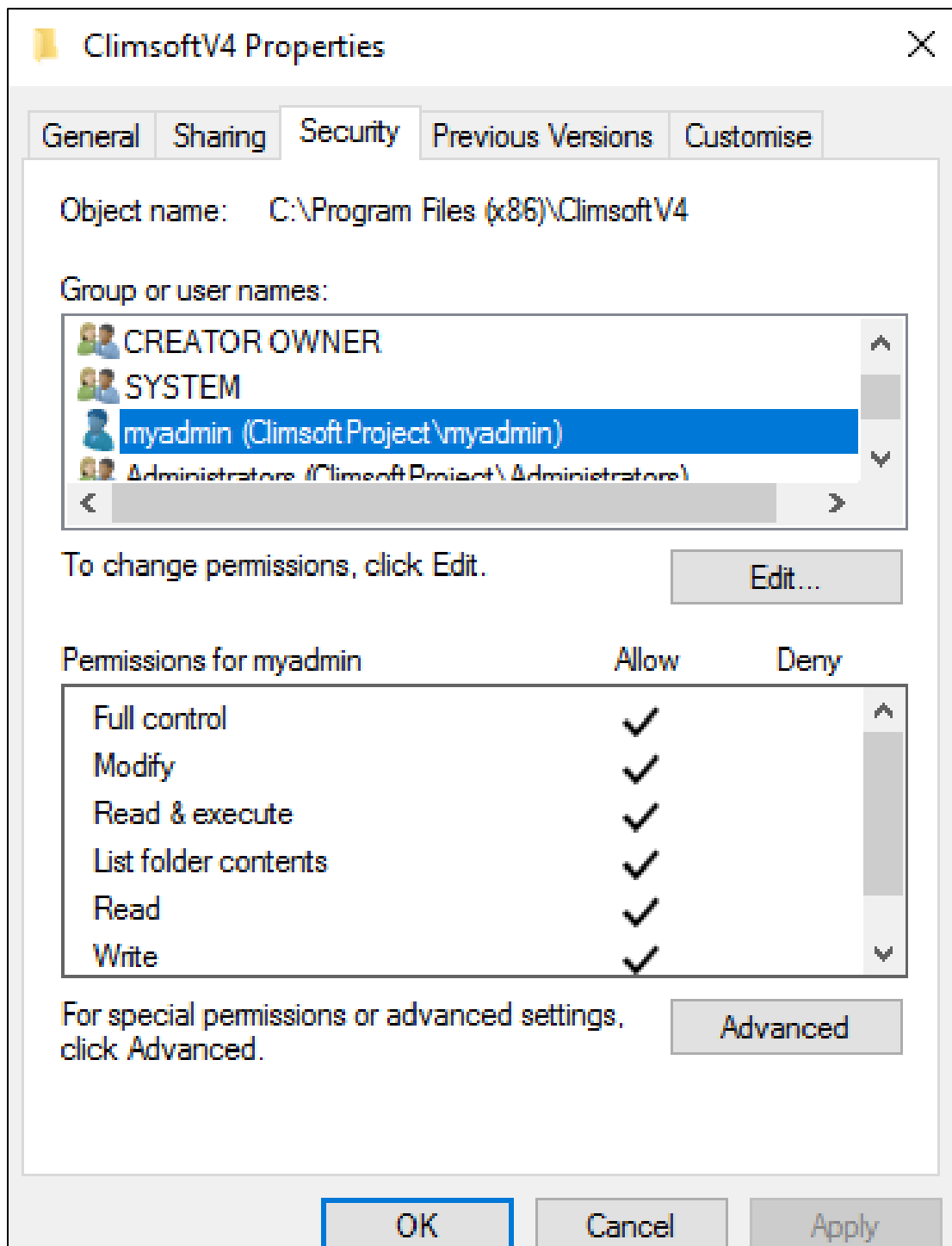


Figure 5: Setup user's permission

Step 5: If the user or group of users is not on the list, Click "**Edit**" then "**Add**" button followed by "**Advanced**" then "**Find Now**";

Step 6: Choose the right user in the list and click **OK** then Click on **Full Control** box then **OK**.

***NOTE:** These instructions are also listed in paragraph 4 of the document "**Readme_Climsoft_V4.txt**" found in sub folder "**bin**" of the Climsoft installation folder.*

2.5 Climsoft First Login for Climsoft Version 4.1.4 and earlier versions

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 username must be “**root**”.

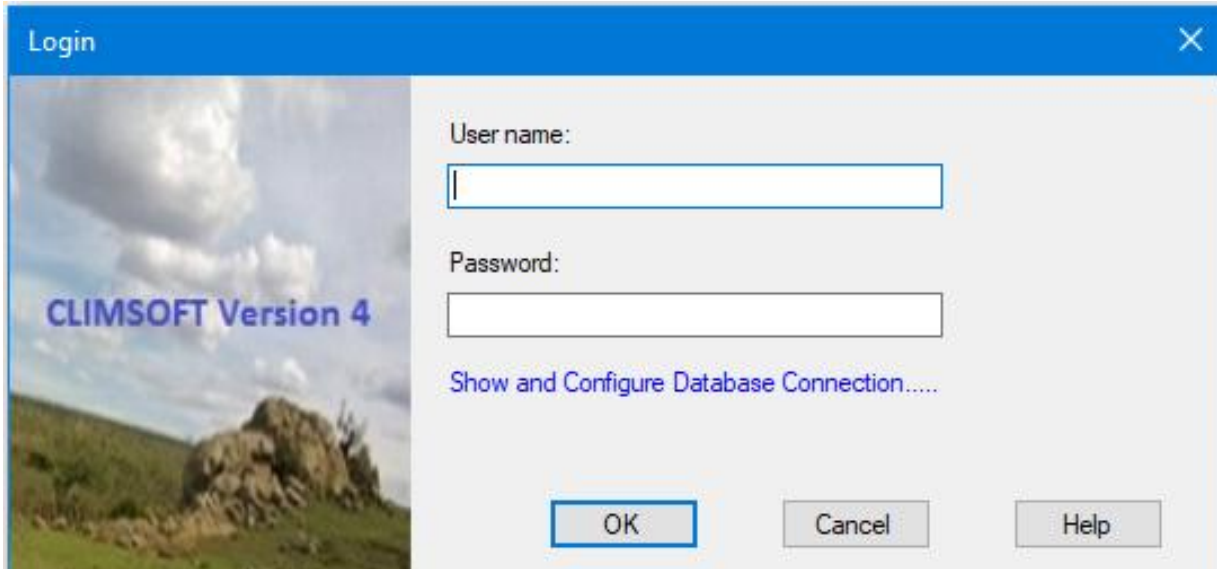


Figure 6: Climsoft Version 4 Login Dialog

(iv) If you are sure you have typed the correct password but have been denied access, click twice (not double click) on the blue label “**Show and configure database connection...**” on the above dialog to check the database connection details and adjust accordingly. Then a dialog similar to Figure7 appears.

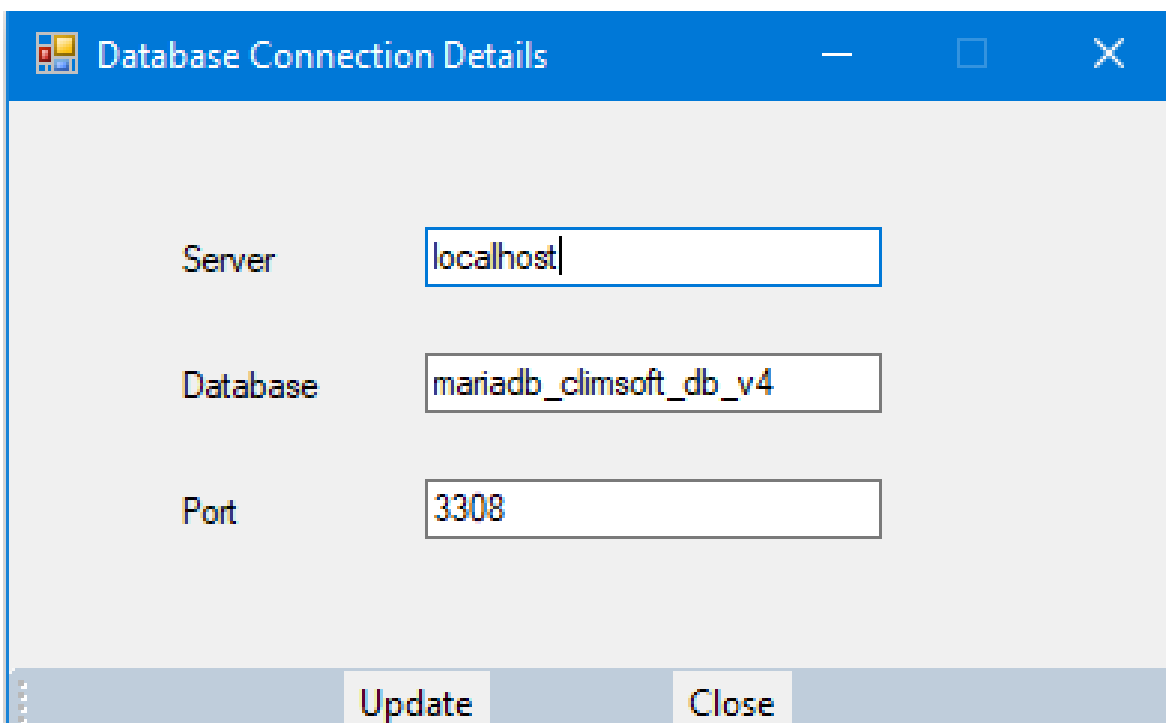


Figure 7: Database connection details

If the MariaDB database to which you want to connect is on your local computer then the server must be “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 one you used during the installation of MariaDB and click **Update**.

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 to.

2.6 Updated Climsoft Login and Database Connection

2.6.1 Login Dialog

Figure 6a : Climsoft Version 4.1.5 Login Dialog

To Login

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

To Change database connection

Click twice on Manage database connections string

To remember user name in subsequent logins

Check the box *Remember username*

2.6.2 Database Connection Dialog

Connection name	Server address	Database name	Port number
Default_database	localhost	mariadb_climsoft_db_v4	3308
MzDB	192.168.20.145	mariadb_climsoft_db_v4	3308
test_db	localhost	mariadb_climsoft_test_db_v4	3308

Example connections

Server address: 127.0.0.1

Database name: mariadb_climsoft_db_v4
mariadb_climsoft_test_db_v4

Port number: 3306 MySQL default
3308 MariaDB default

Current selection

Make default
Test connection
Remove connection

OK Cancel

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 (i.e *)
- Follow the provided *Example connections* to fill all cells of that row
- Click on the button *Make default*
- Click OK to save changes and close the dialog

Figure 7a: Database connection details

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.

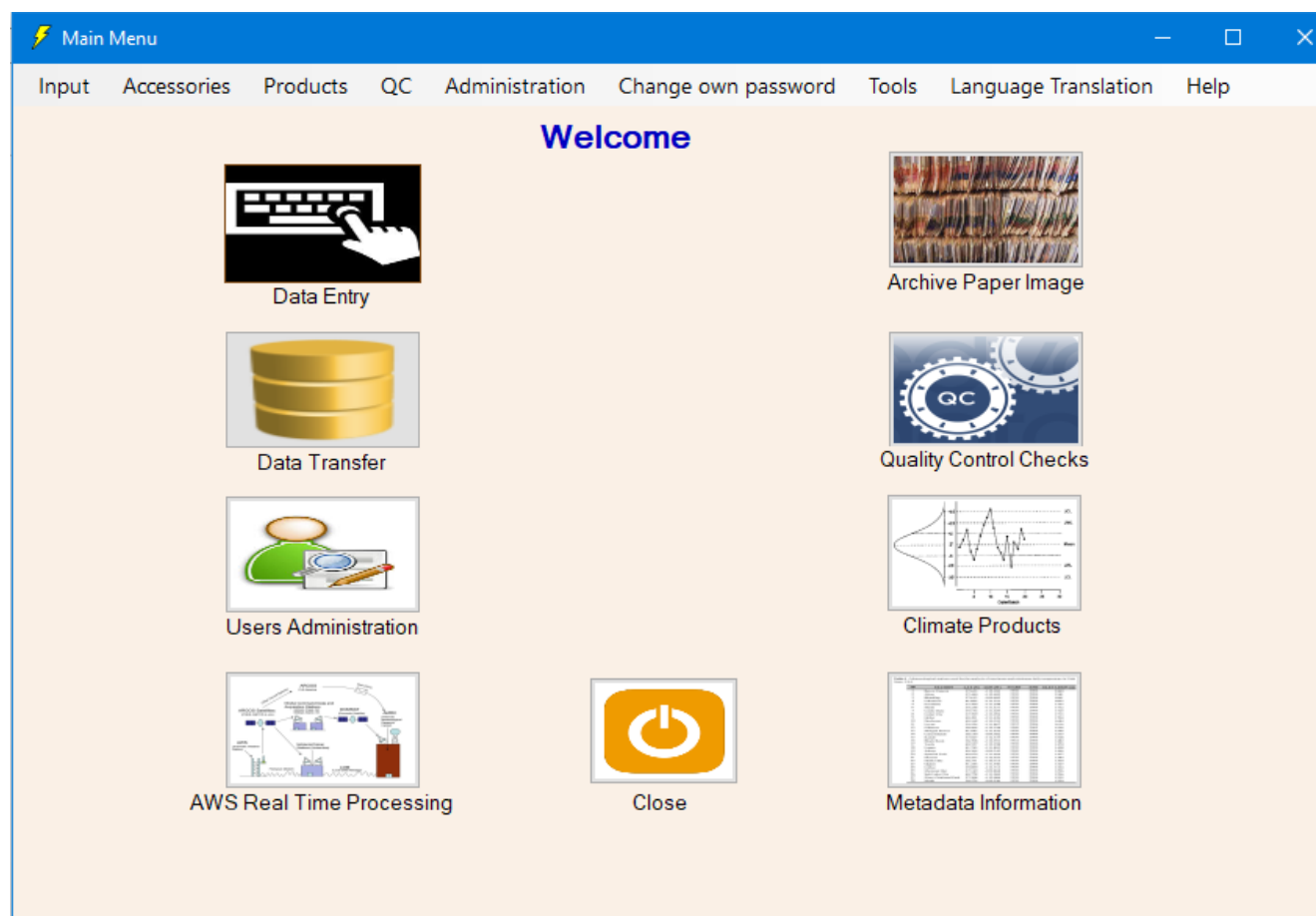


Figure 8: Welcome Dialog

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

3.1 Menu Bar

- **Input** – Open key entry forms and the paper archive dialog;
- **Accessories** – Open the calculation of Relative Humidity and Dew point, given the Dry; Bulb and Wet bulb temperature;
- **Products** – Open the Climate data 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 password;
- **Tools** – Open dialogs for different operational settings;

- **Language translation** – Open the dialog for setting the language to be used in the user interfaces;
- **Help** – About Climsoft V4 and online help on how to undertake various operations.

3.2 Main Menu Icons

- **Data Entry** – List key entry forms to enter climate data. Same as in the menu **Input**;
- **Data Transfer** – Open a dialog for data upload, import (external data), backup and restore;
- **Users Administration** – Open a dialog for adding users and updating their details. . Same as in the menu **Administration**;
- **AWS Real Time Processing** – Open a dialog for setting and managing Automatic Weather Station (AWS) real time operations;
- **Archive Paper Image** - Open a dialog for managing paper images. Same as in the **Menu**;
- **Quality Control checks** - Open a dialog for quality control checks. Same as in the menu **Input**;
- **Climate Products** - Open a dialog to extract climate products. Same as in the menu **QC**;
- **Metadata Information** - Open 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 observationintial and Quality Control
ClimsoftRainfall	Key-entry of only rainfall data
ClimsoftTranslator	Translation of text on controls and messages

Table 1: CLIMSOFT user roles

The “**root**” user or an administrator 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.

User Management

To remove a user account, select the username on the grid display and click on Delete button.

Username

User Role

Password

Confirm Password

Add New Delete Close Help

	userName	userRole
▶	admin	ClimsoftAdmin
	developer	ClimsoftDeveloper
	metadata	ClimsoftMetadata

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.

After creating new users, the Climsoft administrator can change the password of any user via the “**Administration**” menu, any user can change his/her own password via the menu item “**Change own password**”.

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.

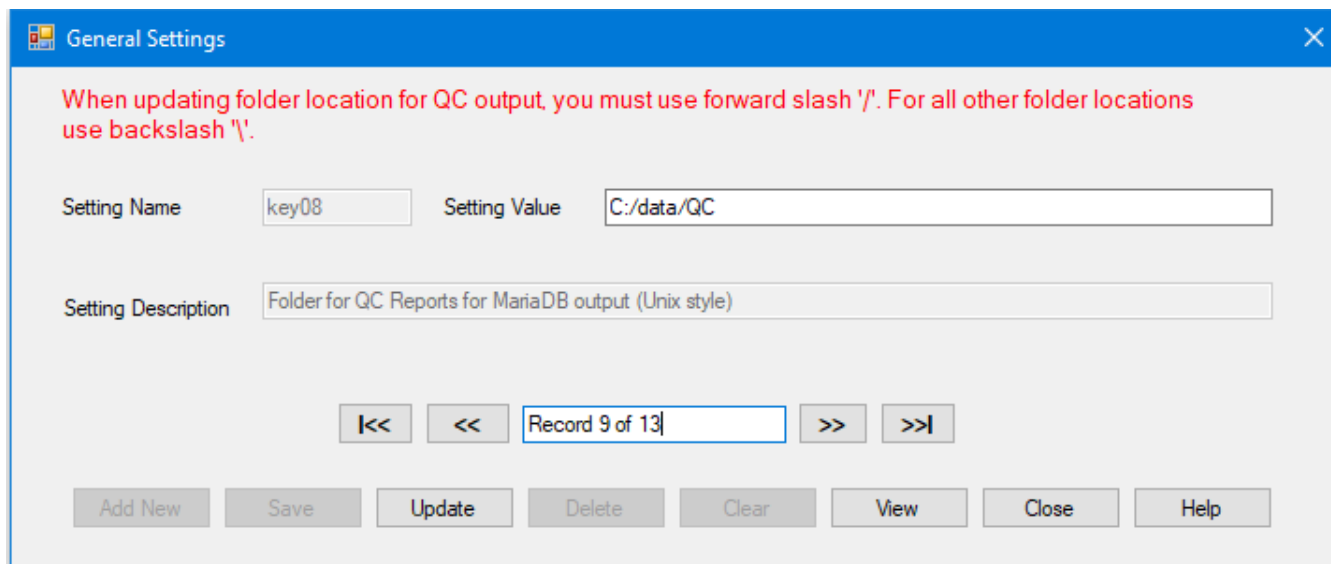
The screenshot shows a window titled "General Settings" with a blue header bar. Inside, a red text warning reads: "When updating folder location for QC output, you must use forward slash '/'. For all other folder locations use backslash '\\". Below this, there are two input fields: "Setting Name" with the value "key08" and "Setting Value" with the value "C:/data/QC". A "Setting Description" field contains the text "Folder for QC Reports for MariaDB output (Unix style)". At the bottom, there is a navigation bar with buttons for "<<", "<<|", "Record 9 of 13", ">>|", and ">>". Below the navigation bar is a row of action buttons: "Add New", "Save", "Update", "Delete", "Clear", "View", "Close", and "Help".

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

The screenshot in Figure 10a shows the default value for the folder for QC reports that will be generated from Climsoft. In Figure 10a, the folder name and path must match the folder and path on the computer where the Climsoft database has been installed. The folder name and path do not necessarily have to be the same as the default value shown in the screenshot. The “**Update**” button must be clicked for each setting (on each record) to take effect.

IMPORTANT!

In Figure 10a, 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.

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

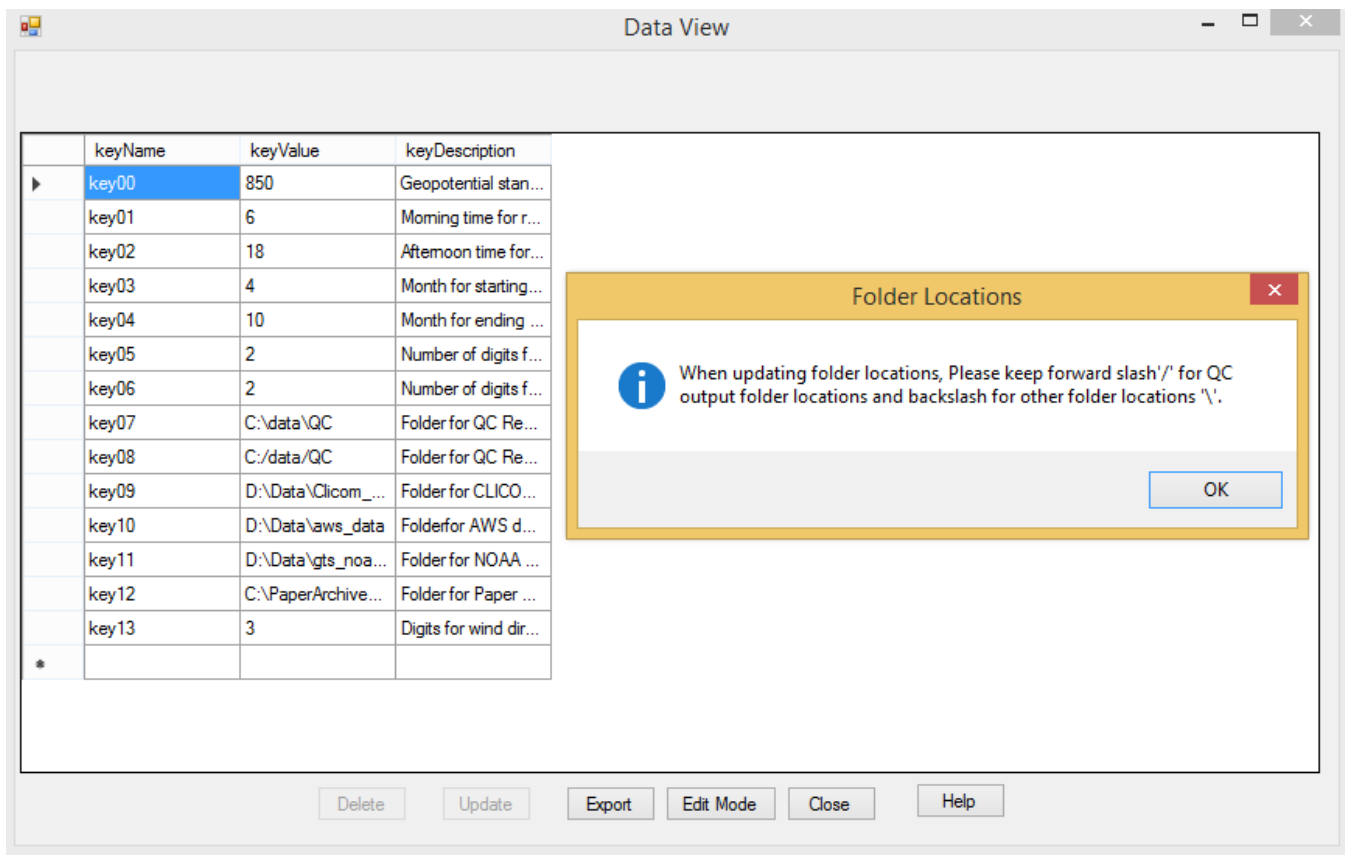


Figure 10 (b): General settings in datasheet view mode

Read and understand the message in the information box the click OK to proceed. 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. Values in the column “**KeyName**” should not be changed because they are used by Climsoft to reference the selected record.

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 data is in place before the data 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 metadata type.

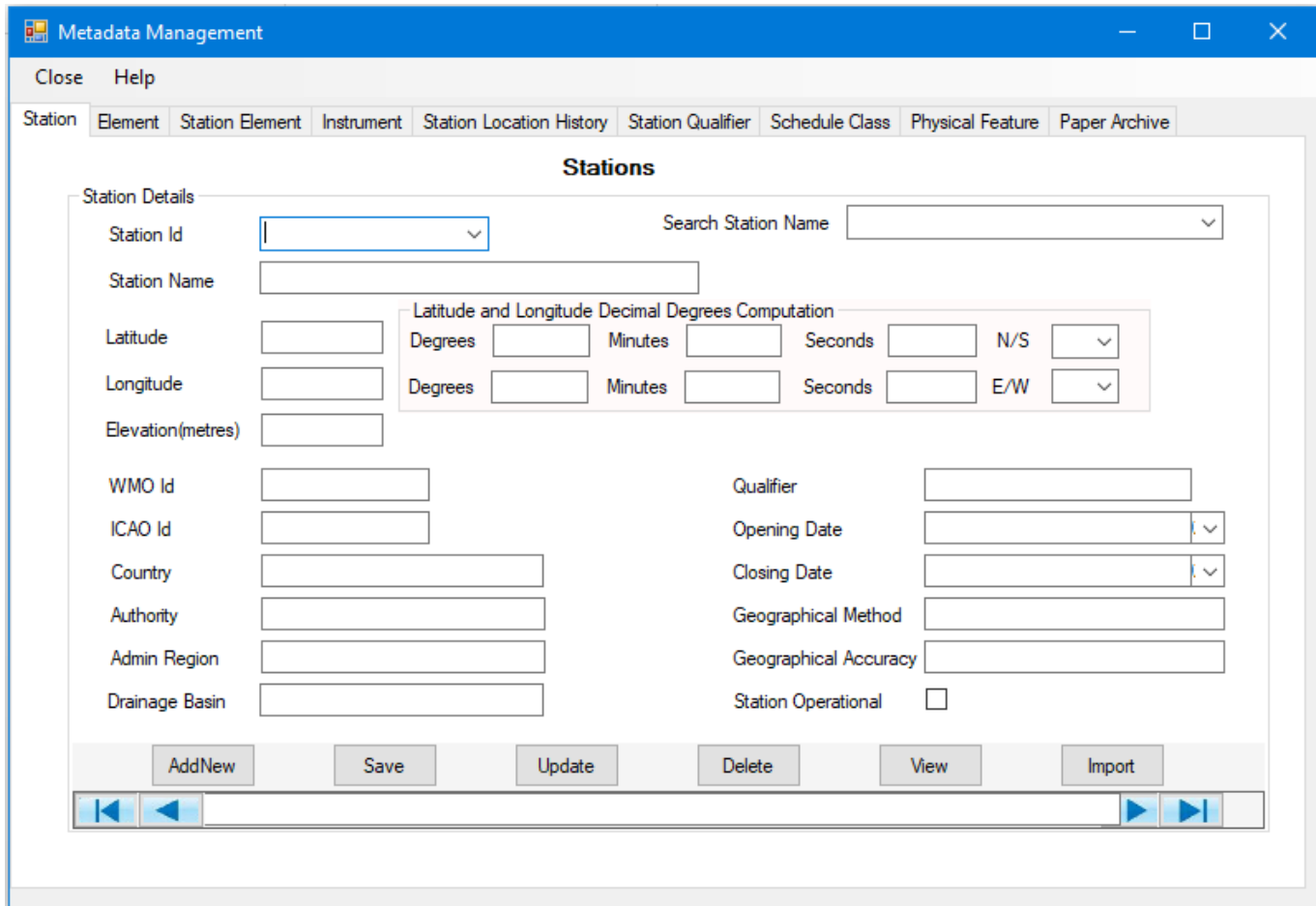


Figure 11: Metadata Management

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** – 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 by selecting the Station Id value.

- **Latitude** and **Longitude** MUST be entered in decimal degrees. However, a dialog to convert directly geographical coordinates in degrees, minutes and seconds (Latitude and Longitude in Degrees, Minutes and Seconds) into Degrees Decimal is provided.
- **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 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

Text File (CSV) C:\Users\myadmin\Documents\Rda\Backup_climsoft_rda\manual_station

Import Field No	Import Field Name	Select Fields
1	id	stationId
2	station_name	stationName
3	qualifier	qualifier
4	country	country
5	district	adminRegion
6	authority	authority
7	begin_datetime	openingDatet...
8	end_datetime	closingDateti...
9	longitude	longitude
10	latitude	latitude
11	elevation	elevation
12	drainagebasin	drainageBasin

Error Messages

Import Reset Close Help

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		LOKICHOGIO LOPANDING AMREF STATION	TURKANA	KENYA	RAINFALL	2B	4.2	34.4	638
8534002			01/01/1986 00:00		LOKICHOGIO 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.

```

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 station 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 do not require importing but are typed since they are usually few.

5.2.1 Elements

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, so the only modifications needed will be to the **limits** or the **scale**.

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.

Metadata Management

Close Help

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

Observation Elements

Search Element

ID: 2

Abbreviation: TMPMAX

Name: Temp Daily Max

Description: Temperature daily maximum

Scale: 0.1

Upper Limit: 460.00

Lower Limit: 130.00

Unit: Degrees C

Type: daily

Selected: ☒

Total Required: ☐

AddNew Save Update Delete View

1 of 424

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.
- 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
2	TMPMAX	Temp Daily Max	Temperature daily	0.1	460.00	130.00	Degrees C
3	TMPMIN	Temp Daily Min	Temperature daily	0.1	250.00	50.00	Degrees C
4	TMPMN	Temp Daily Mean	Temperature daily	0.1			Degrees C
5	PRECIP	Precip Daily	Precipitation daily	0.1	3000.00	0.00	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 ho...	Precip greatest a...	0.1			Millimeters
12	DPTMAX	Temp Dew Point...	Temperature de...	0.1			Degrees C
13	DPTMIN	Temp Dew Point...	Temperature de...	0.1			Degrees C
14	DPTMN	Temp Dew Point...	Temperature de...	0.1			Degrees C
15	RHMAX	RH Daily Max	Relative humidity ...	1	100.00	0.00	Percent
16	RHMIN	RH Daily Min	Relative humidity ...	1	100.00	0.00	Percent
17	RHMEAN	RH Daily Mean	Relative humidity ...	1	100.00	0.00	Percent
18	EVAPPN1	Evap Pan1 Daily	Evaporation pan...	0.1	250.00	0.00	Millimeters

Buttons: Delete, Update, Export, 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,
- **Close:** Closes the view table,
- **Help:** Online help on how to use this dialog.

(iv) Selected elements

This box is used to select the 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. Remember to click the **Update** button whenever the box is checked or unchecked otherwise the action will not be saved.

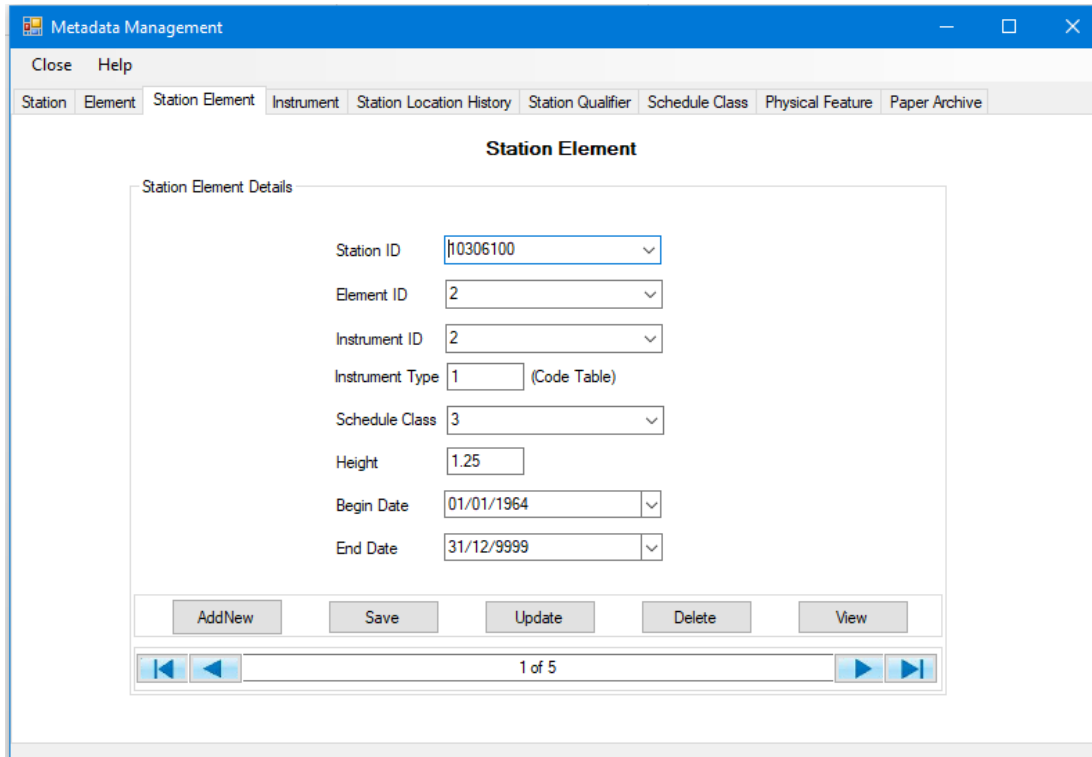
(v) Total Required

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. 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 details about the *stationId*, *elementId*, *instrumentId* and *scheduleclass* that describes this element should be entered in their respective tables in that order.



The screenshot shows a window titled "Metadata Management" with a menu bar containing "Close" and "Help". Below the menu bar is a tabbed interface with tabs for "Station", "Element", "Station Element", "Instrument", "Station Location History", "Station Qualifier", "Schedule Class", "Physical Feature", and "Paper Archive". The "Station Element" tab is selected, and the title "Station Element" is centered above the form area. The form is titled "Station Element Details" and contains the following fields:

- Station ID: A dropdown menu showing "0306100".
- Element ID: A dropdown menu showing "2".
- Instrument ID: A dropdown menu showing "2".
- Instrument Type: A text input field showing "1" followed by "(Code Table)".
- Schedule Class: A dropdown menu showing "3".
- Height: A text input field showing "1.25".
- Begin Date: A date picker showing "01/01/1964".
- End Date: A date picker showing "31/12/9999".

Below the form fields are five buttons: "AddNew", "Save", "Update", "Delete", and "View". At the bottom of the dialog is a pagination bar with navigation arrows and the text "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 Station Element Instrument Station Location History Station Qualifier Schedule Class Physical Feature Paper Archive

Instrument

Instrument Details

Instrument ID:

Name:

Abbreviation:

Station ID:

Serial Number:

Model:

Manufacturer:

Uncertainty (%):

Installation Date:

Deinstallation Date:

Height:

Image File:

1 of 4

Figure 18: Instrument details

5.2.4 Station Location History

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

Metadata Management

Close Help

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

Station Location History

HistoryDetails

Station:

Station Type:

GeogLocation Method:

GeogLocation Accuracy:

Opening Date:

Closing Date:

Latitude:

Longitude:

Elevation:

Authority:

Administration Region:

Drainage basin:

1 of 2

Figure 19: Station Location History

5.2.5 Station Qualifier

The qualifier of the station are shown in the dialog in Figure 20.

The screenshot shows the 'Metadata Management' window with the 'Station Qualifier' tab selected. The 'Station Qualifier' dialog is open, displaying the following fields:

- Qualifier: AGROMET
- Station ID: 10101100
- Begin Date: 01/01/1930
- End Date: 31/01/9999
- Time Zone: 1
- Network Type: AGROMETEOROLOGICAL

At the bottom of the dialog, there are buttons for 'AddNew', 'Save', 'Update', 'Delete', and 'View'. Below these buttons is a pagination bar showing '2 of 5' records.

Figure 20: Station Qualifier

5.2.6 Schedule Class

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

The screenshot shows the 'Metadata Management' window with the 'Schedule Class' tab selected. The 'Schedule Class' dialog is open, displaying the following fields:

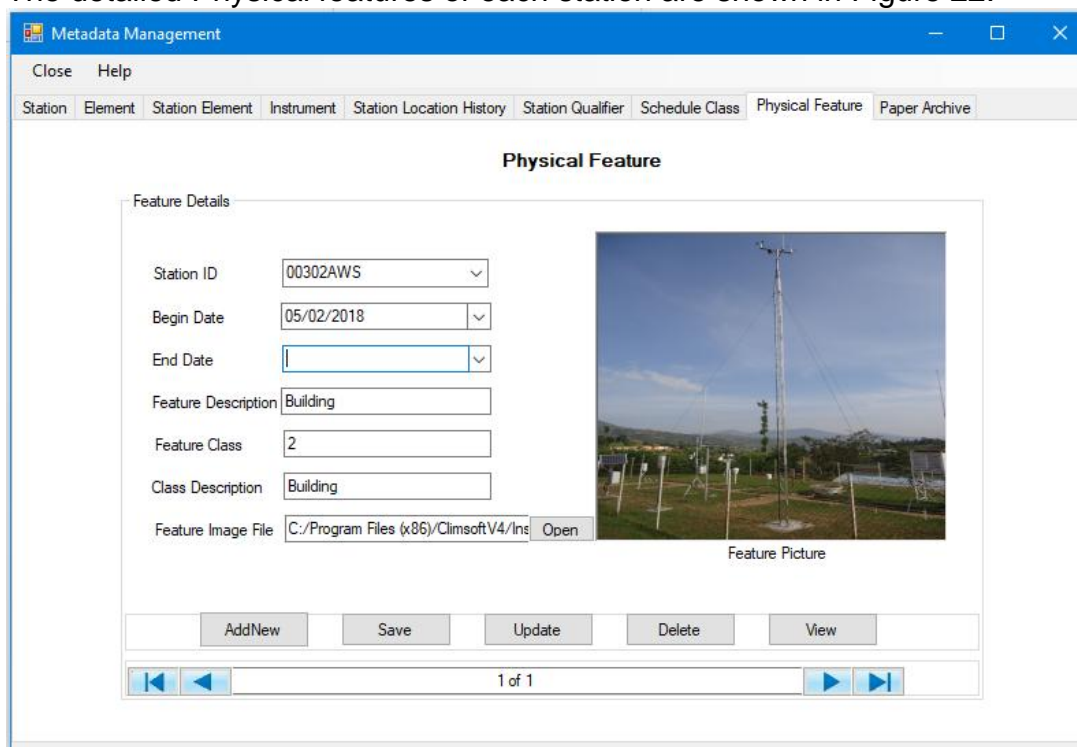
- Class: 11
- Station ID: 00301AWS
- Description: MINUTES

At the bottom of the dialog, there are buttons for 'AddNew', 'Save', 'Update', 'Delete', and 'View'. Below these buttons is a pagination bar showing '1 of 3' records.

Figure 21: Schedule Class

5.2.7 Physical Feature

The detailed Physical features of each station are shown in Figure 22.



The screenshot shows the 'Metadata Management' application window with the 'Physical Feature' tab selected. The window has a menu bar with 'Close' and 'Help'. Below the menu bar is a tabbed interface with tabs for 'Station', 'Element', 'Station Element', 'Instrument', 'Station Location History', 'Station Qualifier', 'Schedule Class', 'Physical Feature', and 'Paper Archive'. The 'Physical Feature' tab is active, displaying a form titled 'Physical Feature'.

The form contains the following fields:

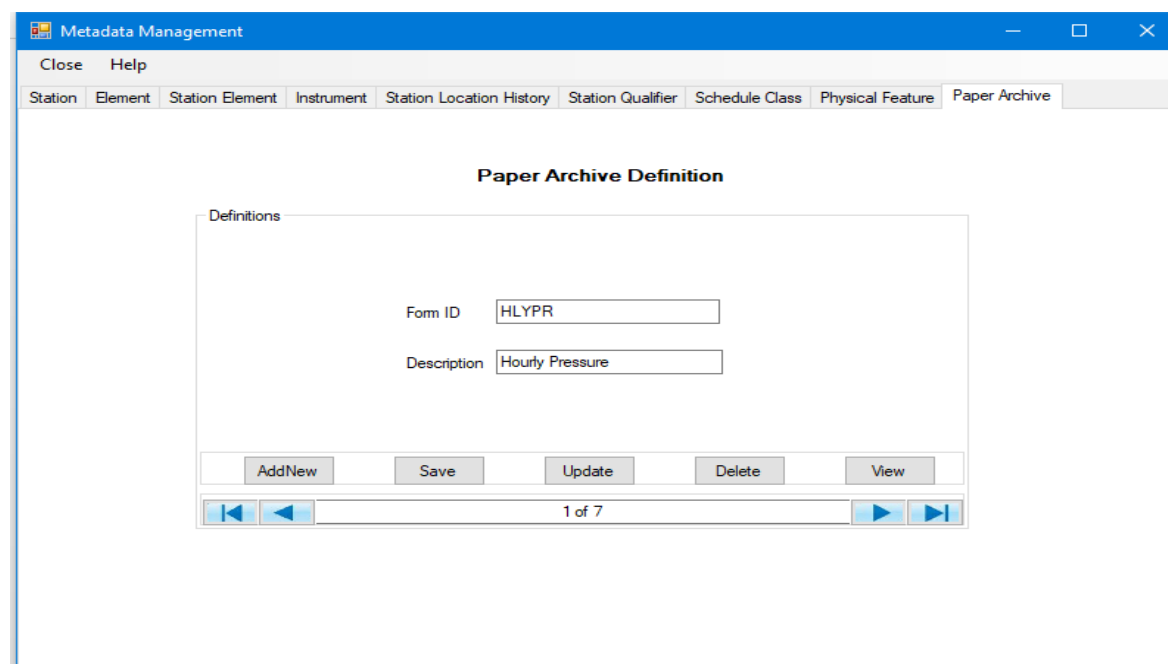
- Station ID: 00302AWS
- Begin Date: 05/02/2018
- End Date: (empty)
- Feature Description: Building
- Feature Class: 2
- Class Description: Building
- Feature Image File: C:/Program Files (x86)/Climsoft V4/Ins (with an 'Open' button)

To the right of the form is a 'Feature Picture' showing a tall meteorological instrument tower. Below the form and picture are buttons for 'AddNew', 'Save', 'Update', 'Delete', and 'View'. At the bottom, there is a pagination bar showing '1 of 1' with navigation arrows.

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.



The screenshot shows the 'Metadata Management' application window with the 'Paper Archive' tab selected. The window has a menu bar with 'Close' and 'Help'. Below the menu bar is a tabbed interface with tabs for 'Station', 'Element', 'Station Element', 'Instrument', 'Station Location History', 'Station Qualifier', 'Schedule Class', 'Physical Feature', and 'Paper Archive'. The 'Paper Archive' tab is active, displaying a form titled 'Paper Archive Definition'.

The form contains the following fields:

- Form ID: HLYPR
- Description: Hourly Pressure

Below the form are buttons for 'AddNew', 'Save', 'Update', 'Delete', and 'View'. At the bottom, there is a pagination bar showing '1 of 7' with navigation arrows.

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 this administration process is 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.

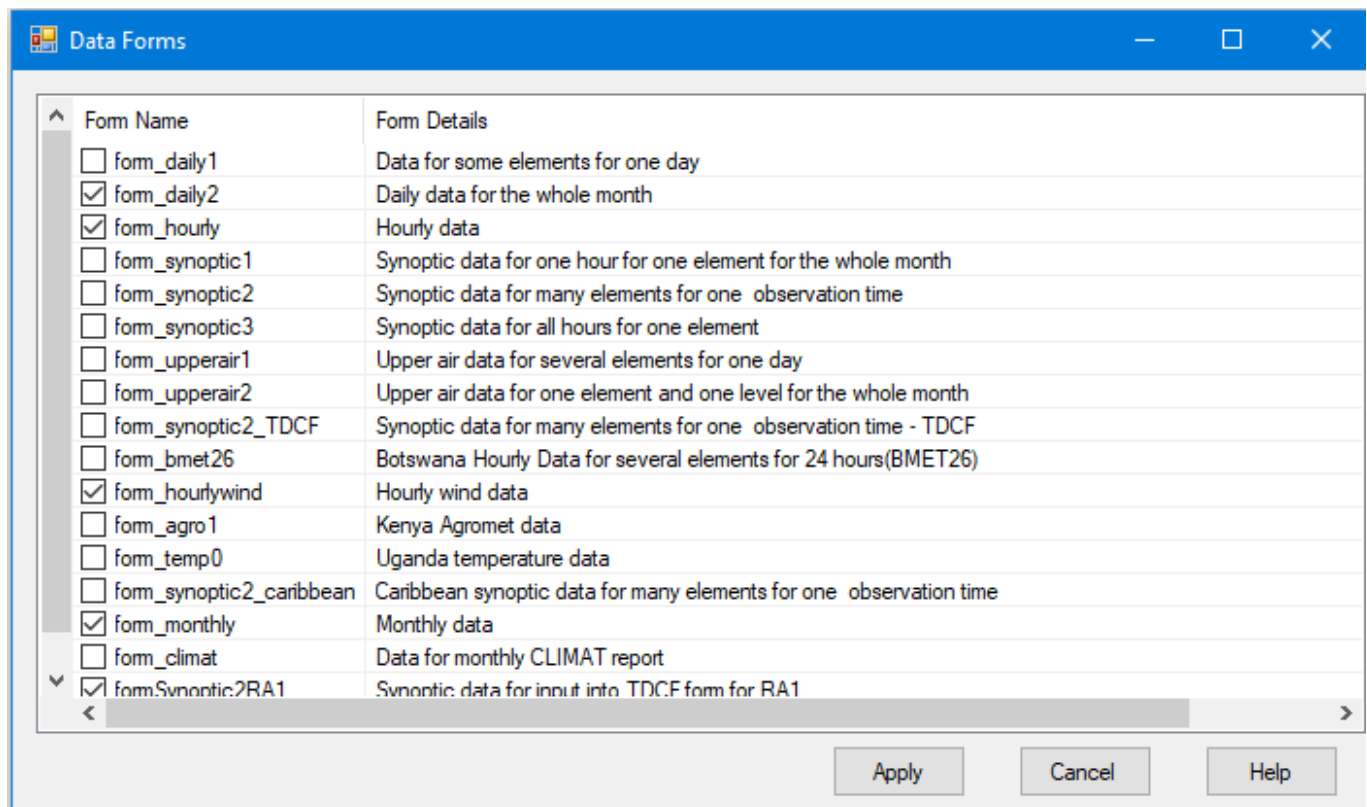


Figure 24: Key Entry Forms Settings

- 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;

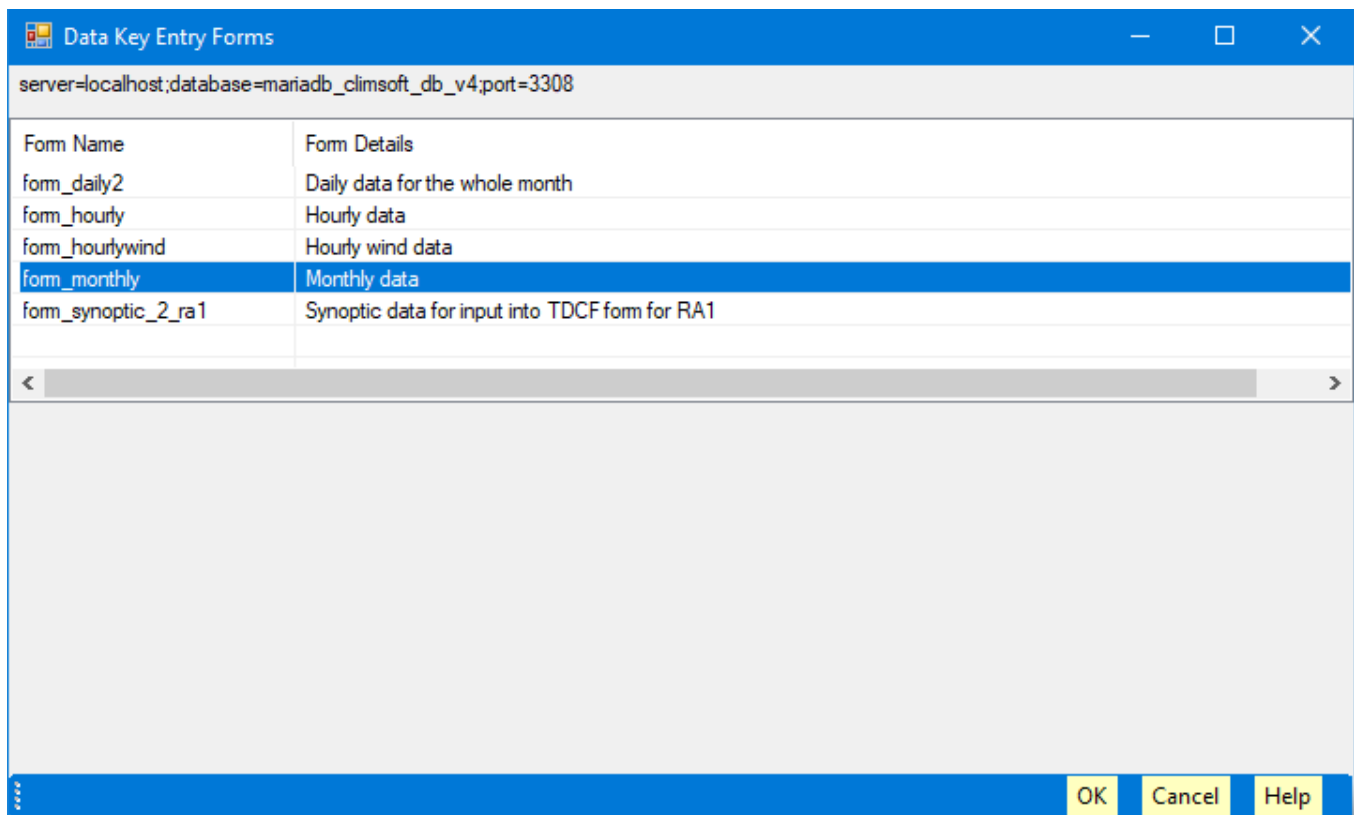


Figure 25: Key Entry forms opening

- 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.

Hourly Data ×

Station:
KIGALI AERO

Element:
Temp Dry Bulb

Year:
1964

Month:
1

Day:
4

Enable synoptic hours only

Assign same value to all obs

Value=

Hour	Value	Flag	Hour	Value	Flag
00	160		12	228	
01	158		13	240	
02	155		14	245	
03	149		15	250	
04	145		16	251	
05	140		17	250	
06	138		18	229	
07	145		19	209	
08	165		20	206	
09	190		21	200	
10	200		22	193	
11	215		23	188	

Total

<<

<

Record 76 of 28395

>

>>

Add New

Save

Update

Delete

Clear

View

Close

Help

☐ Repeat Entry
 Sequencer seq_month_day_element

Upload

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.

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 when entering a new record.

	seq	element_code
▶	1	114
	2	112
	3	111
	4	110
	5	107
	6	106
	7	101
	8	102
	9	166

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.

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.

	seq	elementId
▶	1	2
	2	3
	3	85
	4	853
	5	854
	6	855
	7	856
	8	860
	9	14

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.

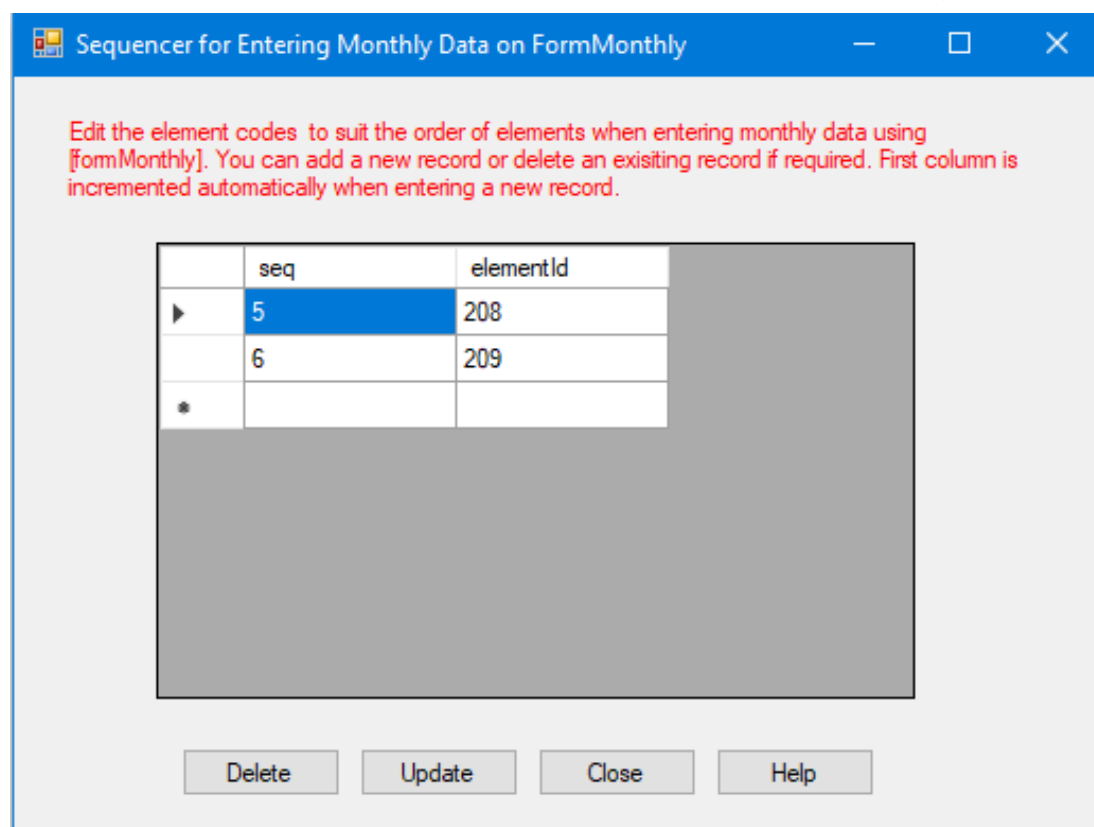


Figure 29: Dialog for configuring sequencer for monthly data

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 synoptic hours. This is done by disabling the text boxes for non-synoptic hours by clicking the button “**Enable synoptic hours only**”. This button is located just below the header information on the hourly form. Figure 30 shows the hourly form when key-entry is enabled only for 3 hours.

Station: KIGALI AERO

Element: Precip Daily

Year: 2016 Month: 7 Day: 1

Enable all hours Assign same value to all obs value=

Hour	Value	Flag
00	0	
01		
02		
03	0	
04		
05		
06	0	T
07		
08		
09	5	
10		
11		

Hour	Value	Flag
12	0	
13		
14		
15	0	
16		
17		
18	0	
19		
20		
21	0	
22		
23		

Total

Record 3 of 3

Add New Save Update Delete Clear View Close Help

Sequencer seq_month_day_element_leap_yr Upload

Figure 30: Hourly form enabled just for synoptic hours

When the button “**Enable synoptic hours only**” has been clicked, its label immediately changes to “**Enable all hours**”, so it allows toggling between “all hours” and “synoptic hours”. The dialog for configuring the specific synoptic hours that would be enabled is accessed via **Tools >> FormHourly time selection**. A screenshot of the dialog is shown in Figure 31.

Time Selection for FormHourly

If you require to use the hourly form for entering only selected hours e.g. synoptic hours, then set the selection for those hours to one [1] and the rest to zero [0]. You can toggle to all hours on the hourly form when required.

	hh	hh_selection
▶	0	1
	1	0
	2	0
	3	1
	4	0
	5	0
	6	1
	7	0
	8	0

Update

Close

Help

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 the 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 and the element limits for QC are adjusted, 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.

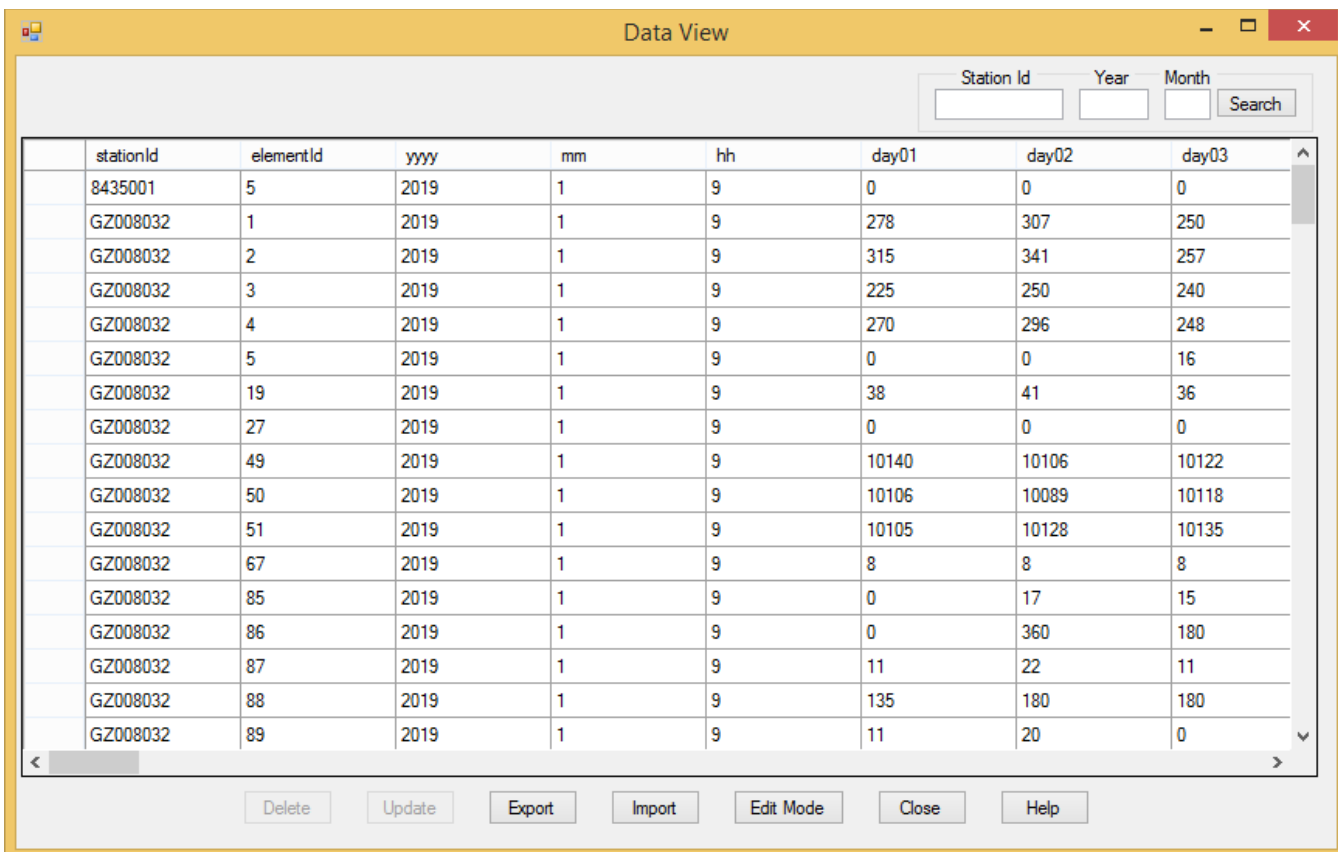
The use of the key entry forms is quite intuitive, so there is no need for detailed guidelines except to highlight the common aspects that apply to all key-entry forms, and some features related to specific forms.

- 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 displays the 'Daily data for the whole month' interface. At the top, there are dropdowns for 'Station' (AGASE) and 'Element' (Temp Daily Max), along with a checkbox for 'Enable Element Sequencer'. Below these are input fields for 'Year' (2017), 'Month' (12), and 'Hour' (6). A button 'Assign same value to all obs' and a 'Value=' field are also present. The 'Units' section shows 'Temperature' as 'Deg C', 'Precip' as 'mm', 'Cloud height' as 'Feet', and 'Visibility' as 'metres'. The main data entry area is a table with columns 'Day', 'Value', 'Flag', and 'Period'. The table is divided into three sections: days 01-10, 11-20, and 21-31. The value '480' is entered for Day 21, which is highlighted in red. A yellow warning icon and a message box 'ClimsoftVer4' with the text 'Value higher than upperlimit of: 460.00' are overlaid on the table. The bottom of the form contains navigation buttons (I<<, <<, Record 1 of 3, >>, >>I), action buttons (Add New, Save, Update, Delete, Clear, View, Close, Help), a 'Sequencer' field set to 'seq_daily_element', and a green '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 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. The 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. Although navigation through all records entered is possible for all key-entry operators, **“Delete”** button is disabled for key-entry operators, but enabled for the and administrator. This is to minimize the chances of operators deleting each other’s data.



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

- (i) 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.
- (ii) 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 synoptic hours for key entry”**, the hourly form can be configured for entering observation data for all hours or for selected synoptic 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 **“Configuring 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.

Key entry form for hourly wind speed and direction

Hourly wind data

Station: KIGALI AERO | Year: 2014 | Month: 1 | Day: 1

Enable synoptic hours only | Number of digits:- direction 3 | Number of digits:- speed 2

Hour	ddff	dd	ff	Flag	Hour	ddff	dd	ff	Flag
00		270	05		12		000	00	
01		180	00		13		200	05	
02		150	04		14		360	00	
03		090	00		15		270	08	
04		300	10		16		300	05	
05		000	00		17		350	00	
06		360	00		18		290	04	
07		210	05		19		300	10	
08		350	00		20		010	05	
09		090	05		21		020	08	
10		120	10		22		270	10	
11		150	00		23		350	00	
					Total [ff]				

Record 1 of 2

Buttons: Add New, Save, Update, Delete, Clear, View, Close, Help

Sequencer: seq_month_day | Upload

Figure 34: Key entry form for hourly wind

(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.

Key entry form for Synoptic observations

Synoptic Data For Many Elements For WMO - RA1

Station Identifier: Year: Month: Day: Hour:

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

Navigation: <<< << Record 1 of 1 >> >>>

Buttons: Add New Save Update Delete Clear View TDCF Close Help

Sequencer:

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

(viii) 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. 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

Key entry form for Upper Air observations

Station Name/ID: DAGORETTI CORNER METEOROLOGICAL STATION

Year: 2020 Month: 1 Day: 2 Hour: 6 Level: 700

	Value	Flag
Time Displacement (sec)	501	
Latitude Displacement (deg)		M
Longitude Displacement (deg)		M
Pressure	700	
Geopotential Height		M
Dry Bulb Temperature	-45	
Dew Point Temperature	-76	
Relative Humidity	79	
Wind Direction	266	
Wind Speed	318	
Wind Shear 1 km layer below		M
Wind Shear 1 km layer above		M
Vertical Significance (code)	5	

Navigation: I<< << Record 1 of 3 >> >>I

Buttons: Add New Save Update Delete Clear View Close Help

☐ Repeat Key Entry Mode Upload

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 sheer 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 Metdata

6.7 Empty Key Entry Tables

This operation facilitates emptying of key entry tables. This is necessary to avoid the records growing to a point of slowing the key entry and data uploading processes. However, it should be ensured 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(s) 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 can be deleted and may be re-entered later then uncheck the box **“Skip Records Not Uploaded”**.

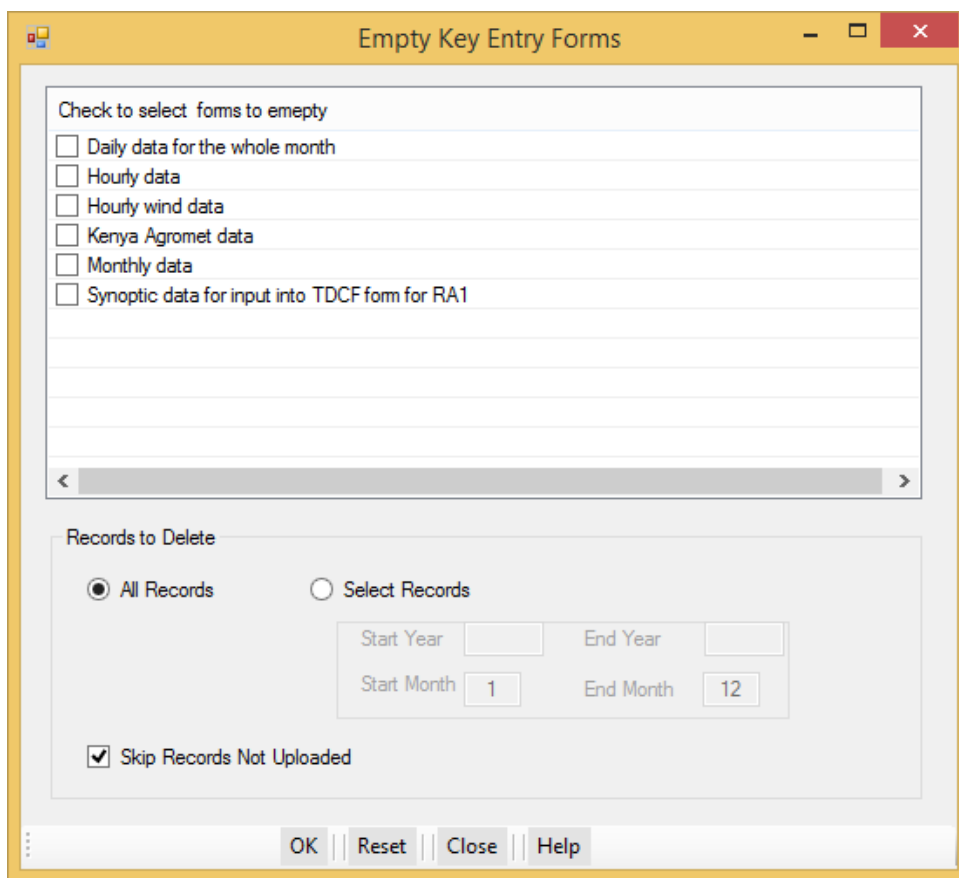


Figure 36: Dialog for Emptying Key Entry Forms

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 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 operator on that terminal 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

Operations Monitoring

Users Records | Performance Monitoring | Double Key Entry Verification | Settings

Users Records

☒ User root ☐ All Users

Start Date 01 November 2018

End Date 30 November 2018

Total Records = 33

Login	Station	Year	Month/Code	Form	Entry DateTime
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

Operations Monitoring

Users Records | Performance Monitoring | Double Key Entry Verification | **Settings**

Settings

☒ Targets Records

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

Total Records = 0

Figure 38: Operations monitoring settings dialog

To undertake any of the operation in this dialog select the 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**. There should be a value for every operator listed.

(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 form requires to be set to double key entry status then the entry mode should be set to **1** 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.

The screenshot shows a window titled "Operations Monitoring" with four tabs: "Users Records", "Performance Monitoring", "Double Key Entry Verification", and "Settings". The "Performance Monitoring" tab is active. Inside this tab, there is a section titled "Users Performance Monitoring". It contains two radio buttons: "Monthly" (unselected) and "Range" (selected). The "Range" option has two date pickers: "From" (01 November 2018) and "To" (30 November 2018). Below these are two buttons: "Compute Performance" and "Save Output". At the bottom of the dialog, there is a "Close" button, a status bar showing "Total Records = 1", and a "Help" button. Below the status bar is a table with the following data:

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 key 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 form_daily2
☐ All Forms

Begin Year 2018 Begin Month 1
 End Year 2018 End Month 12

Selection Type
☒ NOT Verified Records
☐ Verified Records

Retrieve Save

Close Total Records = 987 Help

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

The options for QC checks currently available are “**Absolute limits checks**” and “**Inter-element comparison checks**”.

The “**Absolute limits checks**” option is checked by default when the QC icon is clicked. After specifying the QC time range, selecting (by ticking) the stations and elements which you want to QC, then click on the “**Perform QC**” button, to generate the QC report output files in comma separated value(csv) format.

Two output files are generated, one for the upper limits (e.g. qc_report_upperlimit_190001_201712.csv) and another for the lower limits (e.g. qc_report_lowerlimit_190001_201712.csv). The QC report filename give an indication of which type of QC report is being performed and the specific period of time. The filename is generated automatically after selecting the type of QC and time range for QC.

If the specific stations and elements are not selected, the QC will be performed on all stations and elements in the “**observationinitial**” table. This is the same as selecting or ticking “**Select All Stations**” and “**Select All Elements**”.

In the case of “**Inter-element checks**”, the QC checks are done by default on all the stations and elements or on specified stations and elements. Five output files in csv format are generated after specifying the QC time range and clicking on the “**Perform QC**” button. Each file contains the report on related elements e.g. maximum and minimum temperatures

(qc_interelement_2_3_193001_193112.csv), dry and wet bulb temperatures (qc_interelement_101_102_193001_193112.csv), wet bulb and dew point temperatures, (qc_interelement_102_103_193001_193112.csv), maximum and dry bulb temperatures (qc_interelement_2_101_193001_193112.csv) and dry bulb and minimum temperatures (qc_interelement_101_3_193001_193112.csv).

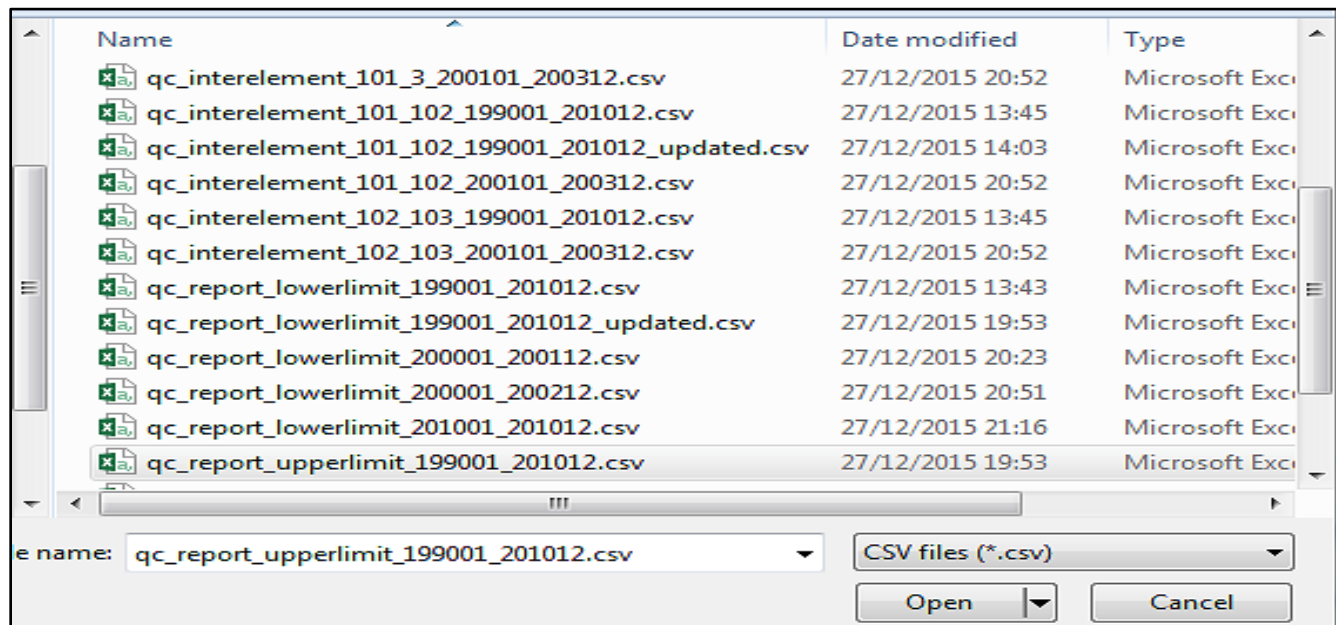


Figure 44: List of QC reports

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. This folder must be on the computer where the MariaDB is running from. If the MariaDB server is being accessed over the network from a workstation, it would be ideal to map that folder on the workstation for easy access from the workstation.

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

For the inter-element QC checks, the codes of the elements that have failed the QC checks will also be included in the file name e.g. “**qc_interelement_101_3_200101_200312.csv**” indicates a report for inter-element checks between dry bulb temperature and minimum temperature from January 2001 to December 2003.

A suffix “**Updated**” is added manually by the QC officer or administrator to show that the values in the QC report have been modified. Figure 45 shows the contents of a QC report for limits checks displayed in Excel spreadsheet.

The report on the screenshot in Figure 38 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 surface	amhanda	form_synoptic_2_ra1
3	67774010	2	01/01/2002 15:00	2002	1	1	15	64	120	1		1 surface	amhanda	form_synoptic_2_ra1
4														
5														
6														
7														
8														

qc_report_lowerlimit_200001_200

Figure 45: QC report showing values below lower limit

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												

qc_interelement_2_101_200101_20

Figure 46: QC Report for inter-element comparison

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**”.

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.

Update ObservationInitial from QC Report

Original QC Report

C:\Data\QC\qc_report_upperlimit_201301_201512.csv

Browse

Updated QC Report

C:\Data\QC\qc_report_upperlimit_201301_201512_updated.csv

Browse

Update

Cancel

Help

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 Figure48.

Station Id	Station Name
<input checked="" type="checkbox"/> 10109700	RWAMPARA
<input checked="" type="checkbox"/> 10201500	RUBUNGO
<input checked="" type="checkbox"/> 10202200	KABUYE SUGAR
<input checked="" type="checkbox"/> 10306100	KIGALI AERO
<input checked="" type="checkbox"/> 10308500	MASAKA
<input checked="" type="checkbox"/> 10308600	RUBIRIZI
<input checked="" type="checkbox"/> 20101500	NYANZA
<input checked="" type="checkbox"/> 20101600	GIHISI
<input checked="" type="checkbox"/> 20101700	BUSASAMANA-NYANZA
<input checked="" type="checkbox"/> 20102PLP	BUSORO
<input checked="" type="checkbox"/> 20106500	MWEYA
<input checked="" type="checkbox"/> 20107500	NYAMIYAGA
<input checked="" type="checkbox"/> 20109700	RURANGAZI
<input checked="" type="checkbox"/> 20201200	CYILI
<input checked="" type="checkbox"/> 20201500	GIKONKO
<input checked="" type="checkbox"/> 20203200	KANSI ECOLE
<input checked="" type="checkbox"/> 20203500	KANSI PAROISSE
<input checked="" type="checkbox"/> 20205200	KIGEMBE

Element Code	Element Details
<input checked="" type="checkbox"/> 2	Temperature daily maximum
<input checked="" type="checkbox"/> 3	Temperature daily minimum
<input type="checkbox"/> 4	Temperature daily mean
<input checked="" type="checkbox"/> 5	Precipitation daily total
<input type="checkbox"/> 6	Precip greatest amount in 5 minutes
<input type="checkbox"/> 7	Precip greatest amount in 10 minutes
<input type="checkbox"/> 8	Precip greatest amount in 15 minutes
<input type="checkbox"/> 9	Precip greatest amount in 30 minutes
<input type="checkbox"/> 10	Precip greatest amount in 60 minutes
<input type="checkbox"/> 11	Precip greatest amount in 2 hours
<input type="checkbox"/> 12	Temperature dew point daily maximum
<input type="checkbox"/> 13	Temperature dew point daily minimum
<input type="checkbox"/> 14	Temperature dew point daily mean
<input type="checkbox"/> 15	Relative humidity daily maximum
<input type="checkbox"/> 16	Relative humidity daily minimum
<input type="checkbox"/> 17	Relative humidity daily mean
<input type="checkbox"/> 18	Evaporation pan1 daily total
<input type="checkbox"/> 19	Evaporation lake daily total

☒ Unselect All Stations ☐ Select All Elements

Begin Year: 1900 Begin Month: 1 End Year: 2017 End Month: 12

Upload Cancel Help

Data transfer in progress

Figure 48: Upload data to observationfinal table

By default, data for all the stations for the period specified in the time range (Begin Year, End Year, Begin Month, and End Month) are transferred into the “**observationfinal**” table. However, you can customize the transfer into “**observationfinal**”, by selecting the stations, the elements, and the time range (Begin Year, End Year, Begin Month, End Month). Click the “**Upload**” button to start the data transfer. The progress of data transfer is shown in the progress dialog.

*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”.*

7.3 Update Observations

The **Update Observations** facility in Climsoft Version 4 enables users 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 modify (view, correct, update and delete records in the database). The Update Observations dialog has an option to delete many records at once

by selecting them, here the administrator needs to provide confirmation before the delete operation.

The steps below show how to view, correct, update and delete data in the “observationinitial” or “observationfinal” database tables:

Step 1: Login into Climsoft with a high privilege (e.g.: administrator);

Step 2: From the main menu, select “**Administration**” then “**Update Observations**” to open the dialog;

Step 3: Under “**Tables**”, select the table of your choice (Observation Initial or Observation Final);

Step 4: Under “**Records Selection**”, fill the text box to specify the Station ID, the Element ID, the Start Year, the End Year, the Start Month and the End Month;

Step 5: Under “**Commands**”, select “**View**” to view the records in data sheet view, Figure 49;

Step 6: To correct a data in a cell, click on a particular cell containing data, change the value and click the “**Update**” command button to save the changes;

Step 7: To delete the entire row or many rows, select them and click on the “**Delete**” command button;

Step 8: Select the “**Close**” button to close the dialog and the “**Help**” button to get more help on the “Update Observations” procedures.

Station	Element	Year	Month	Day	Time	Value	Level	Flag	Period	QcStatus
63980	5	2018	4	1	07:00:00	0.20	surface			1
63980	5	2018	4	2	07:00:00	4.60	surface			1
63980	5	2018	4	3	07:00:00	0.00	surface			1
63980	5	2018	4	4	07:00:00	0.30	surface			1
63980	5	2018	4	5	07:00:00	11.20	surface			1
63980	5	2018	4	6	07:00:00	10.50	surface			1
63980	5	2018	4	7	07:00:00	0.70	surface			1
63980	5	2018	4	8	07:00:00	0.00	surface			1
63980	5	2018	4	9	07:00:00	37.10	surface			1
63980	5	2018	4	10	07:00:00	3.20	surface			1
63980	5	2018	4	11	07:00:00	0.50	surface			1
63980	5	2018	4	12	07:00:00	7.00	surface			1
63980	5	2018	4	13	07:00:00	28.40	surface			1
63980	5	2018	4	14	07:00:00	8.50	surface			1
63980	5	2018	4	15	07:00:00	0.50	surface			1
63980	5	2018	4	16	07:00:00	10.50	surface			1
63980	5	2018	4	17	07:00:00	0.00	surface	T		1
63980	5	2018	4	18	07:00:00	21.50	surface			1
63980	5	2018	4	19	07:00:00	9.90	surface			1

Figure 49: Update Observations Dialog

8. Data Transfer Operations

Data transfer operations involve importing and exporting data from different formats. The data transfer operations are:

- (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; earlier Climsoft versions, CLICOM, Automatic Weather Station (AWS), NOAA GTS and any other text data in delimited texts files. More details 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.

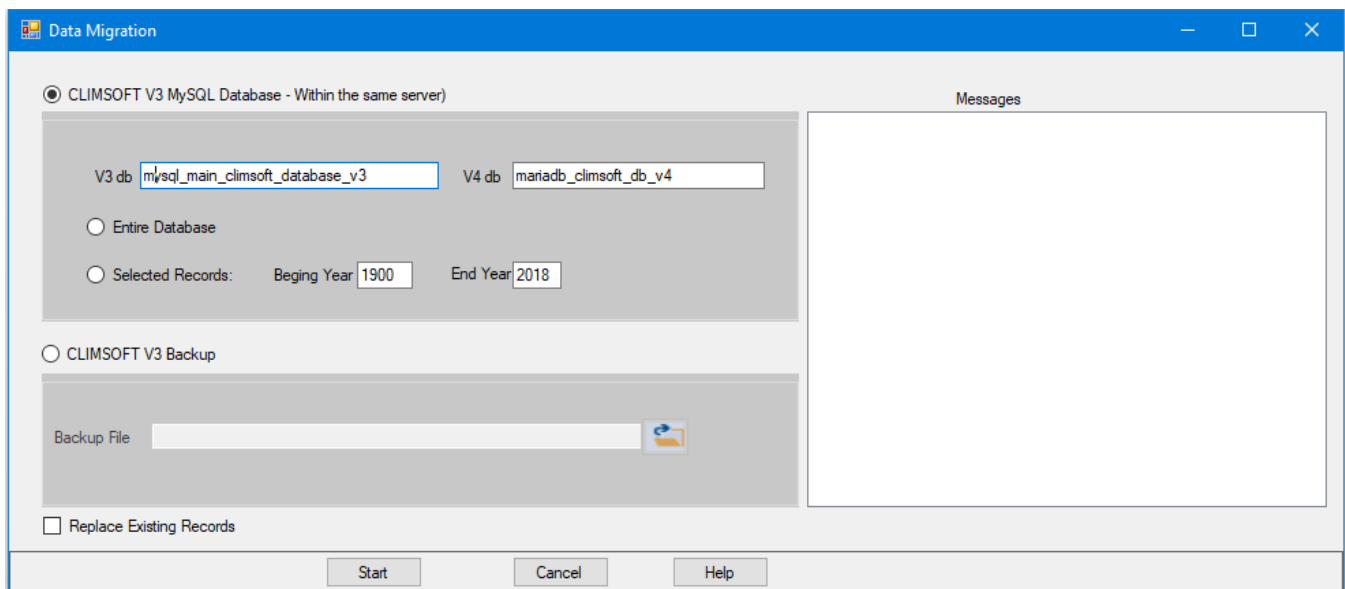


Figure 50: Data migration dialog

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.

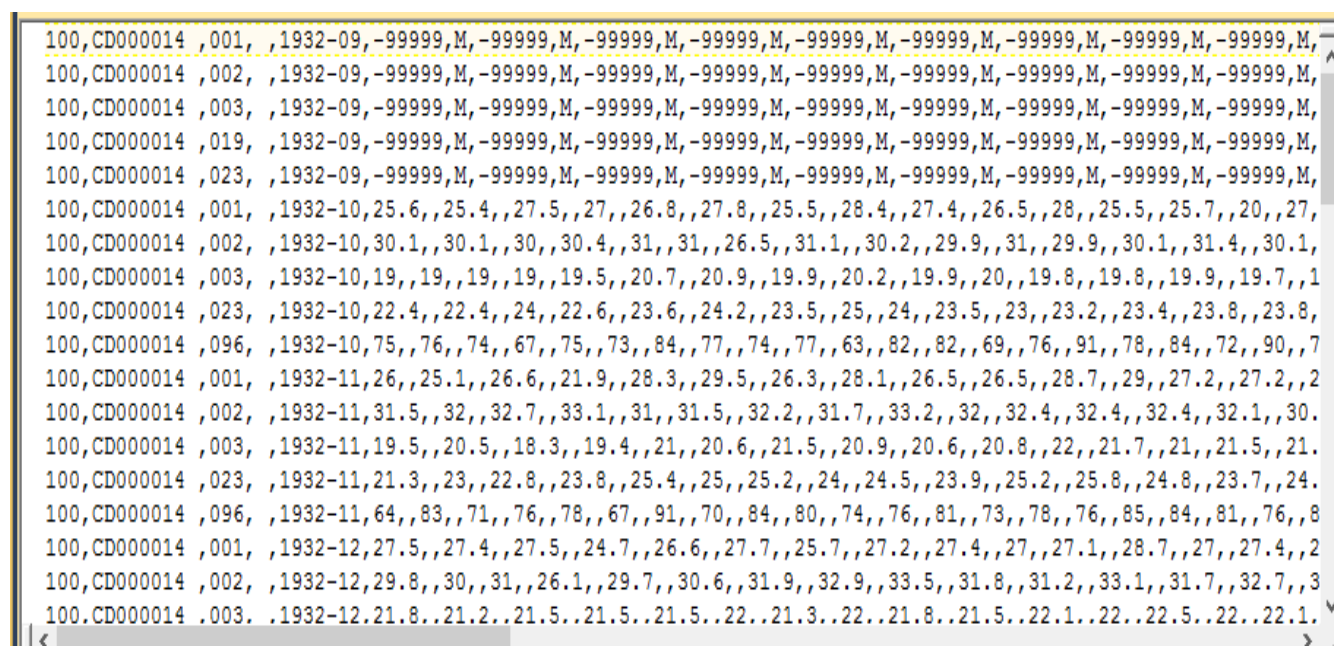
The steps to be followed are:

- (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 3 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.



100,CD000014	,001,	,1932-09,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,
100,CD000014	,002,	,1932-09,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,
100,CD000014	,003,	,1932-09,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,
100,CD000014	,019,	,1932-09,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,
100,CD000014	,023,	,1932-09,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,-99999,M,
100,CD000014	,001,	,1932-10,25.6,,25.4,,27.5,,27,,26.8,,27.8,,25.5,,28.4,,27.4,,26.5,,28,,25.5,,25.7,,20,,27,
100,CD000014	,002,	,1932-10,30.1,,30.1,,30,,30.4,,31,,31,,26.5,,31.1,,30.2,,29.9,,31,,29.9,,30.1,,31.4,,30.1,
100,CD000014	,003,	,1932-10,19,,19,,19,,19,,19.5,,20.7,,20.9,,19.9,,20.2,,19.9,,20,,19.8,,19.8,,19.9,,19.7,,1
100,CD000014	,023,	,1932-10,22.4,,22.4,,24,,22.6,,23.6,,24.2,,23.5,,25,,24,,23.5,,23,,23.2,,23.4,,23.8,,23.8,
100,CD000014	,096,	,1932-10,75,,76,,74,,67,,75,,73,,84,,77,,74,,77,,63,,82,,82,,69,,76,,91,,78,,84,,72,,90,,7
100,CD000014	,001,	,1932-11,26,,25.1,,26.6,,21.9,,28.3,,29.5,,26.3,,28.1,,26.5,,26.5,,28.7,,29,,27.2,,27.2,,2
100,CD000014	,002,	,1932-11,31.5,,32,,32.7,,33.1,,31,,31.5,,32.2,,31.7,,33.2,,32,,32.4,,32.4,,32.4,,32.1,,30.
100,CD000014	,003,	,1932-11,19.5,,20.5,,18.3,,19.4,,21,,20.6,,21.5,,20.9,,20.6,,20.8,,22,,21.7,,21,,21.5,,21.
100,CD000014	,023,	,1932-11,21.3,,23,,22.8,,23.8,,25.4,,25,,25.2,,24,,24.5,,23.9,,25.2,,25.8,,24.8,,23.7,,24.
100,CD000014	,096,	,1932-11,64,,83,,71,,76,,78,,67,,91,,70,,84,,80,,74,,76,,81,,73,,78,,76,,85,,84,,81,,76,,8
100,CD000014	,001,	,1932-12,27.5,,27.4,,27.5,,24.7,,26.6,,27.7,,25.7,,27.2,,27.4,,27,,27.1,,28.7,,27,,27.4,,2
100,CD000014	,002,	,1932-12,29.8,,30,,31,,26.1,,29.7,,30.6,,31.9,,32.9,,33.5,,31.8,,31.2,,33.1,,31.7,,32.7,,3
100,CD000014	,003,	,1932-12,21.8,,21.2,,21.5,,21.5,,21.5,,22,,21.3,,22,,21.8,,21.5,,22.1,,22,,22.5,,22,,22.1,

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.

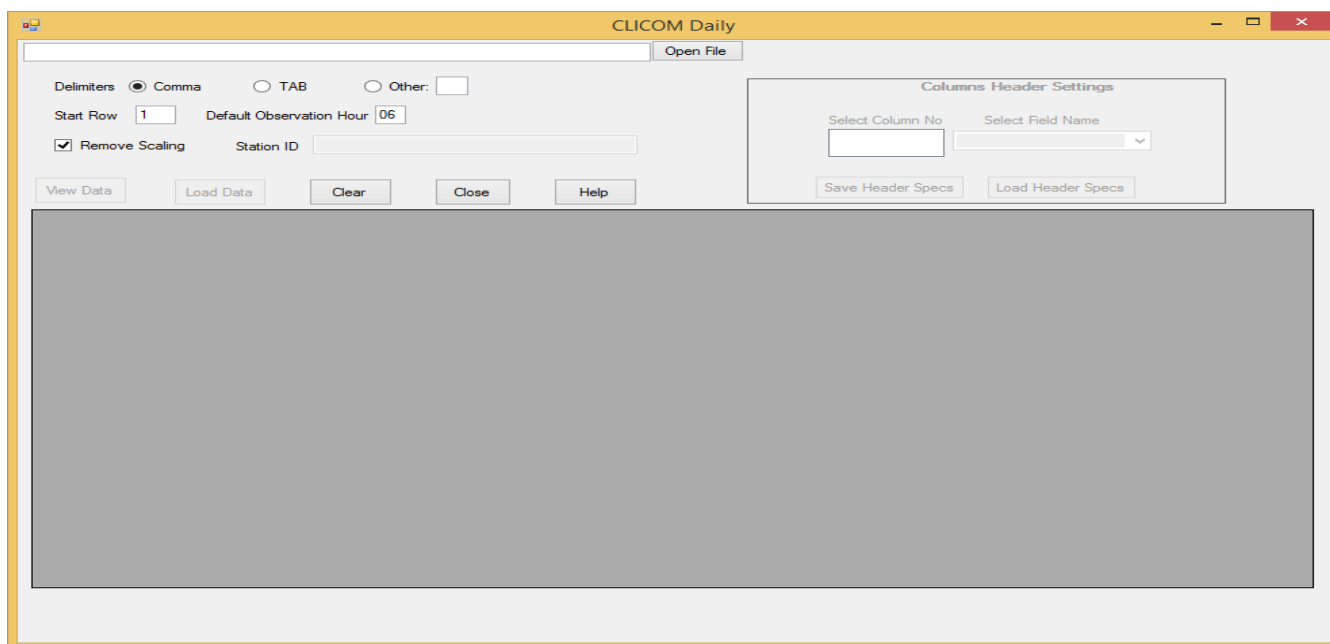


Figure 52: Importing CLICOM daily data

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 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.

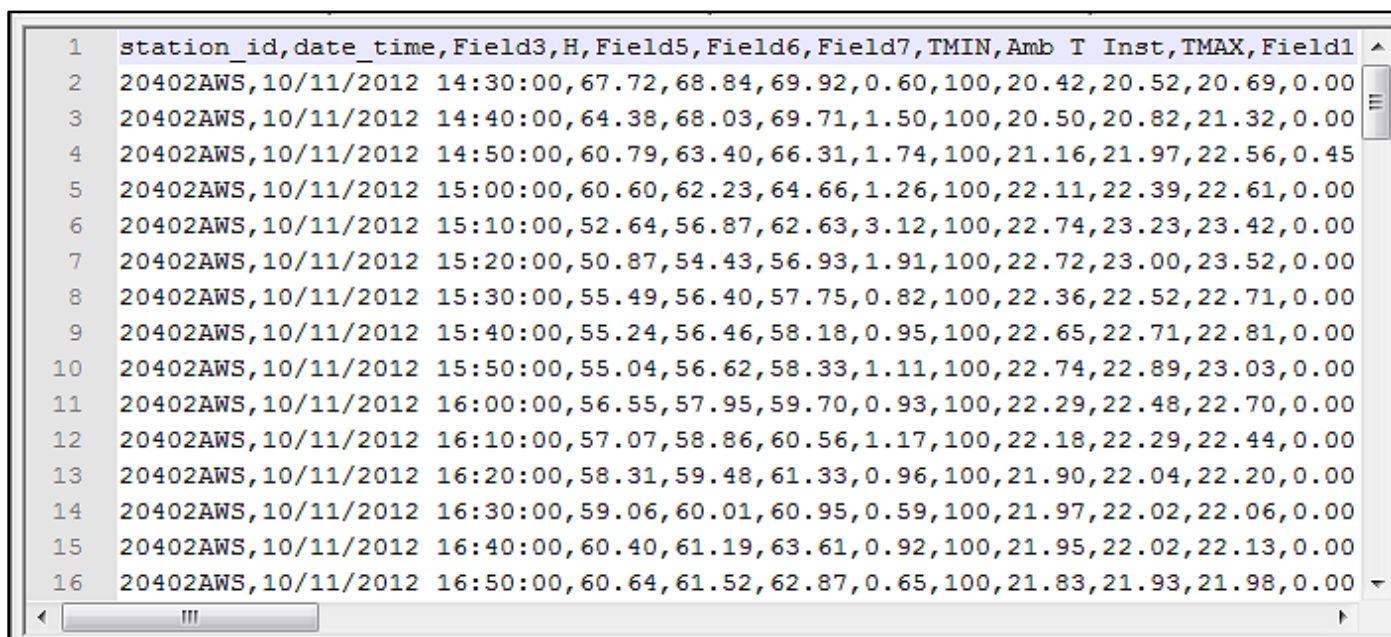
Seq	station_id	element_code	NA	Date	1	FLAG	2	FLAG	3	FLAG	4	FLAG	5	FLAG	6
100	CD000014	001		1932-09	-99999	M	-99999	M	-99999	M	-99999	M	-99999	M	-99999
100	CD000014	002		1932-09	-99999	M	-99999	M	-99999	M	-99999	M	-99999	M	-99999
100	CD000014	003		1932-09	-99999	M	-99999	M	-99999	M	-99999	M	-99999	M	-99999
100	CD000014	019		1932-09	-99999	M	-99999	M	-99999	M	-99999	M	-99999	M	-99999
100	CD000014	023		1932-09	-99999	M	-99999	M	-99999	M	-99999	M	-99999	M	-99999
100	CD000014	001		1932-10	25.6		25.4		27.5		27		26.8		27.8
100	CD000014	002		1932-10	30.1		30.1		30		30.4		31		31
100	CD000014	003		1932-10	19		19		19		19		19.5		20.7
100	CD000014	023		1932-10	22.4		22.4		24		22.6		23.6		24.2
100	CD000014	096		1932-10	75		76		74		67		75		73
100	CD000014	001		1932-11	26		25.1		26.6		21.9		28.3		29.5
100	CD000014	002		1932-11	31.5		32		32.7		33.1		31		31.5
100	CD000014	003		1932-11	19.5		20.5		18.3		19.4		21		20.6
100	CD000014	023		1932-11	21.3		23		22.8		23.8		25.4		25
100	CD000014	096		1932-11	64		83		71		76		78		67
100	CD000014	001		1932-12	27.5		27.4		27.5		24.7		26.6		27.7
100	CD000014	002		1932-12	29.8		30		31		26.1		29.7		30.6

Loading: 60 of 72

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 or format of the AWS data. Many Automatic Weather Stations (AWS) are configured to produce data output files in ASCII format. However, AWS from different suppliers tend to have different observation data outputs depending on the sensors available and configuration of the output. Figure 54 shows a screenshot of sample data from an AWS 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 the Climsoft database.



	station_id	date_time	Field3	H	Field5	Field6	Field7	TMIN	Amb T Inst	TMAX	Field1
1	20402AWS	10/11/2012 14:30:00	67.72	68.84	69.92	0.60	100	20.42	20.52	20.69	0.00
2	20402AWS	10/11/2012 14:40:00	64.38	68.03	69.71	1.50	100	20.50	20.82	21.32	0.00
3	20402AWS	10/11/2012 14:50:00	60.79	63.40	66.31	1.74	100	21.16	21.97	22.56	0.45
4	20402AWS	10/11/2012 15:00:00	60.60	62.23	64.66	1.26	100	22.11	22.39	22.61	0.00
5	20402AWS	10/11/2012 15:10:00	52.64	56.87	62.63	3.12	100	22.74	23.23	23.42	0.00
6	20402AWS	10/11/2012 15:20:00	50.87	54.43	56.93	1.91	100	22.72	23.00	23.52	0.00
7	20402AWS	10/11/2012 15:30:00	55.49	56.40	57.75	0.82	100	22.36	22.52	22.71	0.00
8	20402AWS	10/11/2012 15:40:00	55.24	56.46	58.18	0.95	100	22.65	22.71	22.81	0.00
9	20402AWS	10/11/2012 15:50:00	55.04	56.62	58.33	1.11	100	22.74	22.89	23.03	0.00
10	20402AWS	10/11/2012 16:00:00	56.55	57.95	59.70	0.93	100	22.29	22.48	22.70	0.00
11	20402AWS	10/11/2012 16:10:00	57.07	58.86	60.56	1.17	100	22.18	22.29	22.44	0.00
12	20402AWS	10/11/2012 16:20:00	58.31	59.48	61.33	0.96	100	21.90	22.04	22.20	0.00
13	20402AWS	10/11/2012 16:30:00	59.06	60.01	60.95	0.59	100	21.97	22.02	22.06	0.00
14	20402AWS	10/11/2012 16:40:00	60.40	61.19	63.61	0.92	100	21.95	22.02	22.13	0.00
15	20402AWS	10/11/2012 16:50:00	60.64	61.52	62.87	0.65	100	21.83	21.93	21.98	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*,
- (vii) If some header rows are to be skipped while importing then, enter the row number where importing will start in the “**Start Row**” text box (*Start Row: 2* is the default i.e. data starts at row 2 and row 1 contains the headers for the data columns),
- (viii) “*Remove Scaling*” is checked by default i.e. if the 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 must 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 “*Station ID*” text box.;
- (x) After completing above steps click “*View Data*” to populate the grid view with the selected data. Note that only the first 25 rows of data from the selected file will be listed in the grid table. This is meant to enable confirmation 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 data they represent.

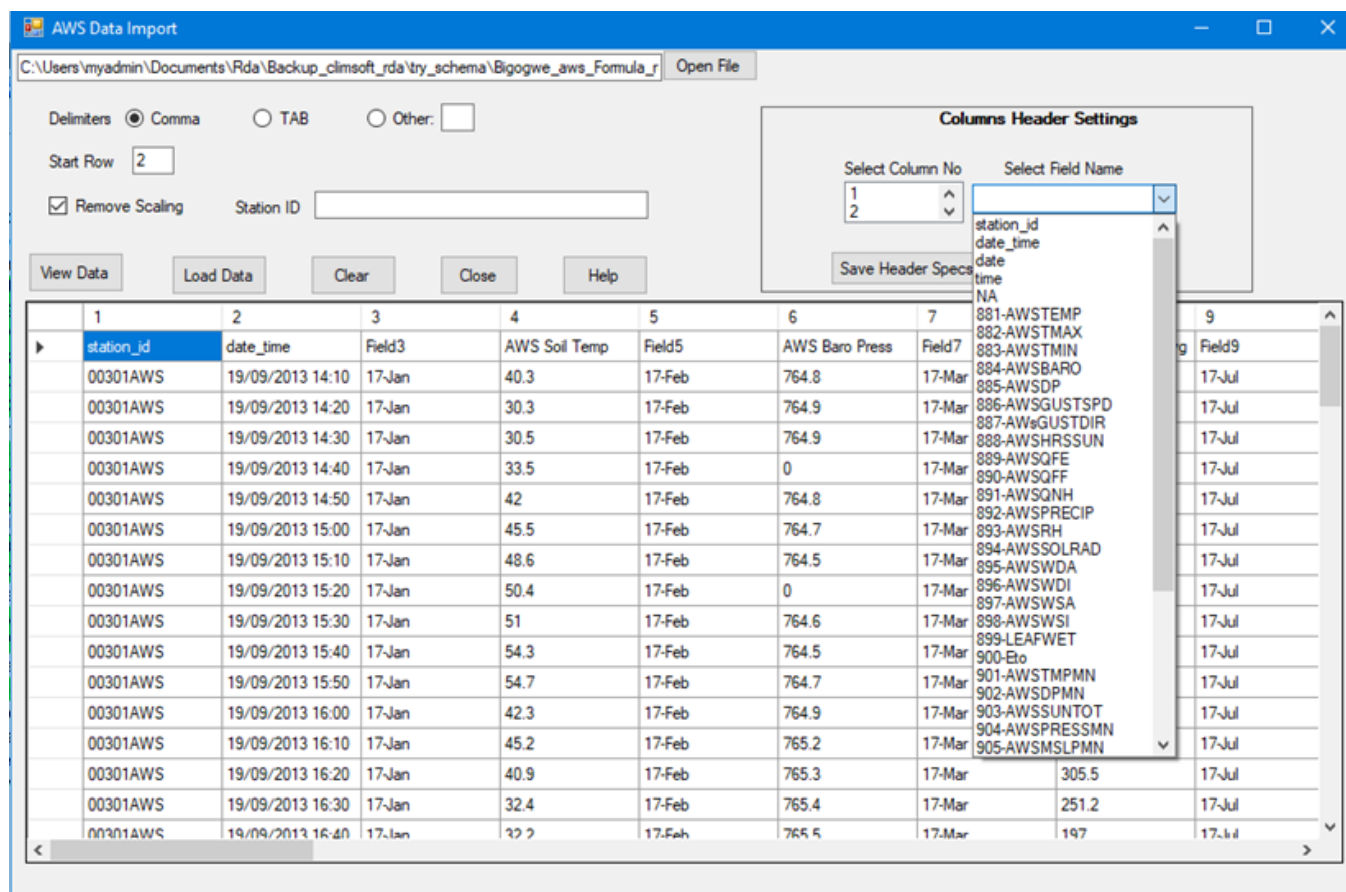


Figure 55: AWS Data Import

8.3.2 Configuring column headers and uploading data into Climsoft database

- (i) Under “**Columns Header Settings**”, select the *column number* and click on the appropriate *field name* from the two boxes therein respectively. 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 in the database. If any column contains data that will not be imported it should be labeled “**NA**”,
- (ii) If the step (i) above is correctively completed then configured header specifications can be saved in a text file to be used later for a similar file without going through that process again. To save the specifications click “**Save Header Specs**” button and choose a convenient location and file. Note that the file will automatically be allocated file extension of *sch* e.g. *aws1.csh*;

(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.

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

It should be noted that the station IDs element codes used must 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.

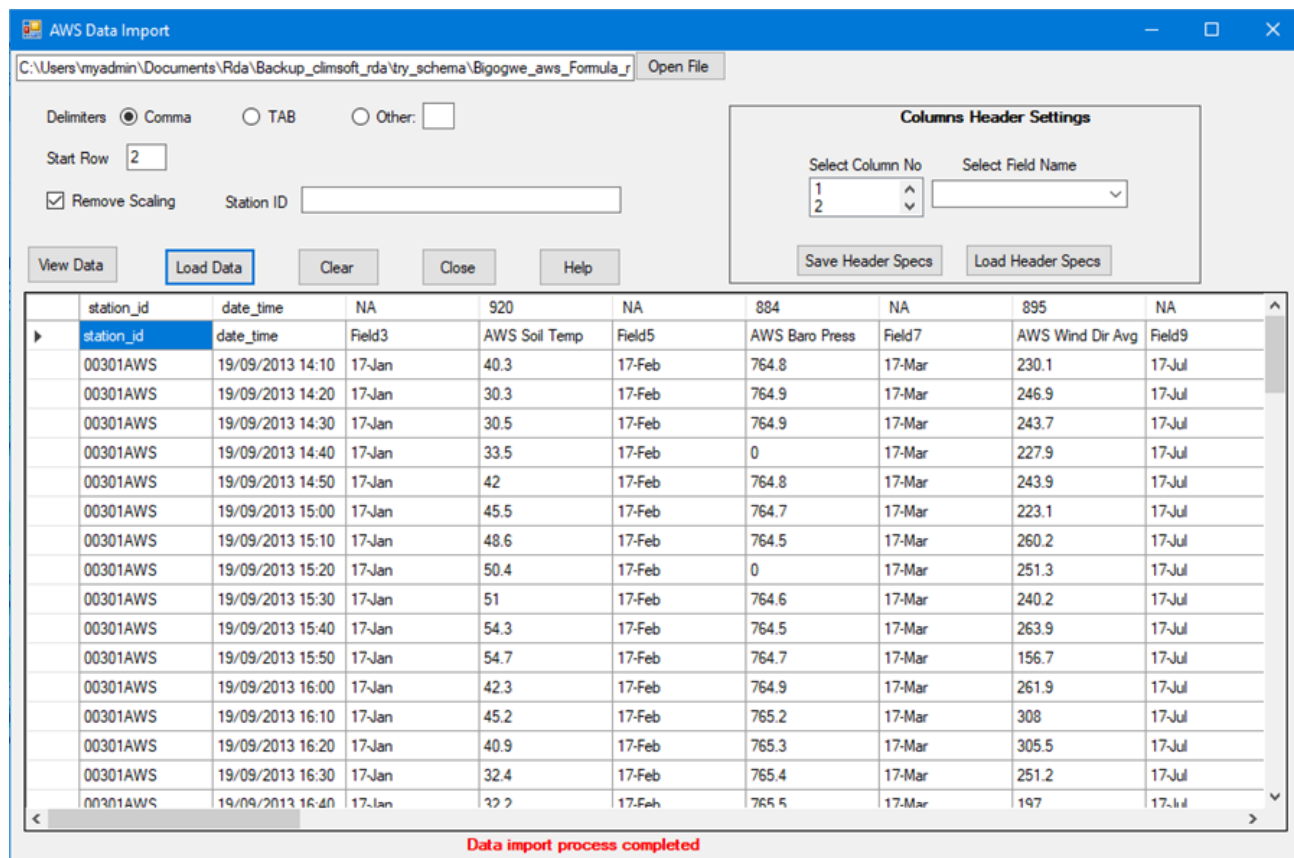


Figure 56: Configuration of column headers

8.4 Importing Text Files Data of Different Structures

8.4.1 Hourly and Daily Data Import

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

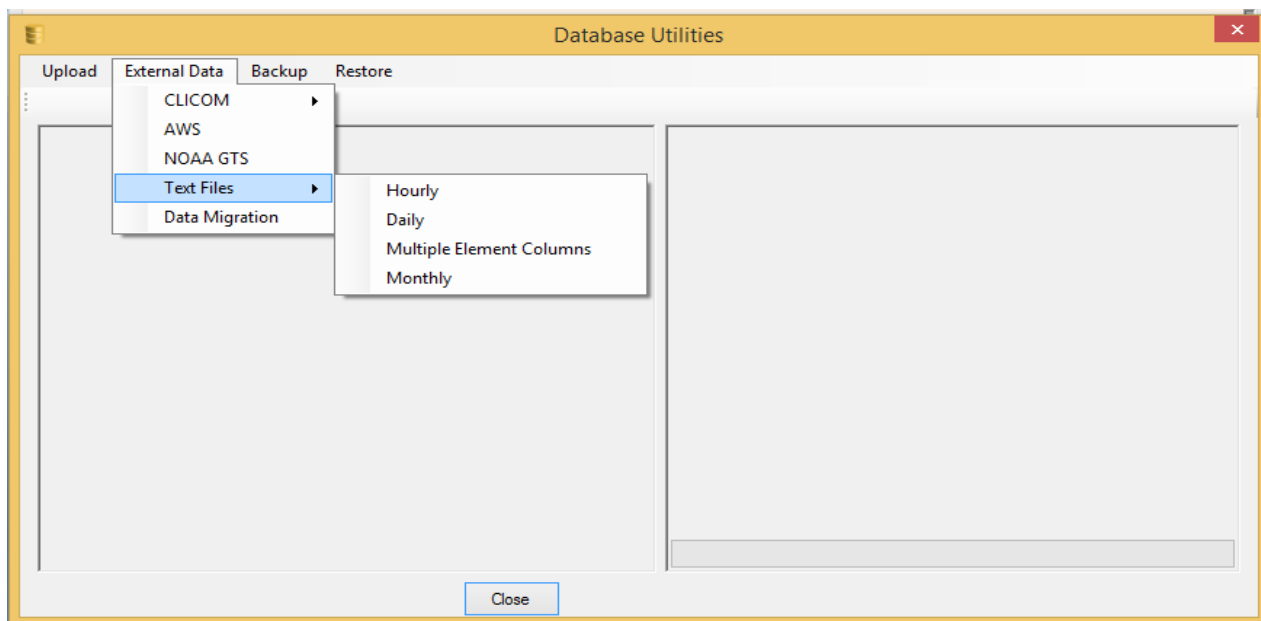


Figure 59: Import External Data Dialog

- (iii) After selecting “**Hourly or Daily**” option, the dialog in *Figure 60* displays. 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, Others), tick/untick the “**remove scaling**” box appropriately to ensure data will be imported into “*observationinitial*” table without the decimal points and then select “**View Data**” to view the file in data sheet view (tabular form),
- (iv) Set the Columns Header by matching each data column by its corresponding field name,

1	2	3	4	5	6	7
stn_id	element_id	Year	Month	Day	Hour	value
9034088	112	2010	1	1	8	360
9034088	111	2010	1	1	8	4
9034088	112	2010	1	1	9	320
9034088	111	2010	1	1	9	7
9034088	112	2010	1	1	11	270
9034088	111	2010	1	1	11	6
9034088	112	2010	1	1	12	300
9034088	111	2010	1	1	12	7
9034088	112	2010	1	1	13	360
9034088	111	2010	1	1	13	6
9034088	111	2010	1	1	15	3
9034088	112	2010	1	1	15	360
9034088	111	2010	1	1	17	3
9034088	112	2010	1	1	17	330
9034088	111	2010	1	1	18	4
9034088	112	2010	1	1	18	360

Figure 60: Importing External Data

(v) After finishing the matching you will have the dialog shown in Figure 61.

Hourly Data Import

C:\Climsoft Project\Data\wind\wind_data.csv Open File

Delimiters: ☒ Comma ☐ TAB ☐ Other:

Start Row:

☐ Remove Scaling Station ID: Element Code:

View Data Load Data Clear Close Help

Columns Header Settings

Select Column No:

Select Field Name:

Save Header Specs Load Header Specs

station_id	element_code	yyyy	mm	dd	hh	value
str_id	elment_id	Year	Month	Day	Hour	value
9034088	112	2010	1	1	8	360
9034088	111	2010	1	1	8	4
9034088	112	2010	1	1	9	320
9034088	111	2010	1	1	9	7
9034088	112	2010	1	1	11	270
9034088	111	2010	1	1	11	6
9034088	112	2010	1	1	12	300
9034088	111	2010	1	1	12	7
9034088	112	2010	1	1	13	360
9034088	111	2010	1	1	13	6
9034088	111	2010	1	1	15	3
9034088	112	2010	1	1	15	360
9034088	111	2010	1	1	17	3
9034088	112	2010	1	1	17	330
9034088	111	2010	1	1	18	4
9034088	112	2010	1	1	18	360

Figure 61: Columns Header Settings

(vi) Click the “**Load Data**” button to load the data into the “*observationinitial*” table and observe the records uploading count and 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 you load new data, 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 select 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 the columns for *StationID*, *Year*, *Month*, *Day* and 5 columns with values of different Elements (i.e. 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
	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

- (i) Select the “Data transfer” icon from the welcome dialog,
- (ii) Select “External Data”, then “Text Files” and then the “Multiple Element Columns” option (see 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 full path will be shown in the “Import 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 enter the row number where importing will start in the “Start Row” box. Row 2 is the default,
- (vii) If the data does not contain the observation hour column, fill the “Default Observation Hour” box by entering the daily observation hour. The value 06 has been set as default as it is the case with most parameters,
- (viii) If the data in the file is scaled to some decimal point, then check the box **Remove Scaling**,

- (ix) When all the above steps have been completed click **View Data**. The table in the dialog is then populated with the data from the selected file. The column header will be serialised with numbers from 1 up to the last column of that data, as shown in *Figure 63*.

	1	2	3	4	5	6	7	8	9
	ID	YEAR	MONTH	DAY	Tmax	Tmin	RAIN	RAD	EVAP
	893702	2018	7	1	23.5	10.2	0	20.88	4.5
	893702	2018	7	2	21.4	8.8	0	17.54	4
	893702	2018	7	3	24.4	10.3	0	20.28	5
	893702	2018	7	4	20.8	11.8	0	18.53	5
	893702	2018	7	5	23.2	8.7	0	22.27	5.5
	893702	2018	7	6	23.5	11	0	20.8	6
	893702	2018	7	7	22.3	11.2	0	20.88	6.5
	893702	2018	7	8	22.7	12	0	20.8	5
	893702	2018	7	9	23.4	12.1	0	21.05	6.5
	893702	2018	7	10	23.5	9.8	1	19.04	5.5
	893702	2018	7	11	22.4	10.6	0	17.76	5.5
	893702	2018	7	12	23.5	10.8	0	19.13	5
	893702	2018	7	13	24.8	10.2	0T	18.06	4
	893702	2018	7	14	23.5	12.4	0	19.3	5
	893702	2018	7	15	23.5	10.5	0	20.67	5.5
	893702	2018	7	16	21.6	8	0	21.05	7.5

Figure 63: Multiple column data Import

b) Configuring column headers and upload data to the Climsoft database

- Under “**Columns Header Settings**”, select the column number and click on the appropriate field name from the two boxes respectively. For the data columns the selected field name should be the element code for the data under that column. Repeat for each column. Make sure the correct field names are selected for the data to be appropriately mapped in the database,
- 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 click “**Save Header Specs**” and choose a convenient location and file,
- If the header specs had earlier been saved in a file then click “**Load Header Specs**” and select the folder that contains that file. If correctly specified, the columns in the displayed data table are labelled automatically as shown in *Figure 64*,
- 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 - Click Save Header Specs to save the header specification as a file for future use;

Load Header Specs - Click on Load header Specs to load the saved header specification into your data to avoid typing the headers each time;

View Data - Click View Data to view the data in a table view;

Load Data - Click Load Data to start the uploading process;

Clear - Click Clear to remove all the data from the table;

Close - Click Close to close the dialog;

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

station_id	yyyy	mm	dd	2	3	5	137	18
ID	YEAR	MONTH	DAY	Tmax	Tmin	RAIN	RAD	EVAP
893702	2018	7	1	23.5	10.2	0	20.88	4.5
893702	2018	7	2	21.4	8.8	0	17.54	4
893702	2018	7	3	24.4	10.3	0	20.28	5
893702	2018	7	4	20.8	11.8	0	18.53	5
893702	2018	7	5	23.2	8.7	0	22.27	5.5
893702	2018	7	6	23.5	11	0	20.8	6
893702	2018	7	7	22.3	11.2	0	20.88	6.5
893702	2018	7	8	22.7	12	0	20.8	5
893702	2018	7	9	23.4	12.1	0	21.05	6.5
893702	2018	7	10	23.5	9.8	1	19.04	5.5
893702	2018	7	11	22.4	10.6	0	17.76	5.5
893702	2018	7	12	23.5	10.8	0	19.13	5
893702	2018	7	13	24.8	10.2	0T	18.06	4
893702	2018	7	14	23.5	12.4	0	19.3	5
893702	2018	7	15	23.5	10.5	0	20.67	5.5
893702	2018	7	16	21.6	8	0	21.05	7.5

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 done when the raw data for those summaries is not available. Otherwise it is advisable to import the actual observations 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 be 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 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

Figure 64a Dekadal – 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 – Single Elements 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 – 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– Single Elements column

The import procedures will differ with the layout of the summarized data as follows:

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

From **Welcome** dialog follow:

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

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

From **Welcome** dialog follow:

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

(iii) 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 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 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 through the corresponding check box. See **Figure 64e** below.

Multiple Columns Data Import

File: C:\KMD\upper air\stand_levels_01022020.CRA [Open File]

Delimiters: ☐ Comma ☒ TAB ☐ Other: []

Start Row: [2] Default Observation Hour: [0]

☒ Remove Scaling Station ID: [9136164]

Missing Data Flag: []

☐ Summarized Data Import: ☐ Dekadal ☐ Monthly ☒ Upper Air Data

Buttons: View Data, Load Data, Clear, Close, Help

Columns Header Settings

Select Column No: [1] [2]
Select Field Name: [date] (dropdown menu open showing: station_id, element_code, level, date_time, date, time, 30-WY, mm, Wfdd, hh, value, NA, 301-PRESS, 302-HEIGHT, 303-TEMPDB, 304-DPTDEP, 305-WNDDIR, 306-WNDSPO, 307-WNDSHR1B, 308-WNDSHR1A, 309-LATHDISP, 310-LONGHDISP, 311-ACCTMDISP, 312-ACCVERSIG, 313-RELHUM, 13.79, 299, 11.93, 283, 15.40, 296, 08.25, 308, 08.72, 292, 12.10, 306)

date	311	302	level	303	304	313	306	307	308	309	310	311	312	313	314
Date	Time	Alt	P(hPa)	T(°C)	DP(°C)	RH(%)	Wfdd	hh	value	NA	301-PRESS	302-HEIGHT	303-TEMPDB	304-DPTDEP	305-WNDDIR
2/1/2020	000030	00763.54	0925.0	08.01	07.32	095.4	23	11	11.93	283	15.40	296	08.25	308	08.72
2/1/2020	000192	01453.39	0850.0	03.17	02.78	097.3	24	12	12.10	306					
2/1/2020	000501	03004.34	0700.0	-04.52	-07.64	078.7	31	13	13.79	299					
2/1/2020	001037	05609.43	0500.0	-17.09	-17.09	100.0	43	14							
2/1/2020	001364	07245.90	0400.0	-29.20	-36.75	047.6	51	15							
2/1/2020	001749	09231.01	0300.0	-45.65	-47.26	083.4	67	16							
2/1/2020	001968	10417.16	0250.0	-56.10	-58.92	069.9	73	17							
2/1/2020	002246	11820.09	0200.0	-60.30	-63.79	062.8	52	18							
2/1/2020	002627	13628.43	0150.0	-57.20	-68.79	020.9	38	19							
2/1/2020	003205	16193.34	0100.0	-57.76	-82.51	002.6	13	20							
2/1/2020	003702	18432.06	0070.0	-60.00	-89.46	000.3	11	21							
2/1/2020	004142	20531.76	0050.0	-61.02	-90.17	000.3	15	22							
2/1/2020	004781	23714.41	0030.0	-60.09	-89.52	000.3	08	23							
2/1/2020	005248	26273.74	0020.0	-55.60	-86.41	000.3	08	24							
2/1/2020	006014	30732.48	0010.0	-50.38	-82.83	000.3	12	25							

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

8.7 Upload failures

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

8.8 Importing GTS data downloaded from NOAA – NCDC FTP site

The NOAA-NCDC FTP 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-NCDC and is updated on a daily basis. The data is publicly available in compressed format. Climsoft has a facility for ingesting the unzipped data from

NOAA-NCDC. Figure 65 below shows a screenshot of sample data downloaded from the NOAA-NCDC FTP site:

	STN---	WBAN	YEARMODA	TEMP		DEWP		SLP		STP	
11564	607400	99999	20160101	58.1	8	51.8	8	1026.1	8	1025.1	8
11565	607400	99999	20160102	58.4	8	49.3	8	1021.8	8	1020.8	8
11566	607400	99999	20160103	57.9	8	48.7	8	1017.2	8	1016.2	8
11567	607400	99999	20160104	63.0	8	48.7	8	1010.8	8	1009.8	8
11568	607400	99999	20160105	65.6	8	50.8	8	1006.4	8	1005.5	8
11569	607400	99999	20160106	58.0	7	50.8	7	1009.6	7	1008.6	7
11570	607400	99999	20160107	57.6	8	42.1	8	1016.0	8	1015.0	8
11571	607400	99999	20160108	60.4	8	45.0	8	1017.4	8	1016.5	8
11572	607400	99999	20160109	57.3	7	46.1	7	1015.1	7	1014.1	7
11573	607400	99999	20160110	60.5	8	48.4	8	1016.7	8	1015.7	8
11574	607400	99999	20160111	62.9	8	45.9	8	1016.3	8	1015.4	8
11575	607400	99999	20160112	61.7	8	52.0	8	1018.6	8	1017.7	8
11576	607400	99999	20160113	61.0	8	46.6	8	1024.6	8	1023.6	8
11577	607400	99999	20160114	57.4	8	45.1	8	1022.7	8	1021.7	8
11578	607400	99999	20160115	58.8	8	47.7	8	1015.0	8	1014.0	8

Figure 65: Sample data from NOAA-NCDC

To import GTS daily data from NOAA-NCDC;

- (i) Select “**Data Transfer**” icon on the CLIMSOFT Welcome screen,
- (ii) Select “**External Data**” menu;
- (iii) 3. Select “**NOAA GTS**” to open the dialog and browse the data file as shown in Figure 66 below.

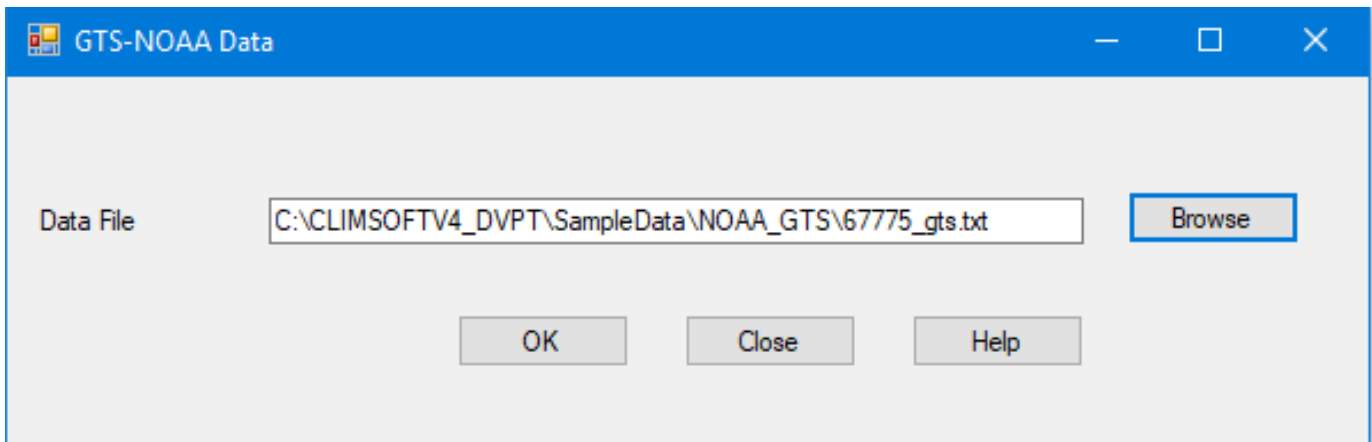


Figure 66: Importing data from a text file downloaded from NOAA-NCDC FTP site

NOTE:

- b) A folder for GTS data must be configured under the “**General Settings**”. This is used as a working area by the Climsoft application during the process of importing the GTS data. If the MariaDB server is being accessed over the network from a workstation, it would be ideal to map that folder on the workstation for easy access or viewing from the workstation. However, the data to be imported can be placed in any location that is accessible via the “**Browse**” button.
- c) Since the GTS data would have gone through QC at NOAA-NCDC, the data is transferred to the “**observationfinal**” table.

9. Data Backup and Restore

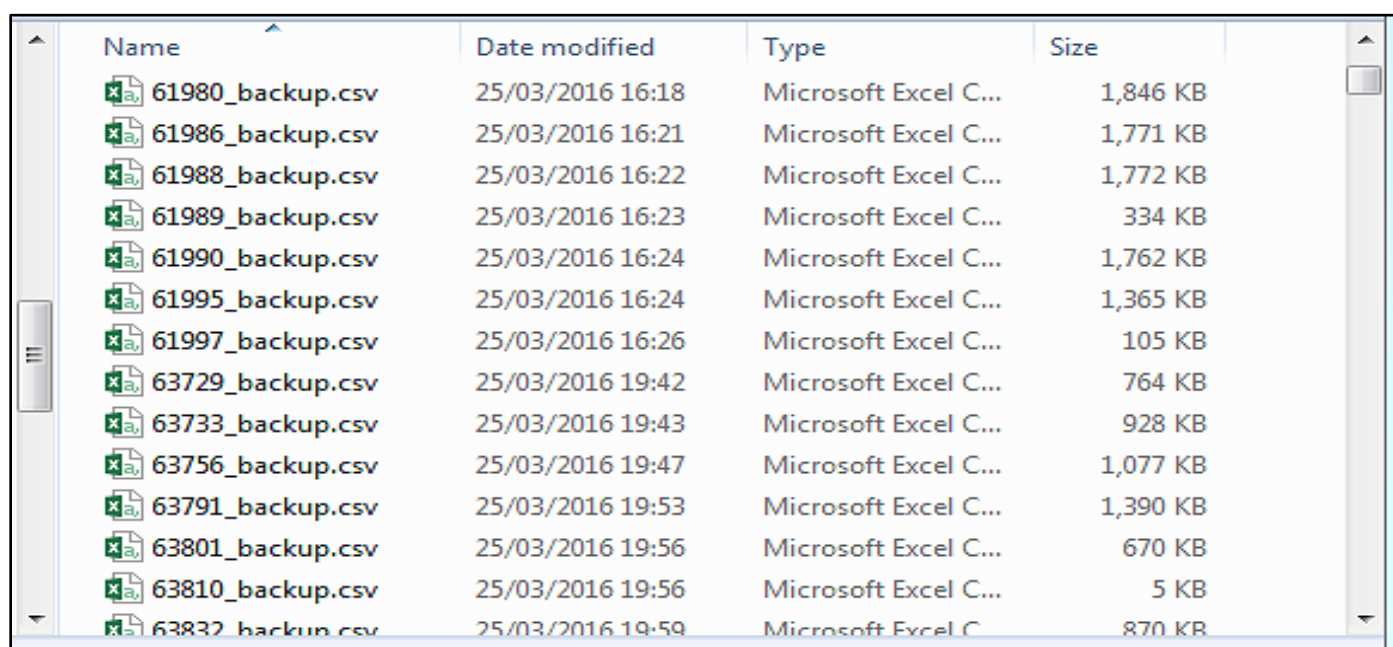
Data backup and restore are essential operations in data management.

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**”.

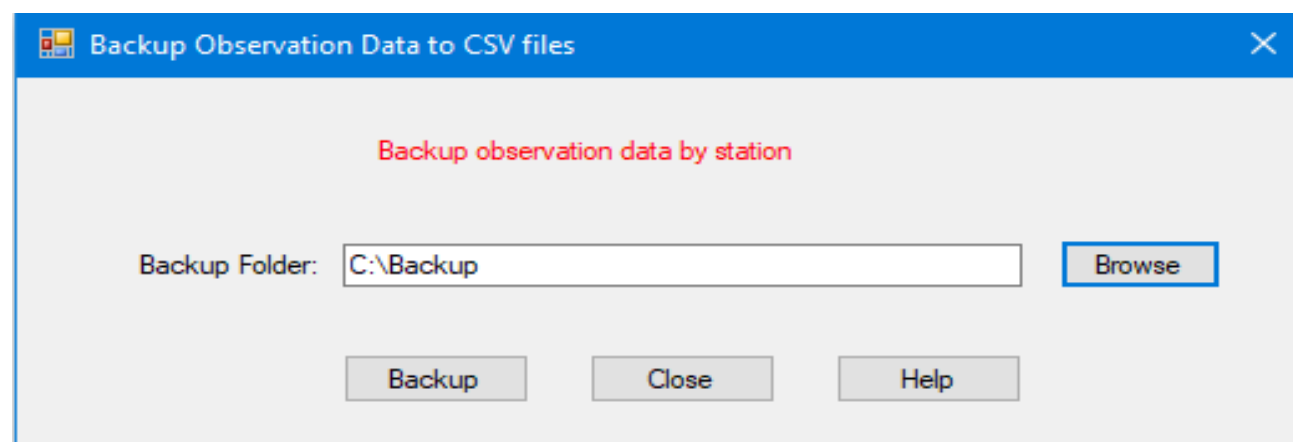


Figure 68: Data backup

Browsing for the backup folder, 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 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.

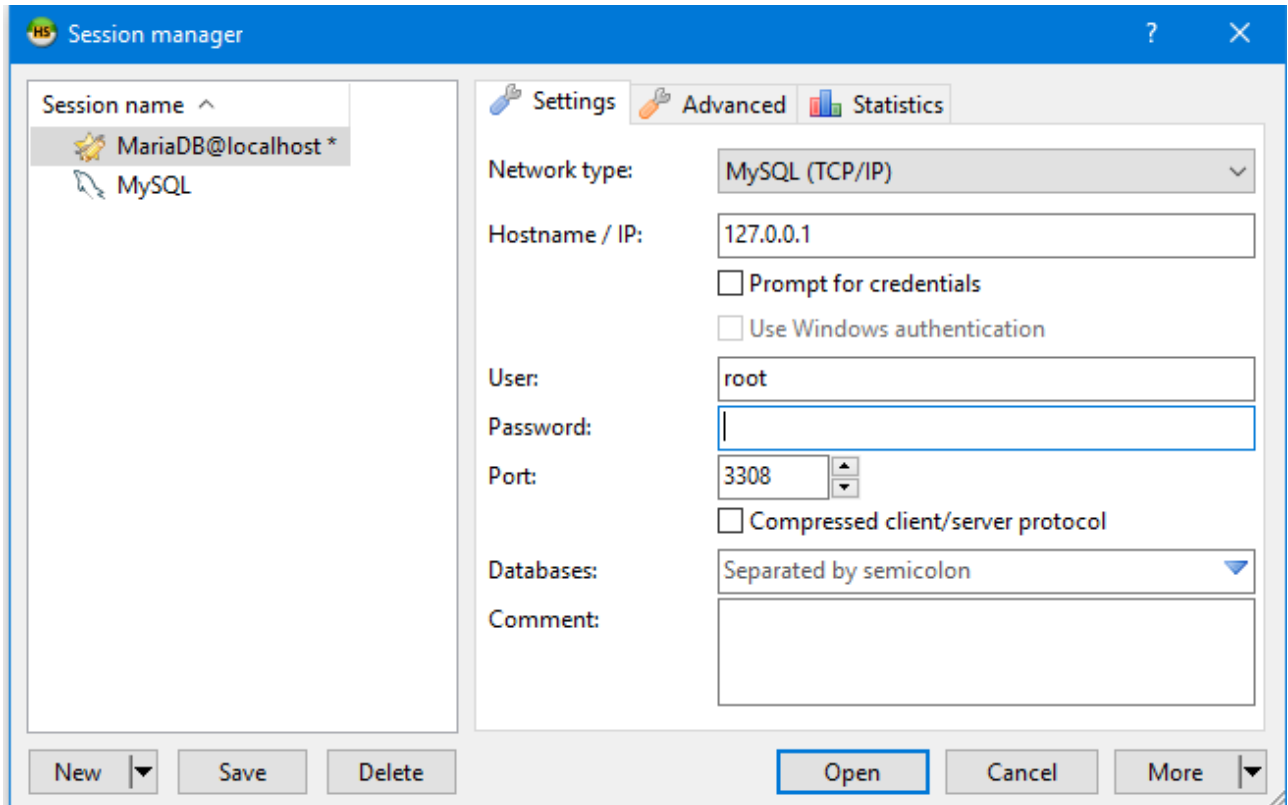


Figure 69: HeidiSQL Session Manager

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 and click the “**Open**” command button (Figure 69), a screen appears with details of the database(s) and objects on the specified Port number, Figure 70.

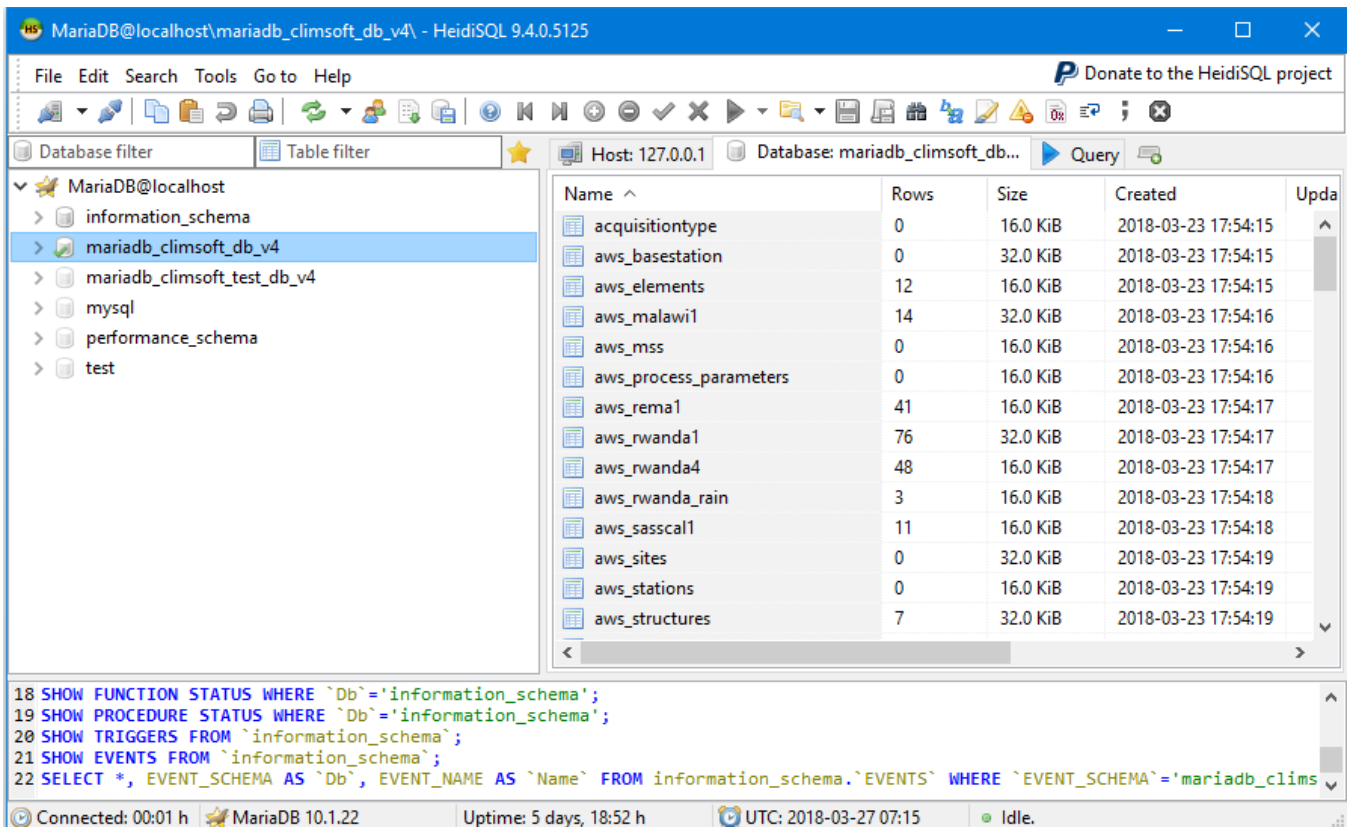


Figure 70: HeidiSQL interface showing database information

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 display a new dialog to specify details for the backup as shown on Figure71.

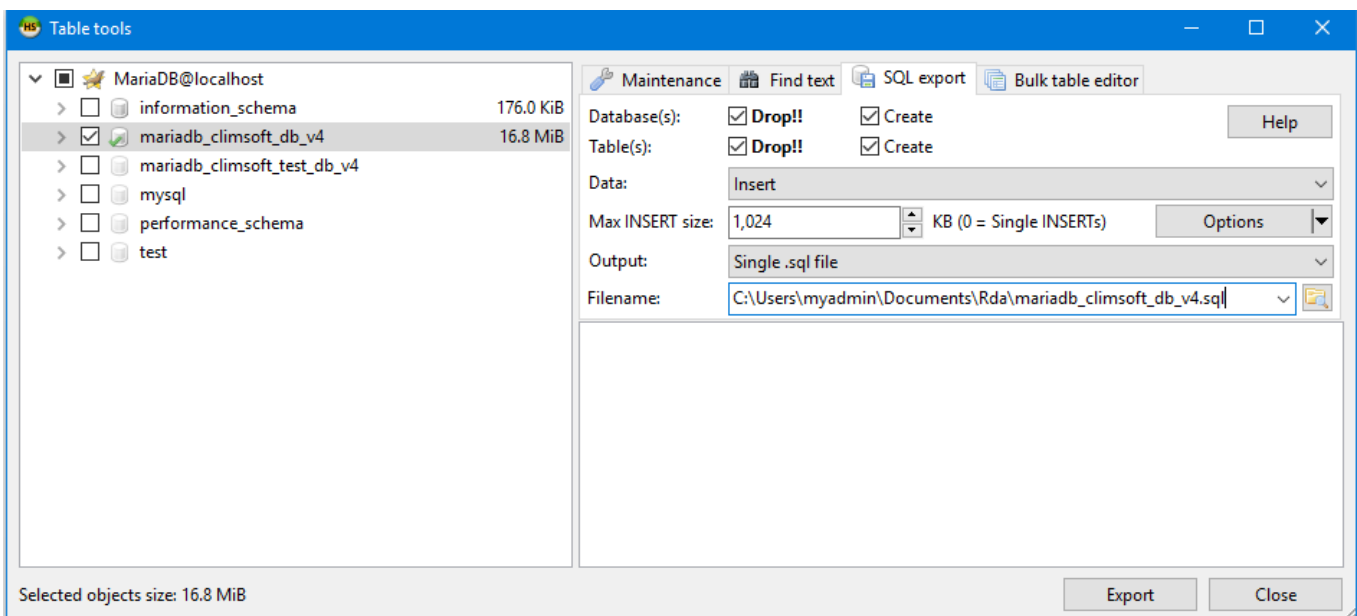


Figure 71: HeidiSQL Dialog for database backup

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 check boxes on the right panel and select **“INSERT”** on the **“Data”** dropdown list.

Click the **“Export”** button, the 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”**.

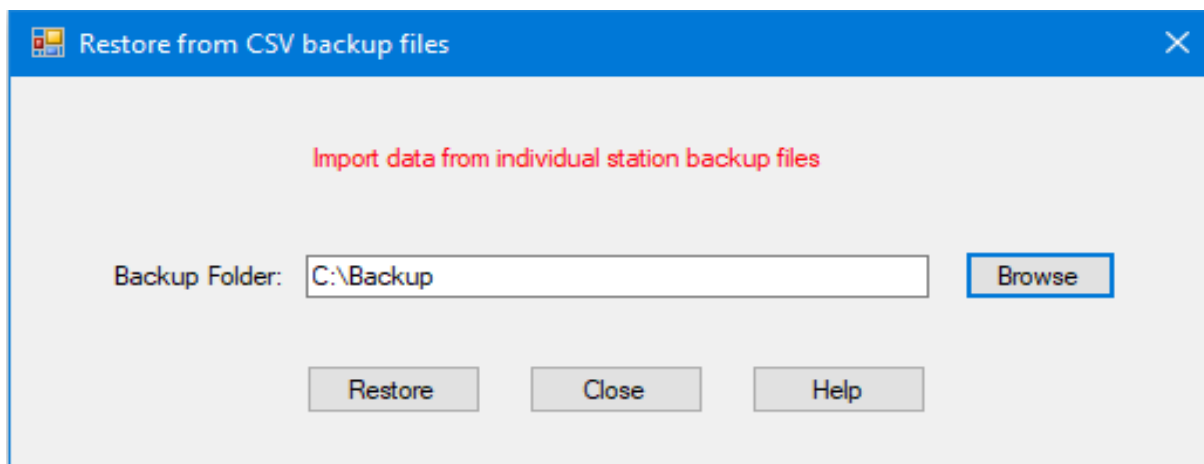


Figure 72: Data restore

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, paragraph 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 in 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 main database. 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.

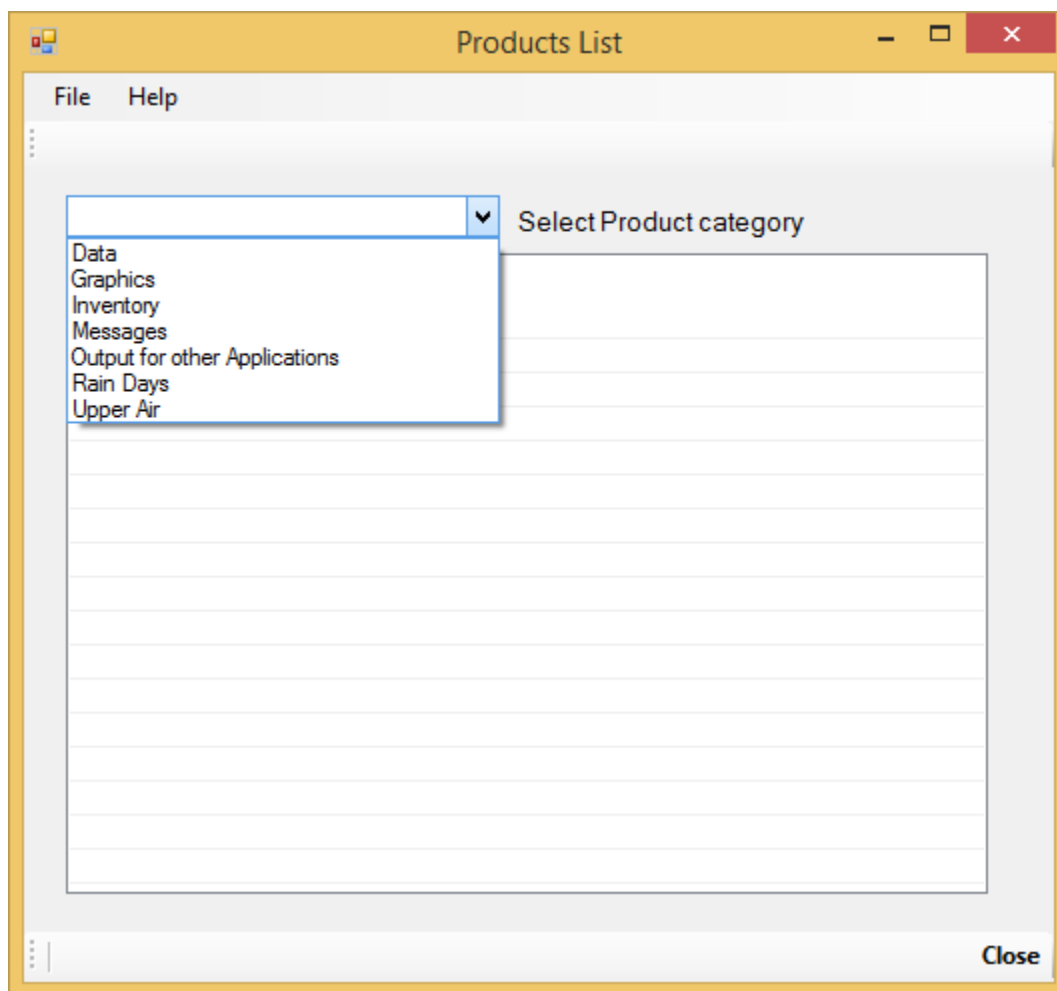


Figure 73: Products category list

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

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

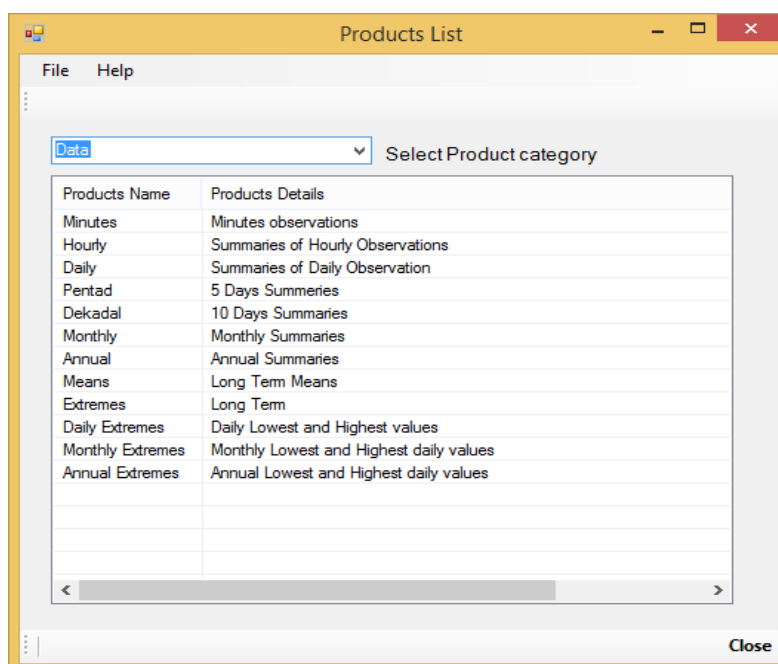


Figure 74: Data Product list

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

No	Products Category	Product Types	Details
	Data	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
	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 Messages
	Output for other Applications	Instat	Daily data for Instat
		Rclimdex	Daily data for Rclimdex
		CPT	Data for CPT
		CDT	Data for CDT
		GEOCLIM	Data for GEOCLIM
	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

Table 3: Climate Products.

Once the product type is selected, the dialog for the corresponding products criteria appears. 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 by their names, 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 corresponding products. Figure 76(a) and Figure 76(b), Figure 76(c) and Figure 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

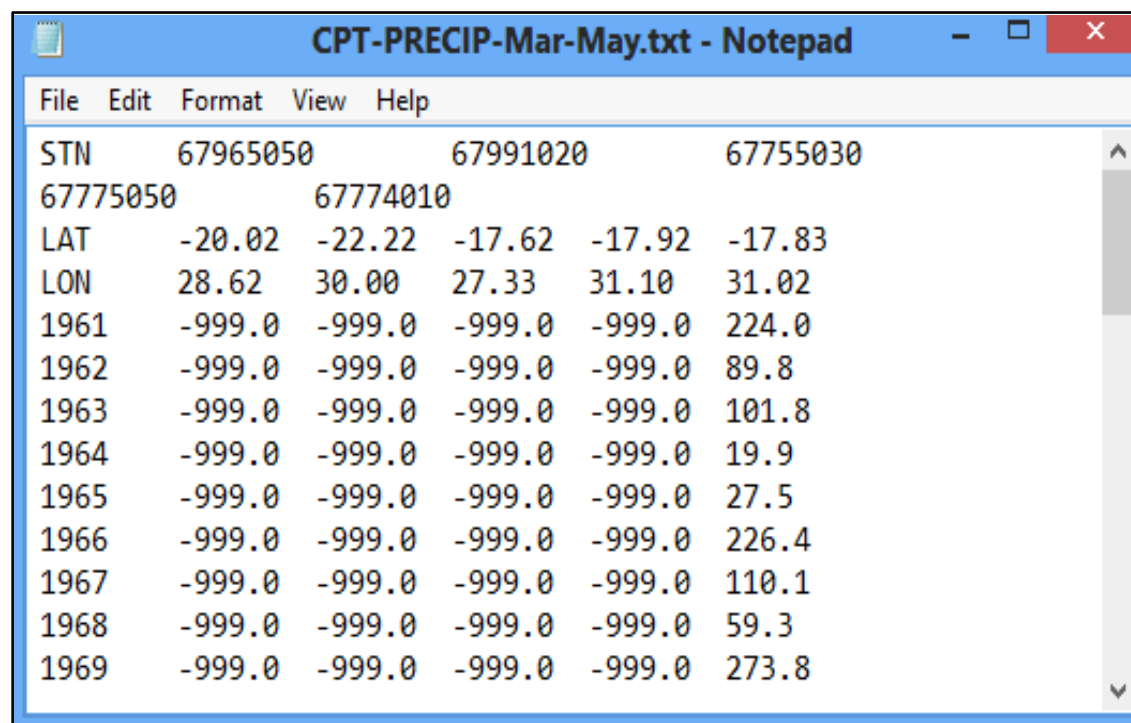
Extreme Minimum Values

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



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 Rclimindex

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 Rclimindex

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 selection of the station. 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.

The application used for plotting the windrose is **WRPLot**. This application is 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 you by email within shortly.

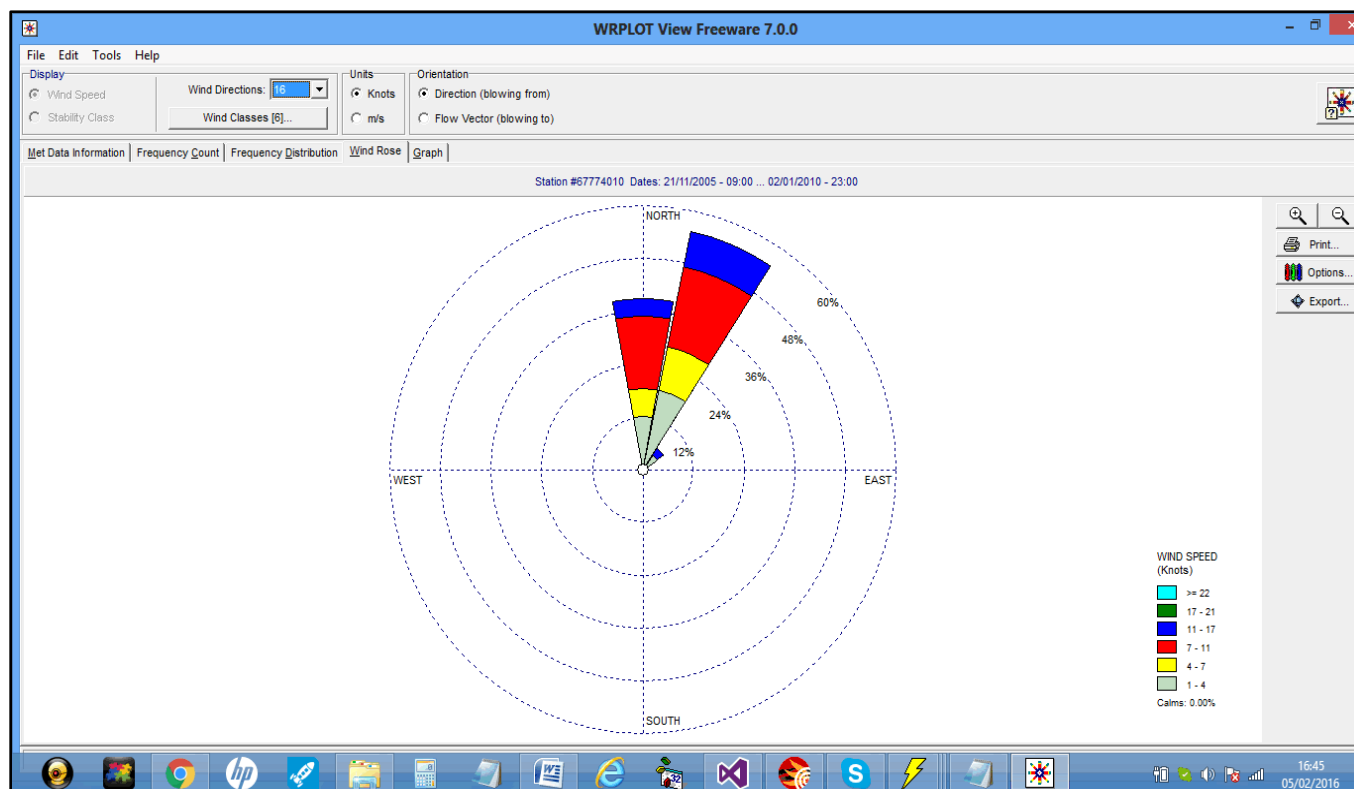


Figure 81: Windrose plot

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 is displayed where the chart options will be provided.

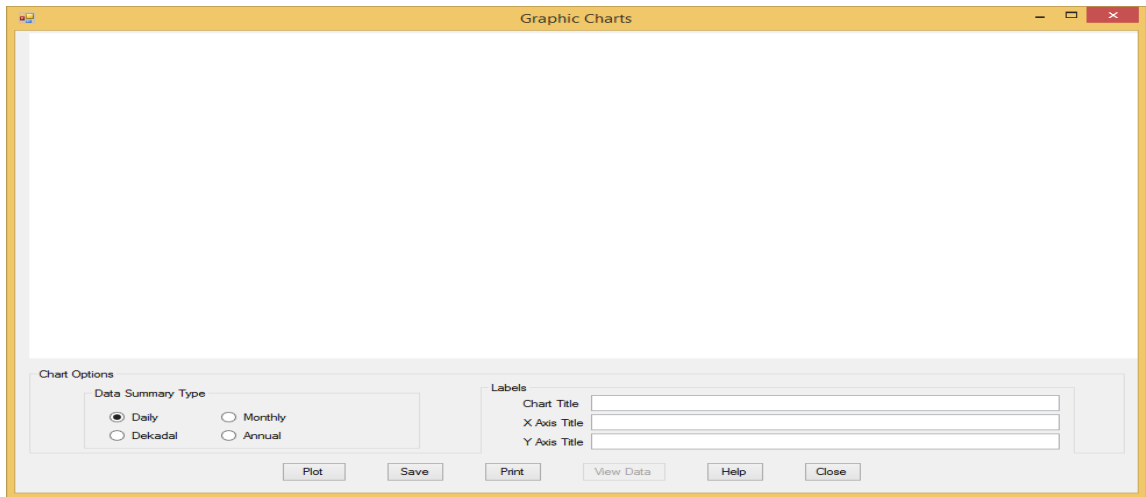


Figure 82: Charts Plotting Dialog

For example to plot a Histogram chart, for monthly temperatures (Tmax and Tmin) from Wilson Airport, Kenya for the year 1984 do the following:

- (i) Check the option Monthly
- (ii) Type in the labels appropriately
- (iii) Click the button Plot and obtain the chart below.

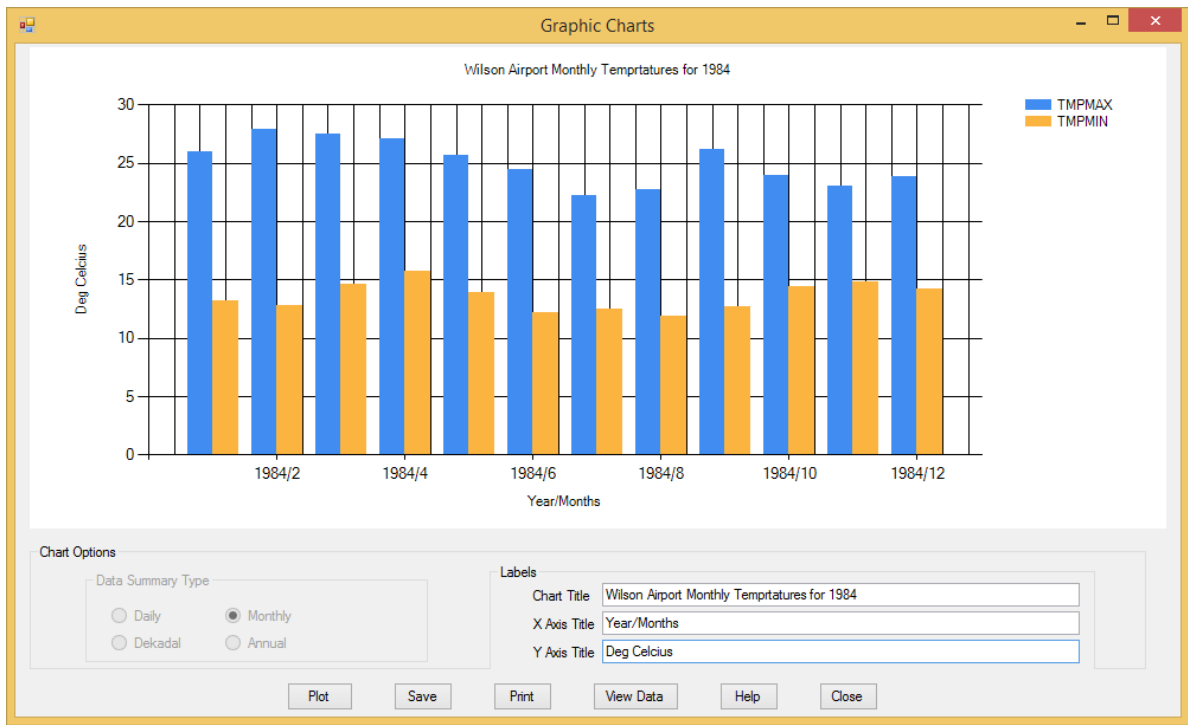


Figure 83: Temperatures Histograms

Similarly a Time Series chart for daily rainfall from Wilson Airport, Kenya for the period 1981-1995 can be plotted as below.

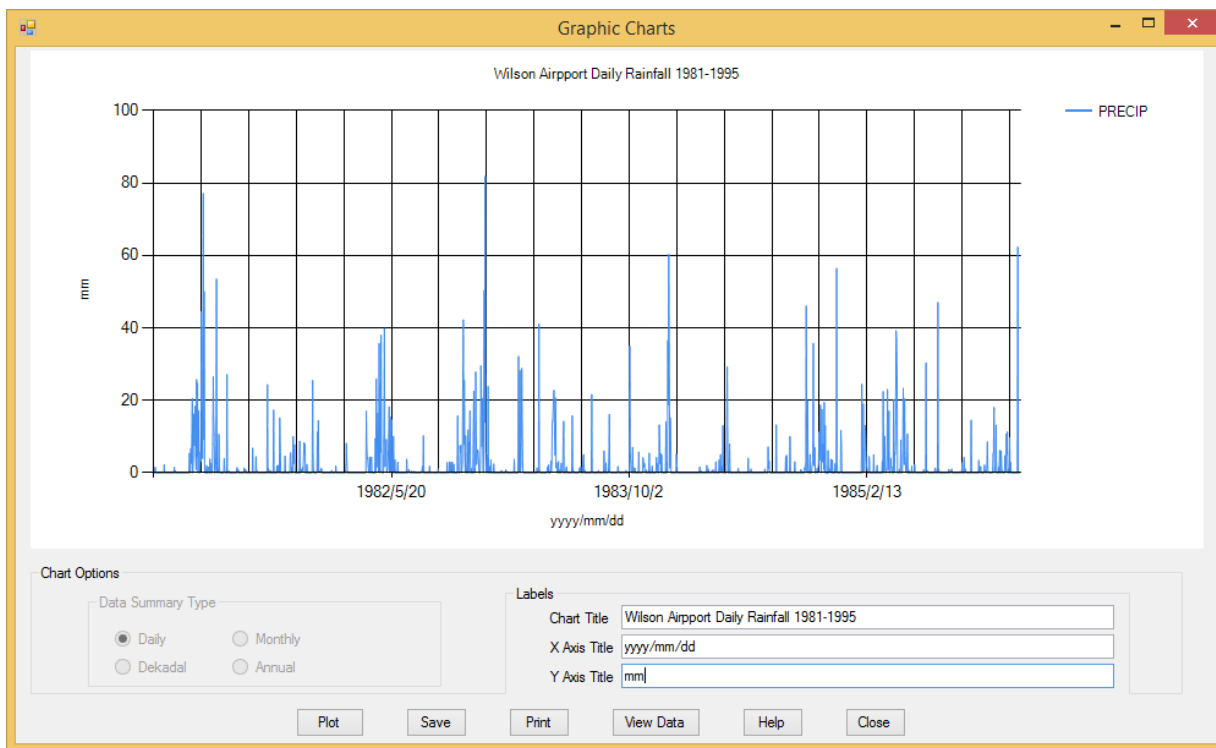


Figure 84: Rainfall Time Series

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:

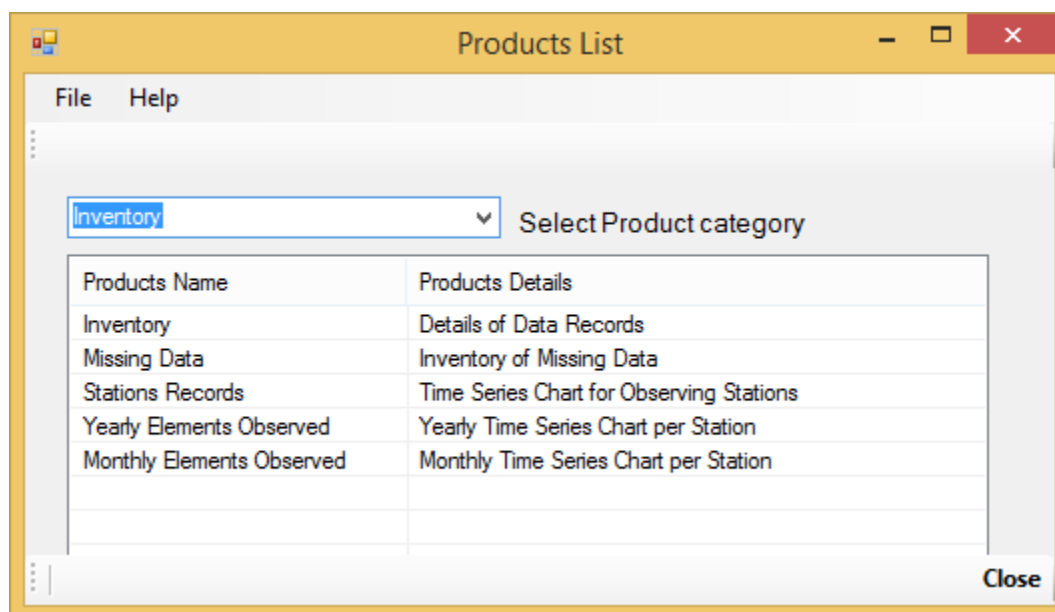


Figure 85: Inventory Products dialog

There are 5 types of outs 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 of 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**.

Data Selection

File Edit Help

Missing Data

Select Station: HARARE AIRPORT Select Element: Precipitation: daily total

Station Id	Station Name
67775050	HARARE AIRPORT

Element Id	Element Abbrev	Element Details
2	TMPMAX	Temperature: daily maximum
3	TMPMIN	Temperature: daily minimum

Summary Type

☒ Mean ☐ Total

Period

Start Date: 01 January 1991 Hour: 00 Minute: 00

End Date: 31 December 2000 Hour: 23 Minute: 00

Buttons: Delete Selected Station, Select All, Clear List, Delete Selected Elements, Select All, Clear List, Start Extraction, Cancel

Figure 86: Input selection dialog for Inventory Products

AQ29		Jx																																							
	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	AL	AM		
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		
2	67775050	HARARE AIRPORT	2	-17.9	31	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	X	X	X	X	X	X	X	X	X
3	67775050	HARARE AIRPORT	2	-17.9	31	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	X	X	X	X	X	X	X	M	M
4	67775050	HARARE AIRPORT	2	-17.9	31	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	X	X	X	X	X	X	X	X	X
5	67775050	HARARE AIRPORT	2	-17.9	31	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	X	X	X	X	X	X	X	M	
6	67775050	HARARE AIRPORT	2	-17.9	31	1497	2000	5	X	X	X	X	X	X	X	X	X	X	M	M	M	M	M	M	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
7	67775050	HARARE AIRPORT	2	-17.9	31	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	X	X	X	X	X	X	M		
8	67775050	HARARE AIRPORT	2	-17.9	31	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	X	X	X	X	X	X	X	X	
9	67775050	HARARE AIRPORT	2	-17.9	31	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	X	X	X	X	X	X	X	X	
10	67775050	HARARE AIRPORT	2	-17.9	31	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	X	X	X	X	X	X	M		
11	67775050	HARARE AIRPORT	2	-17.9	31	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	X	X	X	X	X	X	X	X	
12	67775050	HARARE AIRPORT	2	-17.9	31	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	X	X	X	X	X	X	M		
13	67775050	HARARE AIRPORT	2	-17.9	31	1497	2000	12	X	X	X	X	X	X	X	X	X	X	X	X	X	X	M	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
14	67775050	HARARE AIRPORT	2	-17.9	31	1497	2009	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	X	X	X	X	X	X	M		
15	67775050	HARARE AIRPORT	2	-17.9	31	1497	2009	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	X	X	X	X	X	X	M		
16	67775050	HARARE AIRPORT	3	-17.9	31	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	X	X	X	X	X	X	X		
17	67775050	HARARE AIRPORT	3	-17.9	31	1497	2000	2	X	X	X	X	X	X	X	X	X	X	M	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	M	M			
18	67775050	HARARE AIRPORT	3	-17.9	31	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	X	X	X	X	X	X	X		
19	67775050	HARARE AIRPORT	3	-17.9	31	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	X	X	X	X	X	M			
20	67775050	HARARE AIRPORT	3	-17.9	31	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	X	X	X	X	X	X	X		
21	67775050	HARARE AIRPORT	3	-17.9	31	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	X	M	X	X	M				
22	67775050	HARARE AIRPORT	3	-17.9	31	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	X	X	X	X	X	X	X		
23	67775050	HARARE AIRPORT	3	-17.9	31	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	X	X	X	X	X	X	X		
24	67775050	HARARE AIRPORT	3	-17.9	31	1497	2000	9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	M	M	M	M	X	X	X	X	X	X	M				
25	67775050	HARARE AIRPORT	3	-17.9	31	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	X	X	X	X	X	X	X		
26	67775050	HARARE AIRPORT	3	-17.9	31	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	X	X	X	X	X	M			
27	67775050	HARARE AIRPORT	3	-17.9	31	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	X	X	X	X	X	X	X		
28																																									
inventory-products																																									
Ready																																									

Figure 87a: Inventory of Data Records

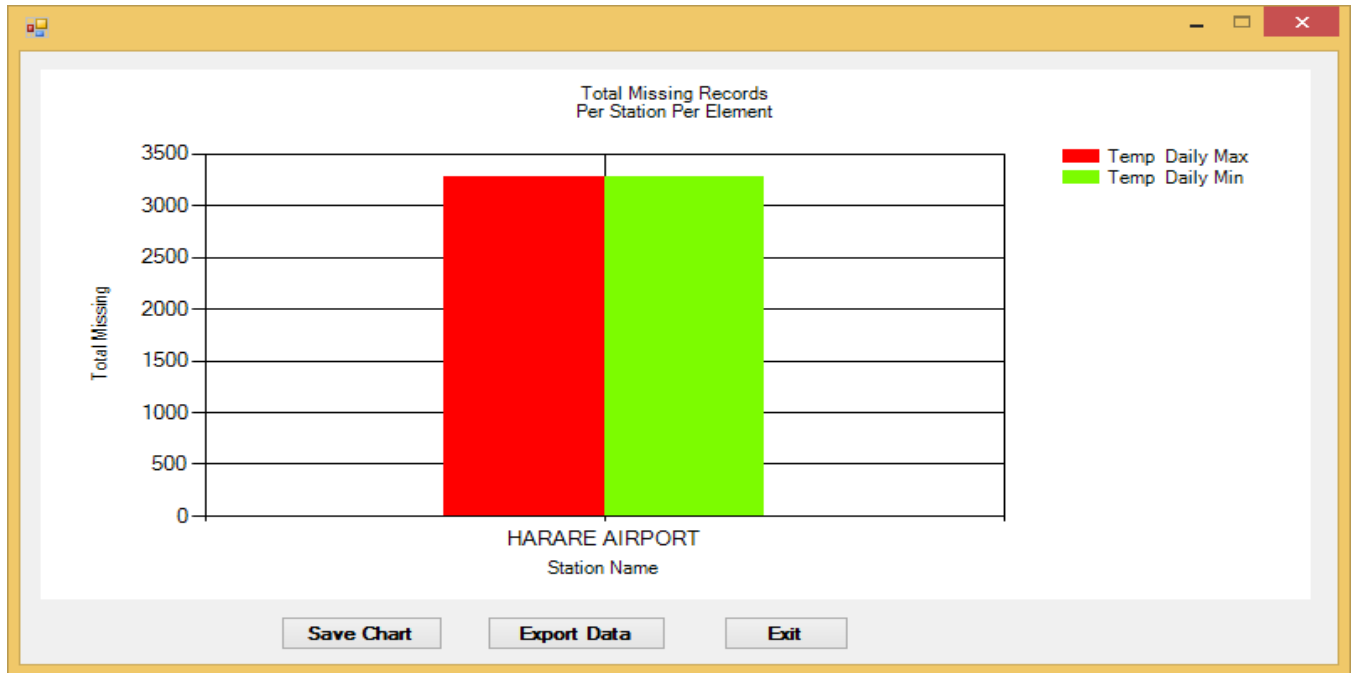


Figure 87b: Total missing data records

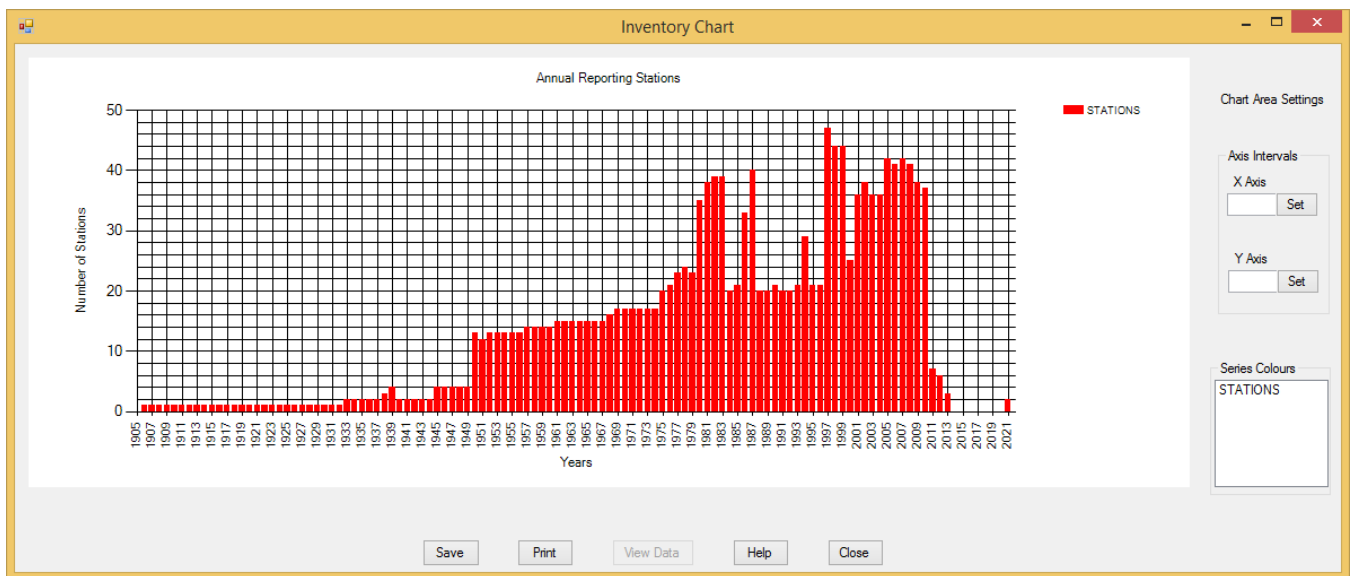


Figure 87c: Total missing data records

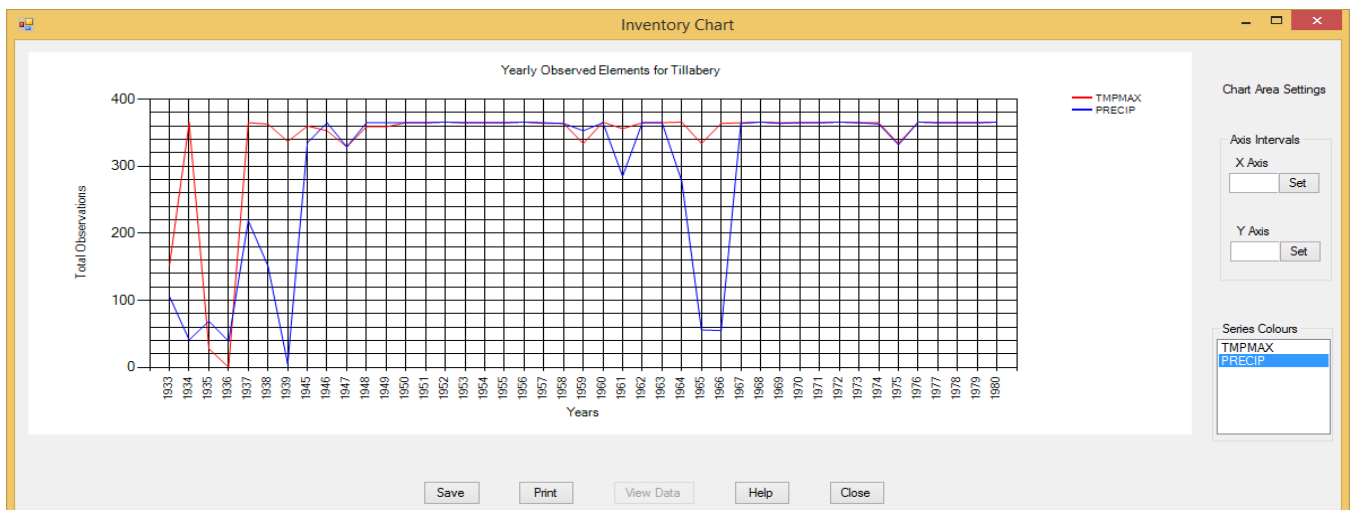


Figure 87d: Annual reporting stations

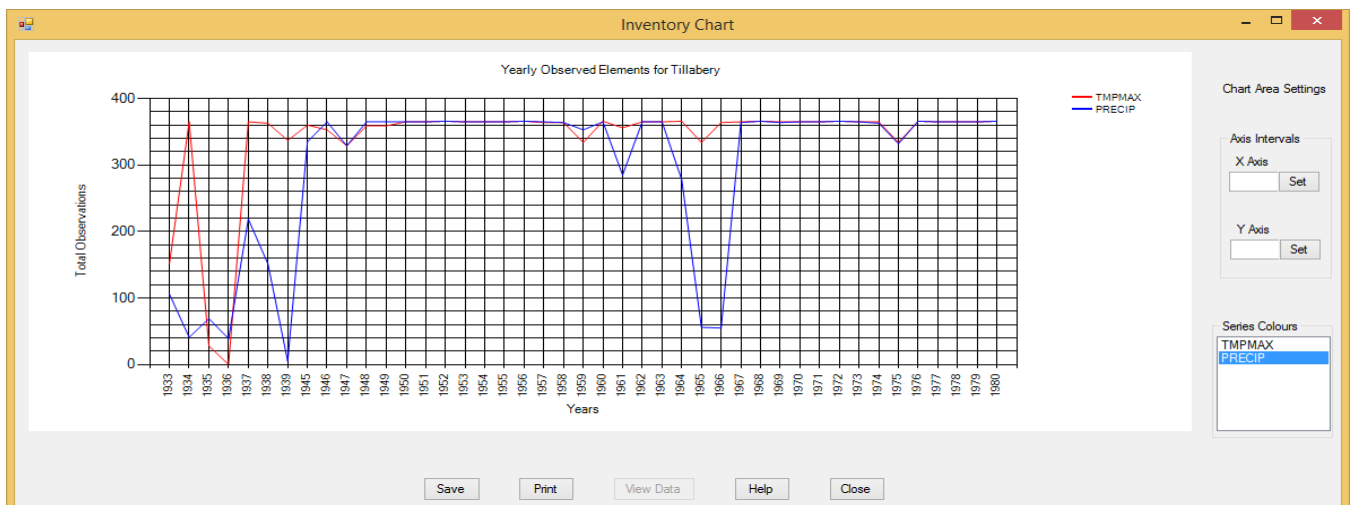


Figure 87e: Monthly observations from station elements

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**.

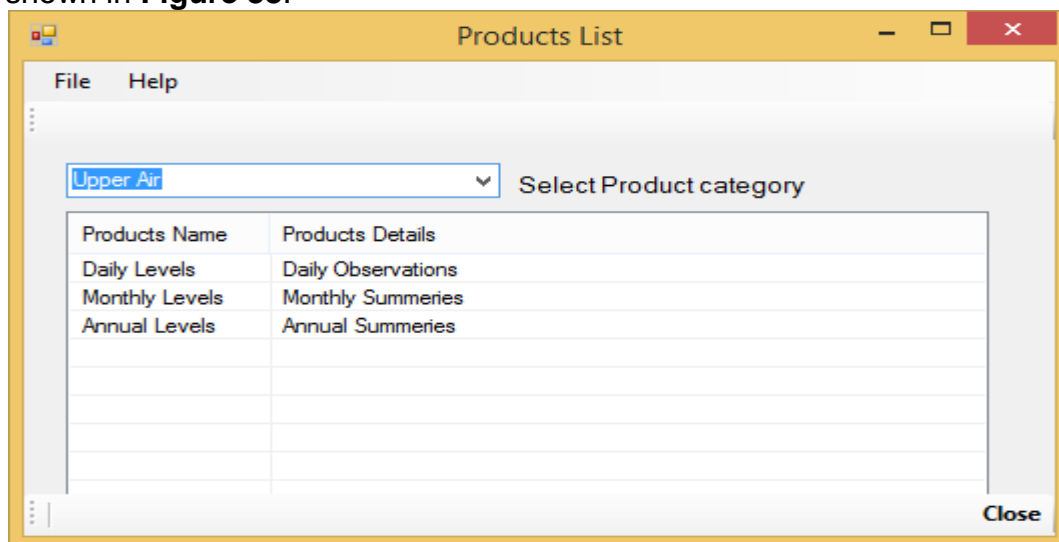


Figure 88: List of Upper Air data summaries

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

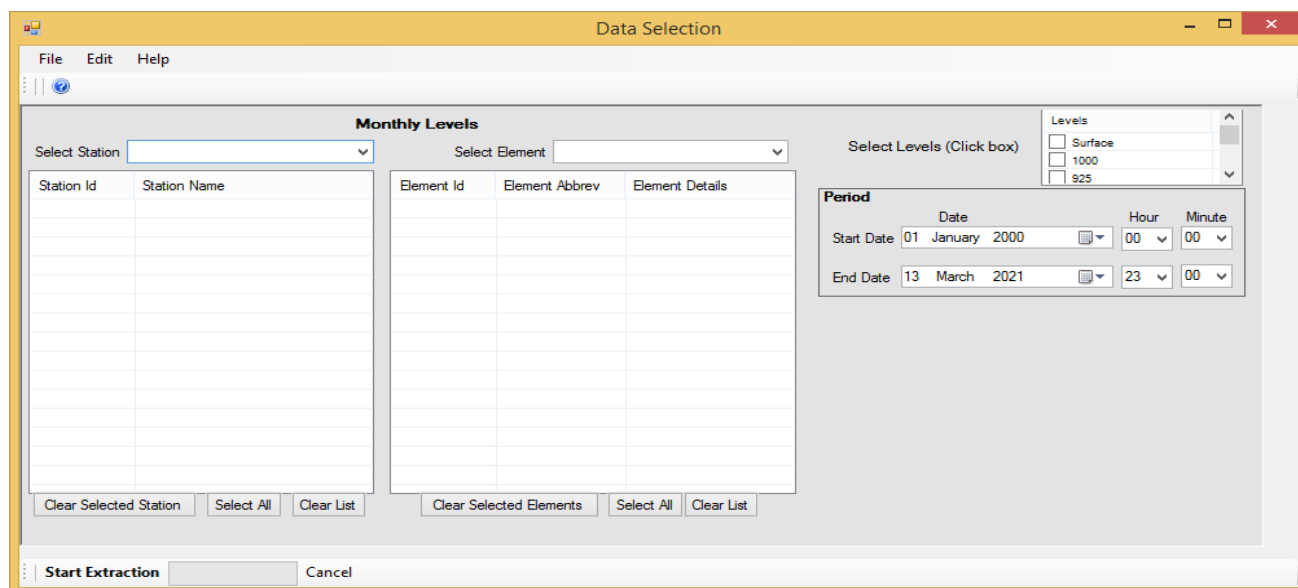


Figure 88a: Dialog for Monthly Upper Air data summaries

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 desired

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

Station Id	Station Name
1017	Bilma
1036	Tillabery
1052	Niamey_Aero
1090	Zinder

CLIMAT message period
Year: 1980 Month: 1

Include Optional Sections - If sufficient climate statistics are available
☐ 222 - Climate Normals
☐ 333 - Days with parameters beyond certain thresholds
☐ 444 - Extreme values and frequencies

Generate long term statistics for CLIMAT message
Specify climate base period with sufficient data
Begin Year: 1951 End Year: 1980 OK

Encode CLIMAT Clear Close Help

CLIMAT 01980
61017 NIL
61036 111 20110 403470197 5102 60000/00 8313100 9000031
61052 111 20110 403480184 5066 60000/00 8313100 9000031
61090 111 20125 403100155 5048 60000/00 8313100 9000031
=
CLIMAT Message File C:\ProgramData\Climsoft4\data\climat011980.a

Figure 88b: Dialog to Encode CLIMAT message.

The dialog is used as follows:

- 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.
- CLIMAT message period** –When the dialog opens the period is set to the previous month of the current date. It's assumed that data for the previous month has been processed and ready for encoding. However, month for the required message should be correctly set.
- Climate 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 define 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 date has been updated.
- Optional Sections** – If required any of these sections can be included in in message when selected. **Section 222** requires that sufficient data to compute the Normal is available.
- CLIMAT Message File** – Encoded CLIMAT message will be saved in the indicated file. It's a text file that be send via email as an attachement or pasted into the email's message section

11. AWS Real Time Data Operations

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

The screenshot shows the 'Process Settings' dialog box. The left sidebar contains buttons for 'Processing', 'Servers', 'Sites', 'Data Structures', 'Encoding Options', 'Help', and 'Close'. The 'Processing' button is highlighted. The main content area is divided into three sections: 'Settings', 'Processing Information', and 'Processing Status'. The 'Settings' section includes radio buttons for 'Restart' and 'Stop' (selected), and input fields for 'Retrieval Interval (Minutes)' (60), 'Hour Offset (Minutes)' (10), 'Retrieve Last' (2), 'Timeout Period (Seconds)' (20), and 'GMT Diff +/-' (0). There is a checkbox for 'Delete Input File After Processing' and a 'Save Changes' button. The 'Processing Information' section is divided into 'Input' and 'Output' columns, each with fields for 'FTP Server', 'Folder', and a list box for 'Input Files' and 'Message Files' respectively. The 'Processing Status' section shows 'Current Date Time' as 27/03/2018 10:44:38, 'Last Processed' and 'Next Processing' times, and a 'Status' field set to 'Stopped'.

Figure 89: AWS real time processing settings dialog

Follow the steps below to begin the AWS data processing.

11.1 Server Settings

Click on “**Servers**” command on the left window of the dialog. The dialog through which the settings can be set is shown in Figure 90

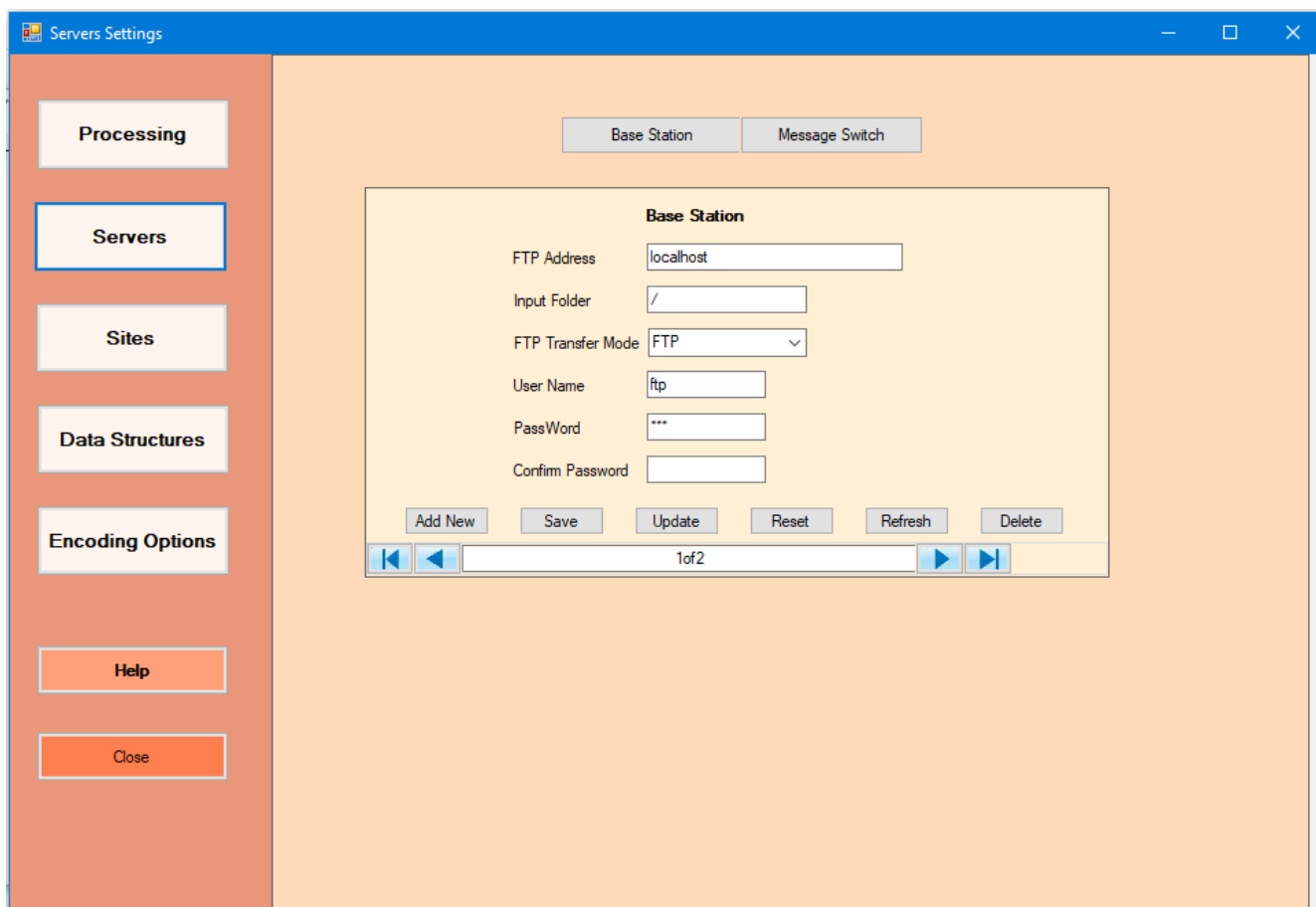


Figure 90: AWS server settings

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 for the server settings should be obtained from the servers' administrators and then entered. Multiple servers can be configured where more than one base station or message switching system is used.

Click **Add New** 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 accordance 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 login 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,

Site Settings

Processing

Servers

Sites

Data Structures

Encoding Options

Help

Close

Site ID: 20402AWS

Site Name: BUTARE_AWS

Input Data file: AWS/input

Data Structure: aws_LSI

Missing Data Flag: *

AWS Server IP: 10.10.233.262

GTS Msg Header:

Files name prefix: ☒ Data_%FN%_

Operational: ☒

Encode for GTS: ☐

AddNew Save Update Delete View/Update

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 or a month. For instance for a 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

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

- **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 corresponds 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.

	Cols	Element_abbreviati	Element_Name	Element_Details	Climsoft_Element	Bufr_Element	unit
▶	1	date/time	Date/time				
	2	T1	Time1				
	3	TempSoilAve	TSAVG	Average Soil Te...	900	012130	°C
	4	T2	Time2				
	5	PRESAve	PRESAVG	Average Pressure	884	030200	hPa
	6	T3	Time3				
	7	WDPrevDir	WDPR	Wind Direction	895	011001	
	8	T4	Time4				
	9	RADAve	RDAVG	Global Radiation ...	894	014028	W/m2
	10	T5	Time5				
	11	WSPAve	WSPAVG	Average Wind sp...	897	011002	m/s
	12	T6	Time6				
	13	TVG	TempAve	Average Temper...	881	012101	°C

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 different data structures should be created and allocated a name so that the received data is correctly mapped in the database. After studying the structure of data from a given site it is easy to create its structure 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;

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

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

	Cols	Element_abbreviati	Element_Name	Element_Details	Climsoft_Element	Bufr_Element	unit
*							

Figure 93 (a): 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** - the position from left for the column being described,
- **Element_abbreviation** – Abbreviation for the name describing data in the column.

Users are free to use any type of abbreviation that 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 Elements 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 93 (b) 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 00:00:00,180925,0,1024,0,1024,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 01:00:00,180985,0,1024,0,1024,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 02:00:00,181045,0,1024,0,1024,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 03:01:00,181106,0,1024,0,1024,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 04:00:00,181165,0,1024,0,1024,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 05:00:00,181225,0,1024,0,1024,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 06:00:00,181285,0,1024,0,1024,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 07:00:00,181345,0,1024,0,1024,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 08:00:00,181405,0,1024,0,1024,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 09:00:00,181465,0,1024,0,1024,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 10:00:00,181525,0,1024,0,1024,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 10:59:00,181584,0,1024,0,1024,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 12:00:00,181645,0,1024,0,1024,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 13:00:00,181705,0,1024,0,1024,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 14:00:00,181765,0,1024,0,1024,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 15:00:00,181825,0,1024,0,1024,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 16:00:00,181885,0,1024,0,1024,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 17:00:00,181945,0,1024,0,1024,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 18:00:00,182005,0,1024,0,1024,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990
1/9/2015 19:00:00,182065,0,1024,0,1024,0,1024,0,1024,0,1024,0,1024,0,1/1/1990 00:00:00,0,0,1/1/1990 00:00:00,0,0,1/1/1990

```

Figure 93 (b): AWS Output Text File

11.6 Coding Settings

Message Coding Settings

Processing

Servers

Sites

Data Structures

Encoding Options

Help

Close

Header and Templates

Encoding Template: TM_307080

Message Header (TTAAii CCCC): ISMH01 HKNC

BUFR Section 2

BUFR Edition No.: 04

Originating/Generating Centre: 00014

Originating/Generating Sub-Centre: 0

Update Sequence No.: 0

Option Section Inclusion: ☐

Data Category: 0

International Data Sub-Category: 0

Local Data Sub-Category: 0

Master Table Version No.: 13

Local Table Version No.: 0

Code and Flags

Element	Name	Unit	Value
001101	State identifier	Code table	128
002001	Type of station	Code table	0
002038	Method of sea su...	Code table	15
002175	Method of precipi...	Code table	1
002176	Method of state o...	Code table	14
002177	Method of snow ...	Code table	15
002178	Method of liquid ...	Code table	4
002179	Type of sky cond...	Code table	3
002180	Main present we...	Code table	14
002181	Supplementary pr...	Flag table	
002182	Visibility measure...	Code table	14
002183	Cloud detection s...	Code table	14
002184	Type of lightning ...	Code table	14
002185	Method of evapo...	Code table	14
002186	Capability to dete...	Flag table	1111111
002187	Capability to dete...	Flag table	
002188	Capability to dete...	Flag table	
002189	Capability to discr...	Flag table	
nnnnn	Vertical signific...	Code table	67

AddNew Save Update Set Default

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

The screenshot shows a window titled "Process Settings" with a blue title bar. On the left is a vertical sidebar with buttons: "Processing" (highlighted), "Servers", "Sites", "Data Structures", "Encoding Options", "Help", and "Close". The main area is divided into several sections:

- Settings:** Contains radio buttons for "Restart" (selected) and "Stop". Below are input fields for "Retrieval Interval (Minutes)" (60), "Hour Offset (Minutes)" (10), "Retrieve Last" (2) "Hour", "Timeout Period (Seconds)" (20), a checkbox for "Delete Input File After Processing" (unchecked), and "GMT Diff +/-" (0). A "Save Changes" button is on the right.
- Processing Information:** Divided into "Input" and "Output" columns. Each has fields for "FTP Server" and "Folder", and a list box for "Input Files" (under Input) and "Message Files" (under Output).
- Processing Status:** Displays "Current Date Time" (2018-08-13 12:18:40), "Last Processed" (empty), "Next Processing" (2018-08-13 13:10:00), and "Status" (Next Encoding Time -2018-08-13 13:10). It includes a scrollable area for more details.
- Error Messages:** A text area at the bottom showing a log entry: "2018-08-13 12:18:27 Could not find a part of the path 'C:\Users\myadmin\Source\Climsoft\Climsoft Ver4\Climsoft Ver4\bin\Debug\data\descripto'".

Figure 95: Dialog for Data Acquisition and processing

The AWS data processing is controlled from the dialog shown in Figure 92 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 Figure 92. Details are as follows;

Controls Details

- **Settings:**
 - **Restart** – Starts the processing schedule,
 - **Stop** – Stops the process schedule,
 - **Retrieval Intervals** – The frequency in minutes at which the message encoding is repeated. Where encoding is required for Synoptic messages only 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 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 station 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 are sent,
 - **Output Folder** – Folder containing output files,
 - **Message Files** – List of the encoded and transmitted TDCF 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** of the Climsoft installation folder.

12. Paper Image Archiving

Images of scanned paper records can be archived in Climsoft Version 4 and later retrieved when required. The operation starts by first creating the metadata for the paper image archives. Next set up the folder where the image files will be archived. The archived images 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** dialog click on the icon **Metadata Information** then on the tab **Paper Archive** in the subsequent dialog on **Metadata Information**. The final dialog is as shown in Figure 93.

The screenshot shows a software window titled "Metadata Management" with a blue header bar. Below the header is a menu bar with "Close" and "Help". A tabbed interface is present, with the "Paper Archive" tab selected. The main content area is titled "Paper Archive Definition" and contains a "Definitions" section. Within this section, there are two text input fields: "Form ID" with the value "HLYPR" and "Description" with the value "Hourly Pressure". Below these fields is a row of five buttons: "AddNew", "Save", "Update", "Delete", and "View". At the bottom of the form, there is a pagination control showing "1 of 7" with navigation arrows on either side.

Figure 96: Dialog for creating paper archive metadata

- Click on command **AddNew** to start the processing of adding a new metadata record,
- The metadata to be entered are the **Form ID** which is the identification allocated by the Met service for that particular paper form. The details of the type of data contained in that form are entered in **Description** box,

- Click on command **Save** to save the metadata record,
- Other commands are used as follows;
 - **Update** – Saves changes made on a metadata record,
 - **Delete** – Removes a metadata record from the database,
 - **View** – Displays metadata records in a tabular form.

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

- From the **Main Menu** click **Tools -> General Settings** and browse the records until the “**Setting Description**” box displays the value; “**Folder for Paper Archive image files**”. See Figure 94,

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 folder 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 customized.

12.1 Archiving Images

The filenames for the archived imaged are structured such that they described the data in that file. Therefore Climsoft version 4 maintains a standard filename structure for the archived images files that it uses when an image for a particular observation is required for retrieval. Image files that come with the standard filename structure are archived straight away while those with a different structure are first taken through a renaming process. The following sections describe how images with different filename structures are archived.

12.2 Archiving Images with Standard Filename Structures

The Climsoft Version 4 standard 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;

- From the **Welcome** dialog, click on the icon **Paper Archive** to obtain the dialog shown in Figure 95,
- Click on the explorer button and select the folder containing images to be archived, All the image files will then be listed as shown in the dialog,
- Uncheck the boxes for the image files that are not required.
- Click the command **Archive** to complete the process.

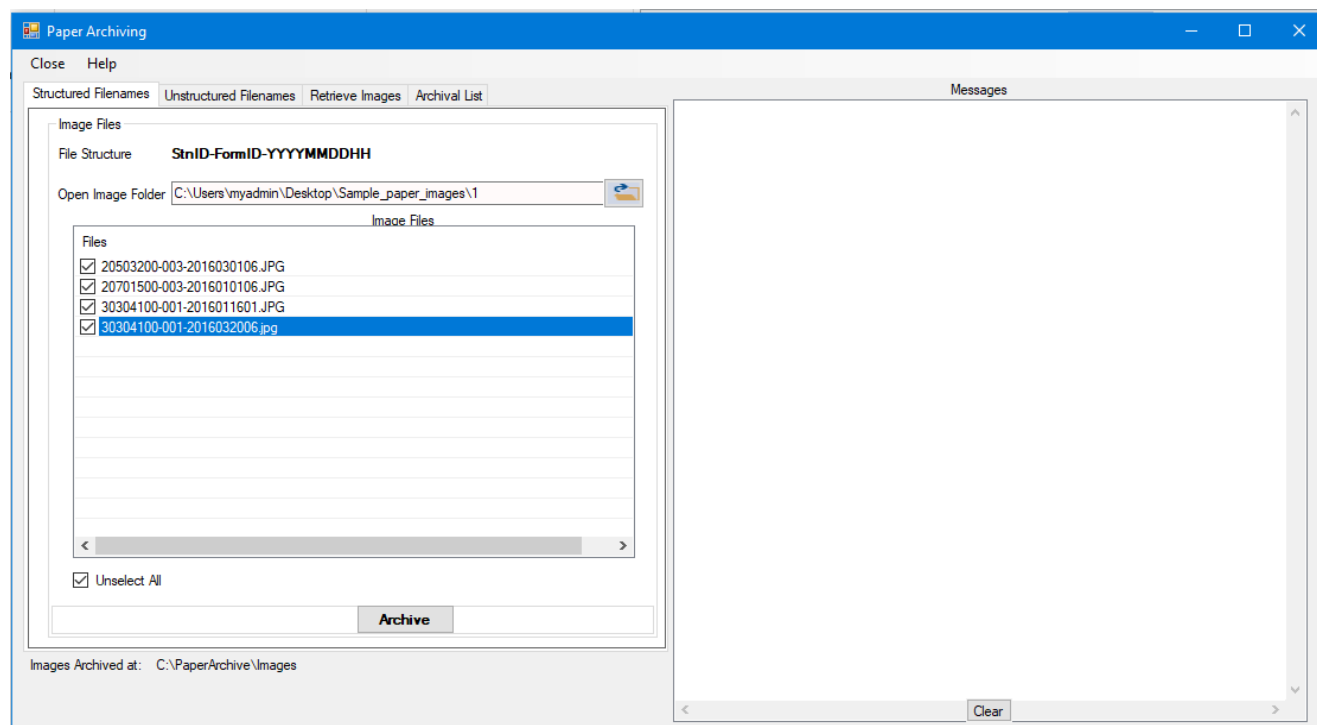


Figure 98: Archiving images with standard filename structure

12.3 Archiving Images without standard filename structured

From the Paper Archive dialog shown in Figure 94 click the tab “**Unstructured Filenames**” to obtain the dialog shown in Figure 96:

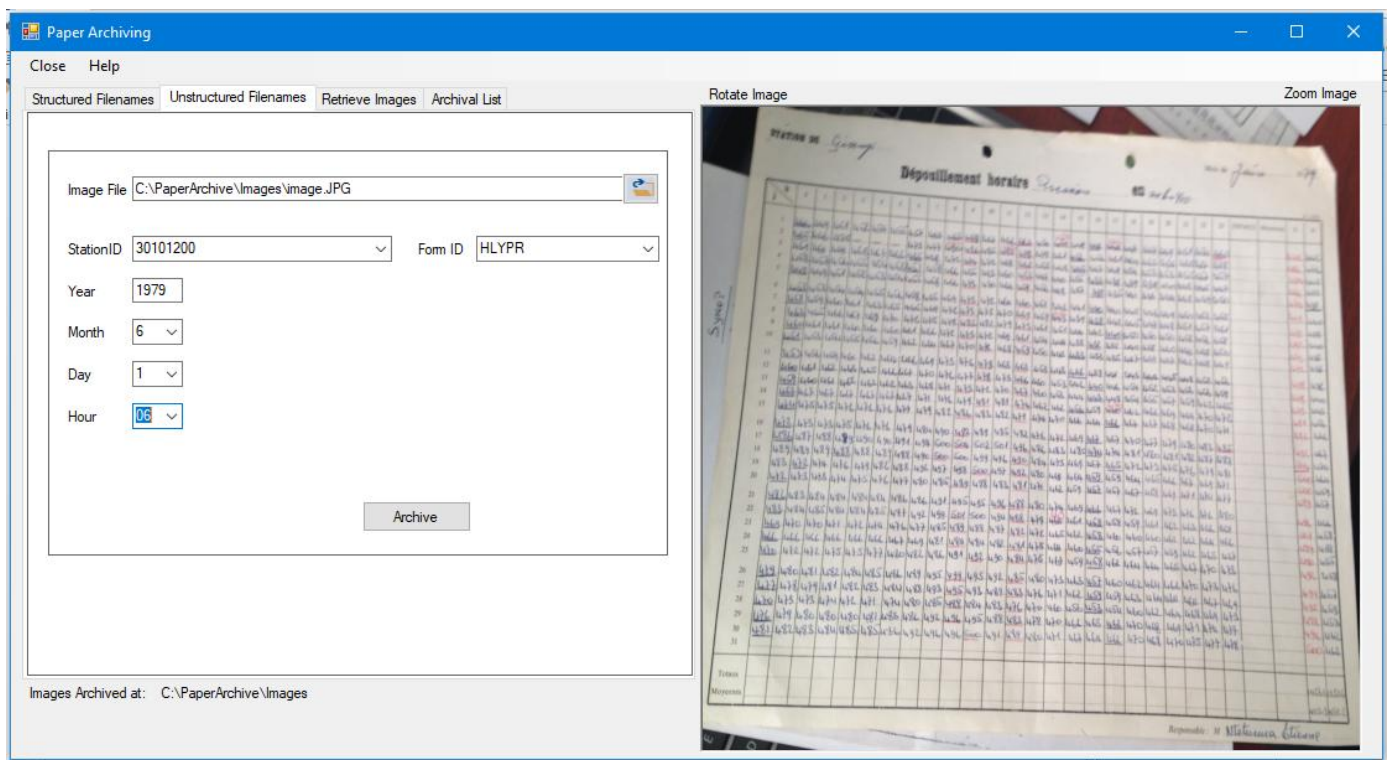


Figure 99: Dialog for archiving images with unstructured file names

- (i) Use the explorer button to select and open the image file to be displayed on the dialog,
- (ii) Enter the details for the content of that image in the 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 save the record,
- (v) Repeat the process for all the images to be archived.

12.4 Retrieving and Viewing Archived Images

Through Climsoft Version 4 records of the archived images can be browsed, opened, updated or deleted. Images saved in pdf format can also be viewed. 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 97;

- (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.

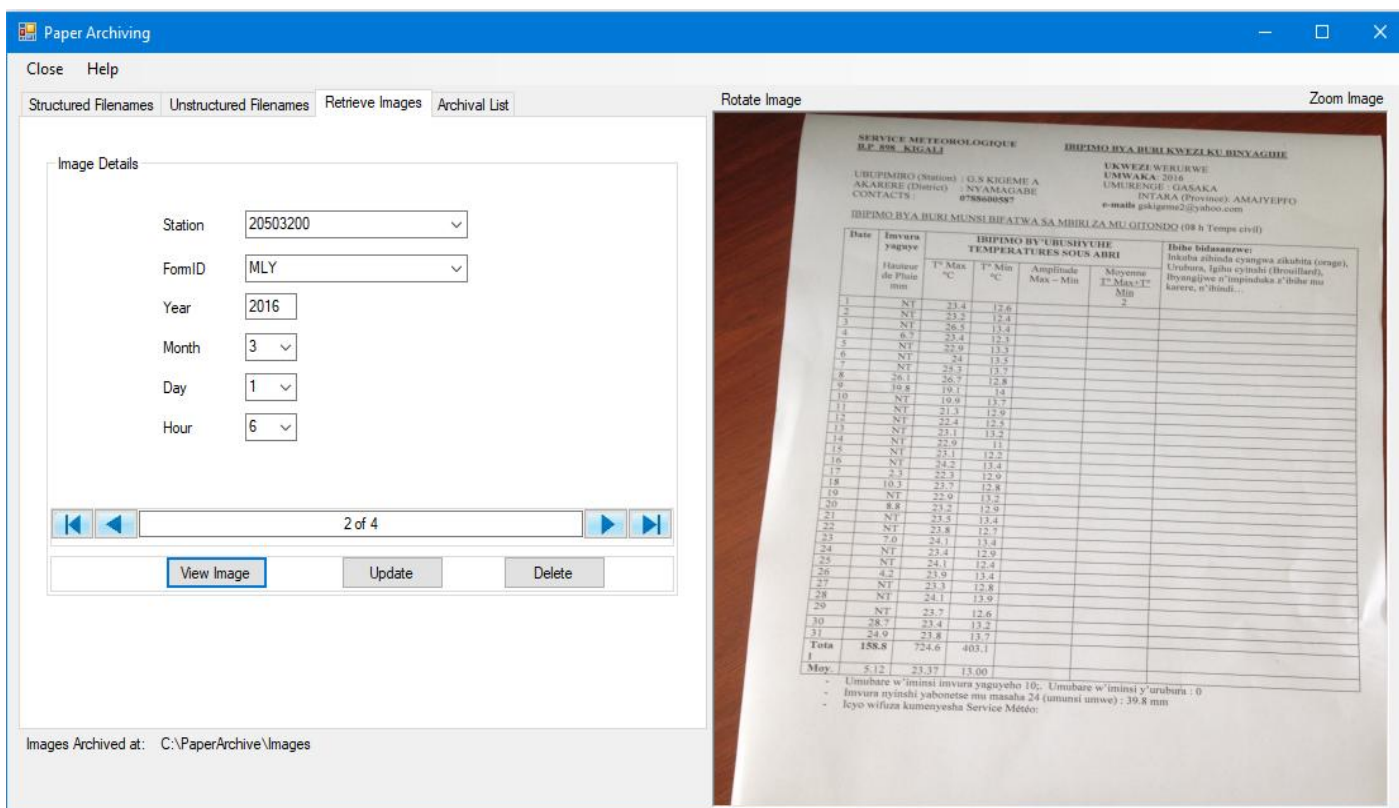


Figure 100: Retrieved archived image

12.5 Viewing a List of Archived Images Files

To view the list of archived image files, click on the “Archival List” tab to open the dialog shown in Figure 97:

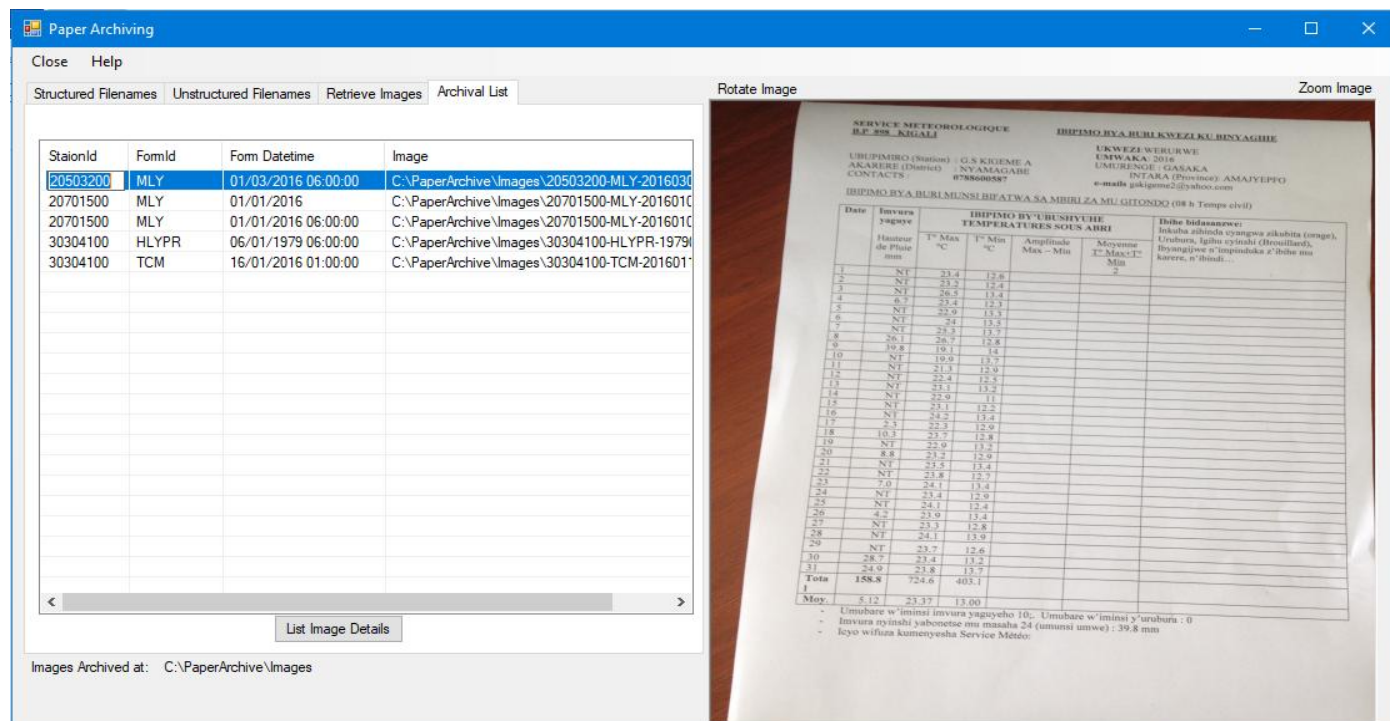


Figure 101: View the list of archived images

13. TDCF Encoding Operations

13.1 TDCF Settings

The settings below need to be in place in your system before sharing your data on Global Telecommunication System (GTS). 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.*

Select the right template for your message and the message header as per the NMHS then enter the message indicators. Enter the Automatic Message Switching System (AMSS) details were the messages will be rooted as shown in Figure 99. Click Update to save changes in each case.

The screenshot shows the 'TDCF BUFR Encoding' window with three tabs: 'Processing', 'Settings', and 'Help'. The 'Settings' tab is active. It contains three main sections:

- Headers:** A dropdown menu for 'Template' set to 'TM_307081' and a text field for 'Message Header' set to 'HKNC'.
- Indicators:** A list of fields with corresponding input boxes:
 - BUFR edition Number: 04
 - Originating/Generating Centre: 00014
 - Originating/Generating Sub-Centre: 0
 - Update Sequence Number: 0
 - Optional Section Inclusion: ☐
 - Data Category: 0
 - International Data Sub Category: 0
 - Local Data Sub-Category: 0
 - Masters Table Version Number: 13
 - Local Tables Version Number: 0At the bottom of this section are 'AddNew' and 'Update' buttons.
- Message Switch Details:** Fields for:
 - Server Address/Name: localhost
 - FTP Mode: FTP (dropdown)
 - Input Folder: input
 - User Name: ftp
 - Password: ***
 - Confirm Password: (empty)An 'Update' button is at the bottom of this section.

At the bottom center of the window is a 'Close' button.

Figure 102: TDCF Settings

13.2 Synoptic data entry form for TDCF encoding

Figure 103: Synoptic Data for many elements for one observation time - TDCF Form

The rules for entering observation values are 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 only at 06Z,
 - Maximum – recorded only at 18Z,
 - Grass minimum – observed at 06Z.
- (vi) **Relative Humidity** – In whole number of percentages,
 - (vii) **Visibility** – Tens of meters,
 - (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 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 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.

When data entry for the synoptic hour is finished, click the button **TDCF**. Then use the **Encode** button to encode your data into BUFR codes as shown in Figure 101.

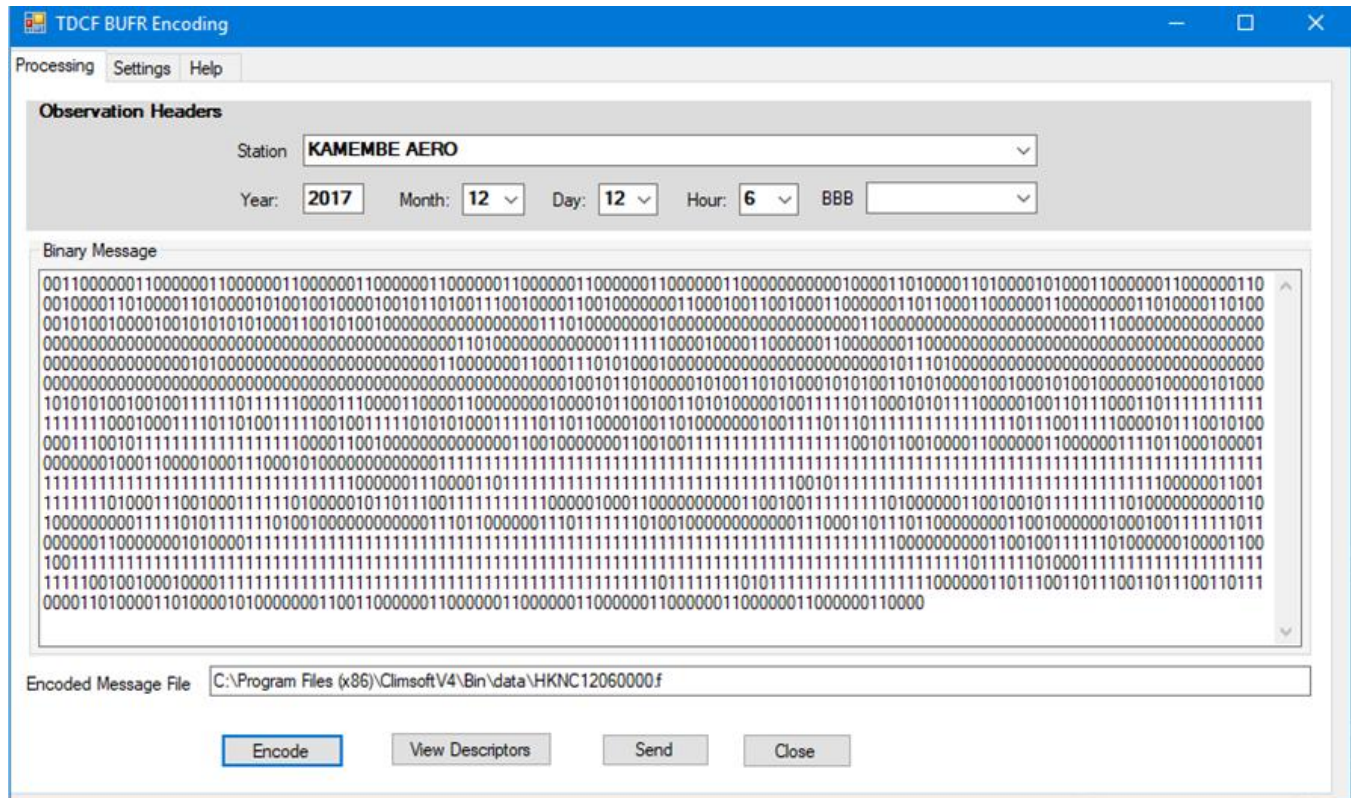


Figure 104: TDCF Processing

Click the **Send** button to send to share your message with the Regional Telecommunication Center for forward transmission to Global Telecommunication System (GTS). You can also view the content of your message in csv format by clicking on the button **View Descriptors**.

14. ACKNOWLEDGEMENTS

Contributions towards the completion of this document were received from different individuals in the following areas:

- (i) Content and the Document Structure
 - Samuel Machua – smmachua@yahoo.com
 - Albert Mhanda – albertmhanda@gmail.com
- (ii) Revisions
 - Samuel Machua
 - Marcellin Habimana – nhmarcellino@yahoo.fr
- (iii) Cover Design
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