# SEAS Met Observations Logger User's Guide

## Introduction

The **Met**(eorological) **Observations Logger** application operates on the [Voluntary Observing Ship](#) (VOS) program vessels to evaluate local weather conditions, and to locate and determine the strength of weather systems such as fronts, air masses, high and low pressure systems, tropical storms, and hurricanes. Meteorological observations are made at least four times per day at 00Z, 06Z, 12Z, and 18Z. Ships are encouraged to also submit reports at 03Z, 09Z, 15Z and 21Z. This application provides accurate meteorological and oceanographic data in real time from ships at sea through the use of satellite data transmission techniques.

As shown in Figure 1, the SEAS AutoIMET Data Logger software connects to the Remote Computer System (RCS) using socket or serial port to retrieve a comma delimited data stream containing the measured weather parameters. The software formats the parameters and feeds the user interface for additional augmentation, which means that the marine weather observations can be quality controlled at the point of origination. The data are transmitted on a user-determined schedule; typically this is hourly using the meteorological observation BBXX format.

Both the augmented and automatic message can be placed in the transmit queue. Periodically, the transmit queue is scanned and if a suitable file is ready for delivery, a connection is and delivered to the distribution address.

Other methods to transmit the observations are:

- Via the code 41 using an INMARSAT C terminal;
- Via Special Access Code (SAC) SEAS using an INMARSAT C terminal;
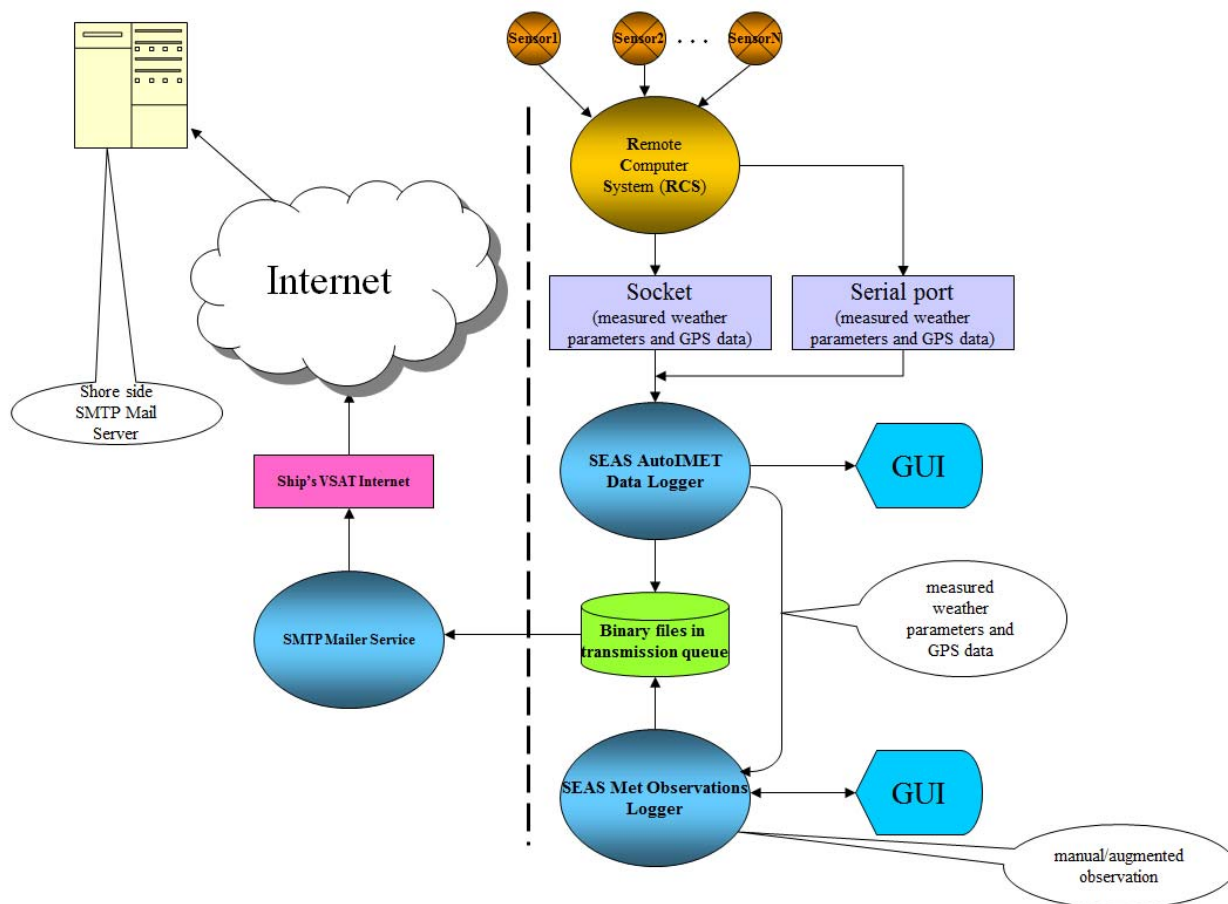- Using the default email client.

*Figure 1*

It was developed in the Integrated Development Environment (IDE) from Microsoft Visual Studio C++ 2008 Standard Edition under Windows 7.

**Contact Information**

*Caridad Ibis Gonzalez*
Software Developer
UM/RSMAS/CIMAS and NOAA/AOML/PhOD
4301 Rickenbacker Causeway
Miami, FL 33149
Phone: (305) 361-4322
Fax: (305) 361-4392
E-mail: caridad.i.gonzalez@noaa.gov

## User Interface

The design of the SEAS Met Observations Logger apply some basic principles making the design something the user will enjoy working with it every day.
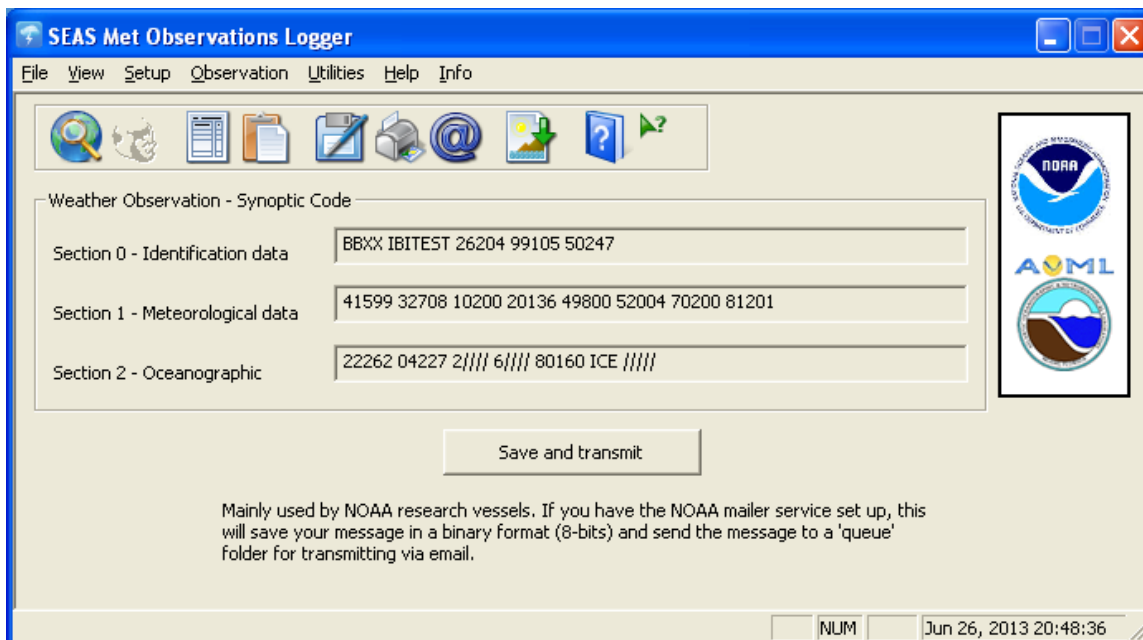


**Main screen**

**Toolbar**: Pre-arranged list of command buttons that give the user direct access to the application commands

- Start manual observation;
- Start automatic observation;
- Show observation as quick form;
- Show observation as text report;
- Save BBXX message in ASCII format;
- Print BBXX message;
- Send BBXX message via email;
- Archive meteorological data;
- List Help topics;
- Display program information.

**Weather Observation – Synoptic Code group:** Shows the observation message in BBXX format. Instantaneous data (that is generated closest to the display time) is displayed.

**Save and transmit** button: Can be pressed to store the message in a predefined format for transmission.

Button action:

1. Posts observation message (CallSign_YYYYMMDDHHMMSS_MET.*) into ...\Archive\ArchiveMet\ directory as backup.
2. Posts observation message into preselected default archive drive (default A:\) for real transmission.
3. Archives observation into  ...\Archive\ArchiveMet\IMMT.txt.

If any of the weather codes are inconsistent then a message box will appear containing information on which codes need to be corrected using the **Quick classic form** dialog.
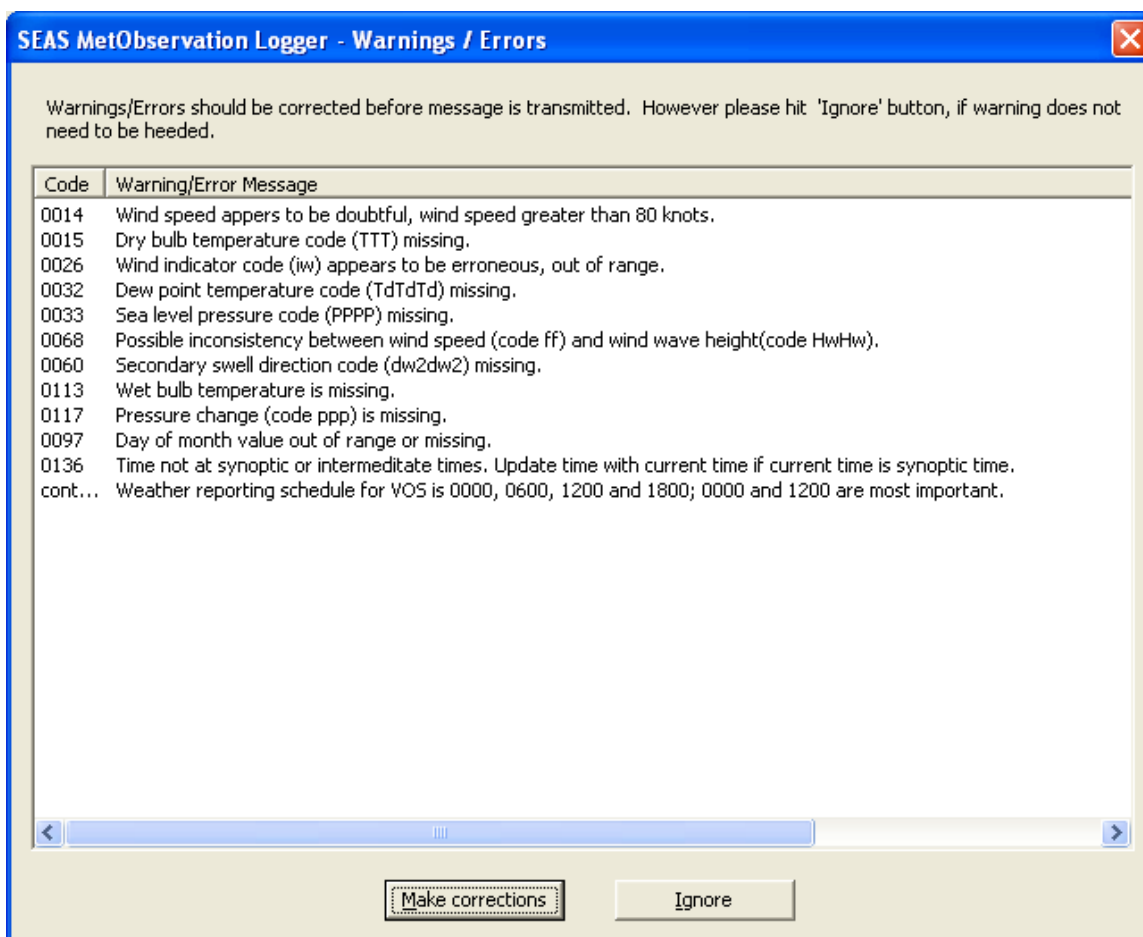


However if the operator is sure that the data is correct then this error message can be overridden by clicking the **Ignore** button.

Main Menu

**File > Exit**: Exits the application
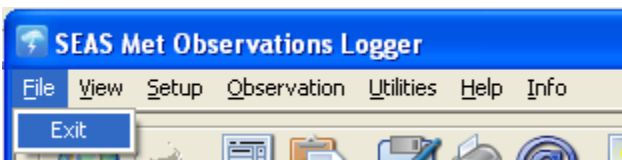


Use this command to end the Met Observations Logger application. You can also use the **Close** command on the application **Control** menu.

**View > Status Bar**: Shows or hides the Status Bar.
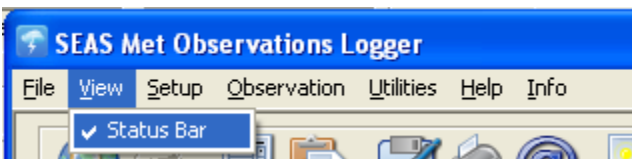


Use this command to display and hide the status bar, which describes the action to be executed by the selected menu item, and keyboard latch state. A checkmark appears next to the menu item when the status bar is displayed.

The status bar is displayed at the bottom of the Met Observations Logger window. The left area of the status bar describes actions of menu items as you use the arrow keys to navigate through menus. This area similarly shows messages that describe the application's status.

The right areas of the status bar indicate which of the following keys are latched down:

| Indicator | Description |
| --- | --- |
| CAP | The Caps Lock key is latched down. |
| NUM | The Num Lock key is latched down. |
| SCRL | The Scroll Lock key is latched down. |
| DATE | The system clock. |

**Setup > Transmission method…**: Setup the transmission method.
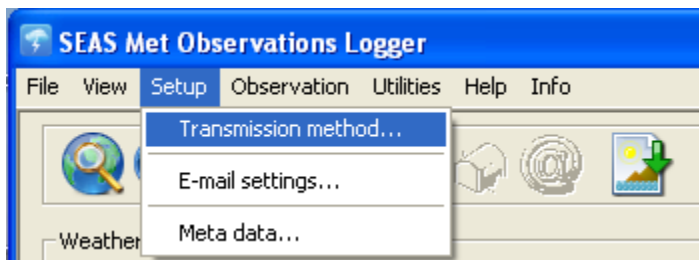


Use this command to setup the transmission method. Once the user select this option the **Transmission method** dialog appears.
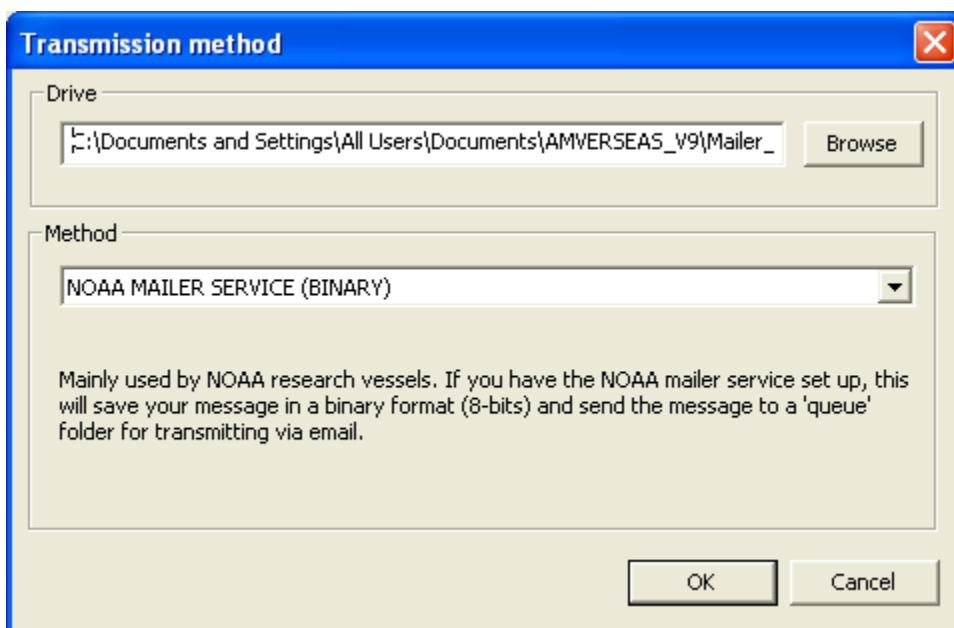


Before the user can transmit the observation he/she has to define the drive where the observation will be stored and the transmission method to be used. The table below summarizes the possible transmission methods.

| Transmission method | Description |
|---|---|
| INMARSAT C CODE 41 (ASCII) | This will save the meteorological message as met.txt in a designated drive/folder for transmitting via code 41 using INMARSAT C terminal. |
| INMARSAT C SPECIAL ACCESS CODE (SAC) SEAS (BINARY) | This will save the meteorological message as met.bin in a designated drive/folder for transmitting via SPECIAL ACCESS CODE (SAC) SEAS using your INMARSAT C terminal. |
| NOAA MAILER SERVICE (BINARY) | Mainly used by NOAA research vessels. This will save the meteorological message in a binary format (8-bits) and send the message to a 'queue' folder for transmitting via email. |
| EMAIL (ASCII) | This will save the meteorological message in ASCII format (txt) and automatically insert your message into the body of an email, using the default email client. |

**Setup > E-mail settings…**: Setup the email.
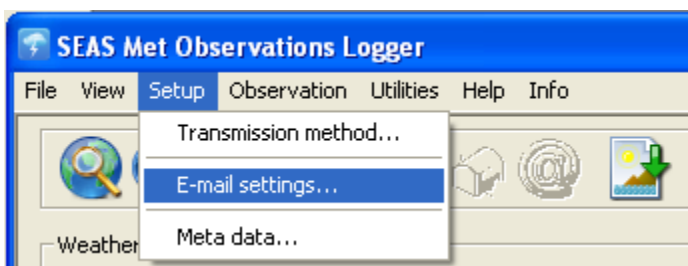


Use this command to manage the detailed e-mail settings. Insert **From**, **To**, and **Subject** information.
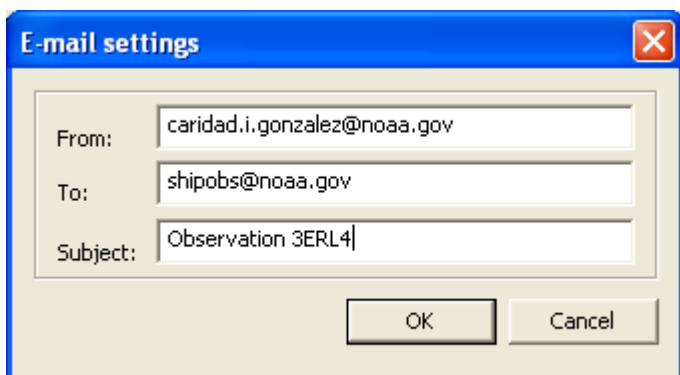
**Setup > Meta data…**: Setup the Meta data.
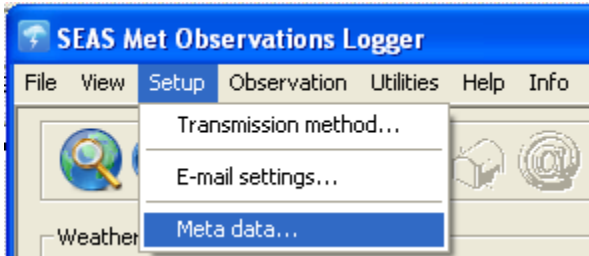


Use this command to setup the metadata. Once the user select this option the **Meta data** dialog appears. It looks analogous to the dividers in a notebook or the labels in a file cabinet. Several pages were defined one for the ship, one for the observing, one for administration, one for the barometer, one for the barograph, one for the thermometer, one for the anemometer, one for the sea surface temperature, and one for wave settings. Each page consists of a set of information that the application displays when the user selects the corresponding tab.



*Ship details tab*

*Observing details tab*



*Administration details tab*

*Barometer details tab*



*Barograph details tab*

**Meta data**

**Note**
After filling out the ship's METADATA information, or after changing any information, please generate a report and e-mail it to your servicing PMO.

| Anemometer | Sea surface temperature | Wave |
| Ship details | Observing | Administration | Barometer | Barograph | Thermometer |

Height above SLL                12.00           meters

Dry bulb type                   Dry bulb mercury thermometer ▼

Dry bulb make and model         Taylor 2252 Mason Hygrometer

Wet bulb make and model         Globe Thermometers (Model 210-4417NT)

Wet bulb observation method     measured ▼

Hygrometer type                 Hair hygrometer ▼

Location(s)                     Bridge wing starboard ▼

Exposure type                   ▼

Reporting practice              Centigrade to tenths ▼

Show Report    Save and Transmit                OK    Cancel    Apply

*Thermometer details tab*



**Meta data**

**Note**
After filling out the ship's METADATA information, or after changing any information, please generate a report and e-mail it to your servicing PMO.

| Ship details | Observing | Administration | Barometer | Barograph | Thermometer |
| Anemometer | Sea surface temperature | Wave |

Type                    Handheld anemometer ▼

Make and model          La Crosse Handheld Anemometer Model EA3010U

Serial number           A236-67899

Location                Handheld ▼

Observation method      measured ▼

Height above maximum SLL    7.10    meters

Height above deck           2.30    meters

Distance from bow           22      meters

Distance from center        5       meters

Show Report    Save and Transmit                OK    Cancel    Apply

*Anemometer details tab*
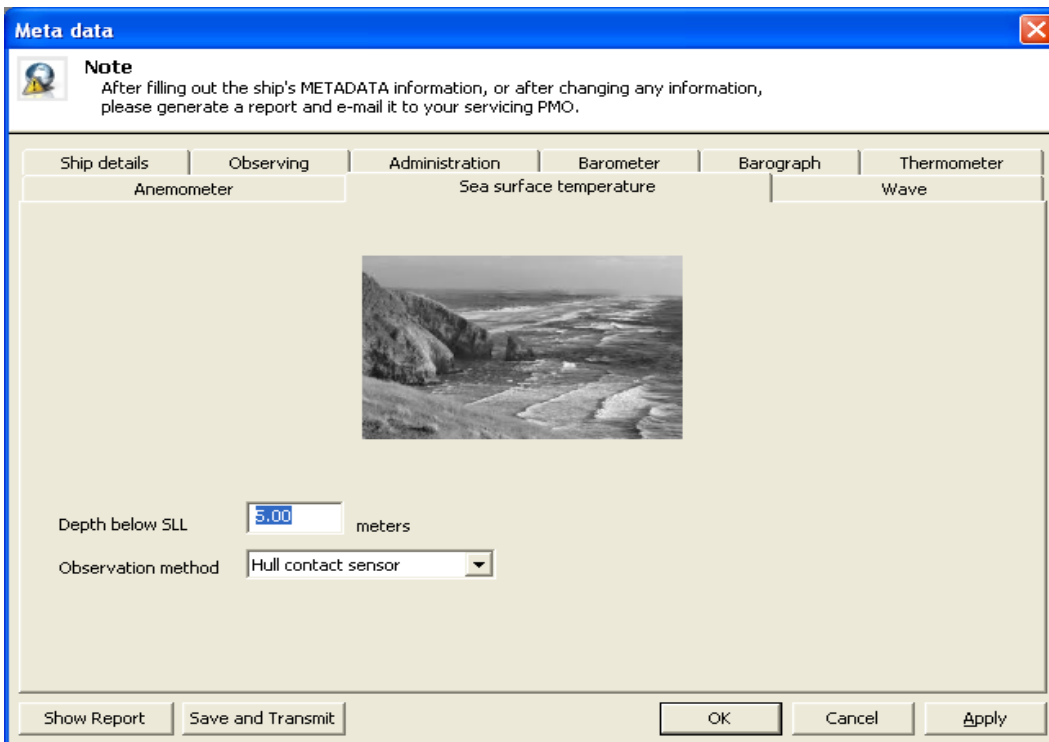
*Sea surface temperature details tab*
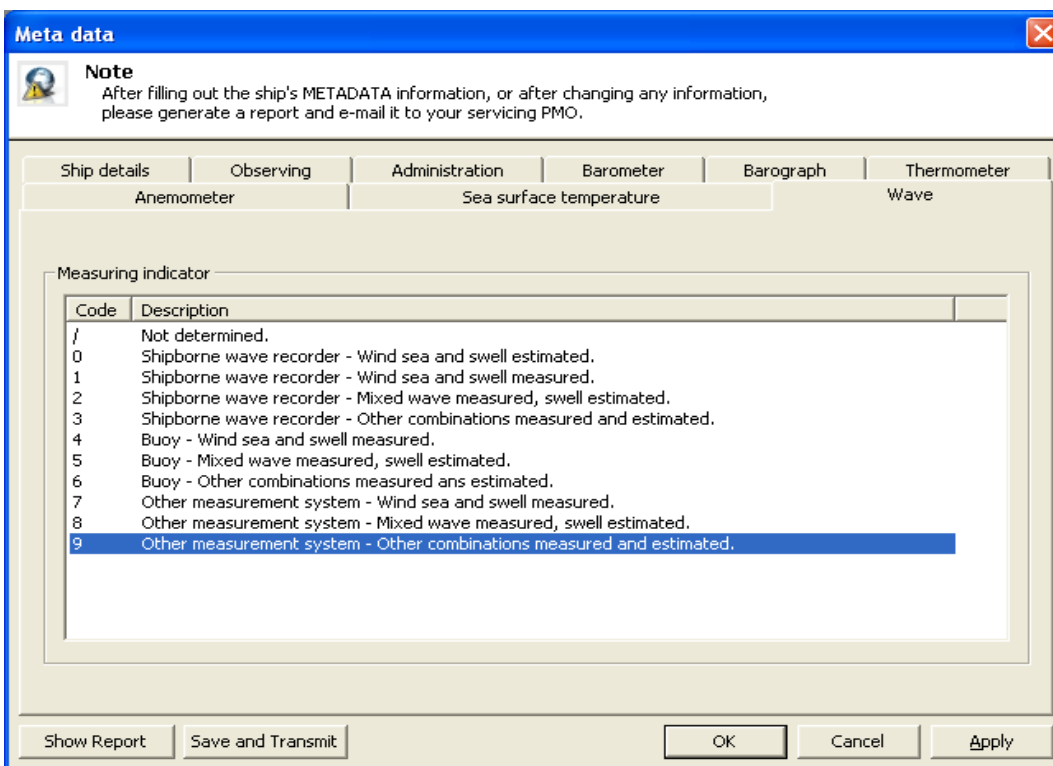


*Wave details tab*

When the Meta data dialog comes up the user can select the desired tab and make changes. Press the **OK** button to save them. To discard the changes click **Cancel**.

To generate a meta-data report, press the **Show Report** button. This report is used to assist the ships and PMOs to gather all the Pub 47 metadata for incorporation into the database.

To transmit the meta-data in predefined format (see Main menu|Setup|Transmission method) press the **Save and Transmit** button. This command posts the file CallSign_YYYYMMDDHHMMSS_ADMIN_MET.* into the preselected transmission directory.

The thought process is that the PMO can fill out as much of the metadata as possible when installing the application and then show the user where it is and if there are any blanks, which cannot be filled out at the time, the ship users can fill that in when the information is available. The ships can then generate a report and email it to the PMO or the PMO can download the data when a ships visit is performed and update the database when they return to the office.

The following illustration shows a typical generated file:

```
                                    MetaData.txt
*** Observation Meta Data ***

Computer Time: 2013/06/12 20:19:41

Ship's details
    Ship's name                 = M/V Deep Cygnus
    Call sign                   = 3ELR4
    IMO number                  = 9479541
    Company name                = Ocean-Drive
    Ship flag                   = PA
    Vessel type                 = Container ships, including open and closed
container ships and refrigerated container ships
    Recruiting country          = Not assigned
    Length                      = 122 meter(s)
    Breadth                     = 22 meter(s)
    Freeboard                   =  meter(s)
    Draught below SLL           = 6.1 meter(s)
    Maximum cargo height        = 16.32 meter(s)
    Bridge to bow distance      =  meter(s)
    Gross tonnage               = 9423 ton(s)
    Year built                  = 2009
    Maximum speed               = 11.90 knot(s)
    Departure of reference level = -8.14
    VOSClim participant         = No

Observing
    Observing platform          = Ancillary Pilot Project
    General observing practice  = Always supplemented by manual input
    Quality control indicator   = Manual and automated QC (superficial; no
automated time-sequence checks)

Administration
    Medical staff
        Nurse                   = Yes
        MD                      =
        PA                      =
        None                    =
    Forward
        AmVer                   = Yes
        Marep                   = Yes
        Jasrep                  = Yes
    Ship's email address        = caridad.i.gonzalez@noaa.gov
    Ship's prefered mailing address= AOML, 4301 Rickenbacker Causeway Miami, FL
33149, USA
    Ship's INMARSAT number      = 437009210
    Ship's INMARSAT equipment type = ISAT-TOGO-KG

Barometer
    Type                        = Aneroid barometer (issued by the PMO or a NMS)
    Location                    = Chart room
    Make and model              = Chelsea Ships Bells Barometer: Model# 20825
    Serial number               = 123-456-88
    Height above SLL            = 13.21 meter(s)

Barograph
    Type                        = Open Scale barograph with 1 day clock
    Make and model              = Plastimo Marine Barograph Model 207M
    Serial number               = CZR22

Thermometer
    Height above SLL            = 12.00 meter(s)
    Dry bulb type               = Dry bulb mercury thermometer
    Dry bulb make and model     = Taylor 5525 Mason Hygrometer
    Wet bulb make and model     = Globe Thermometers (Model 210-4417NT)
    Wet bulb observation method = measured
    Hygrometer type             = Hair hygrometer
    Location(s)                 = Bridge wing starboard
    Exposure type               =
    Temperature reporting practice = Centigrade to tenths

                                    Page 1
```
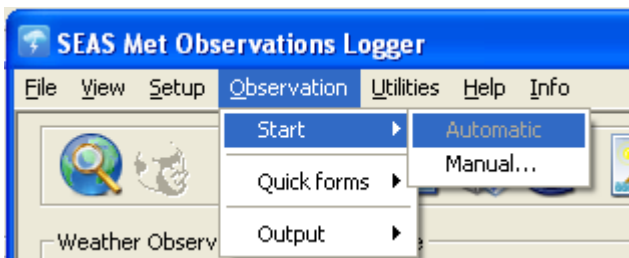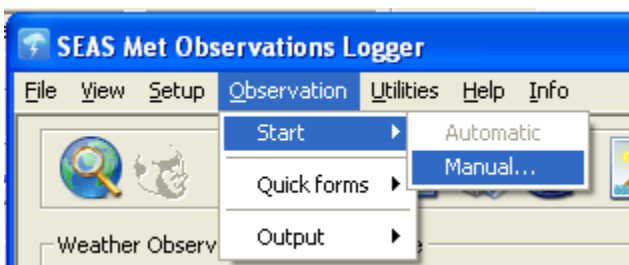
**Observation > Start**: This menu allows the user to start manually the observation or to start the AutoIMET Data Logger application.

**Observation > Start > Automatic:** Use this command to start the AutoIMET Data Logger application.



**Observation > Start > Manual…:** Starts the input of weather data starting the Met Observations Wizard.



Use this command to start the Met Observations Wizard. This wizard allows for the input of weather data. Sequences of dialog boxes are presented that guide the user through a series of well-defined steps. A key characteristic of this wizard is that the user navigates using **Next>** or **Finish**, **<Back**, and **Cancel** buttons.

**Observation > Quick forms**: This menu allows the user to show the classic or the report dialog.

**Observation > Quick forms > Classic…**: Use this command to access instant to all of the FM-13-X-SHIP, ships' synoptic code, symbols.
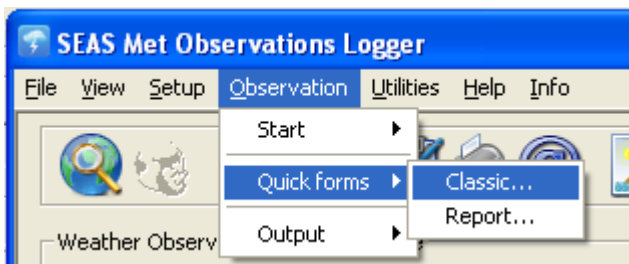
Once the user selects this option the **Quick form** dialog appears. This dialog allows instant access to all of the FM-13-X-SHIP, ships' synoptic code, symbols. Data can be entered clicking the button below each edit field. This will take the user to the dialog associated with that code in the Met Observations Wizard.



**Observation > Quick forms > Report…:** Use this command to display and/or print the entry data for the currently observation as report.
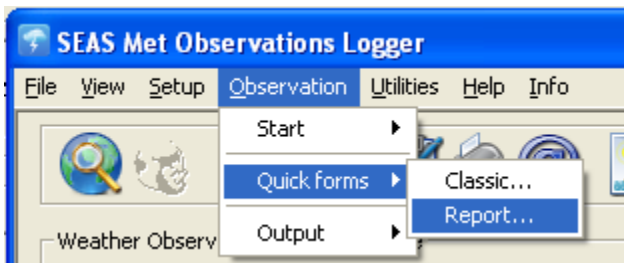


Once the user selects this option the **Observation report** dialog appears. This dialog allows the user to edit the current message and print it as a report by clicking the **Print** button.

The **Print** dialog allows the user to select particulars for the print job. For example, the user can specify the printer to use, the range of pages to print, and the number of copies.

The following illustration shows a typical printed report.

06/12/13  20:16:50                    SEAS Meteorological Observation Report                    Page  1

| | |
|---|---|
| Observer initials: | CIG |
| Call sign: | 3ELR4 |
| Year: | 2013 |
| Month: | 06 |
| Day: | 10 |
| Hour: | 19 |
| Latitude: | 10 30 S |
| Longitude: | 024 42 W |
| Ship's course: | W |
| Ship's speed: | 11 to 15 knots |
| Wind indicator: | measured |
| True wind direction: | 70 degrees |
| True wind speed: | 8 knots |
| Dry bulb temperature: | 20.0 °C |
| Wet bulb temperature: | 16.0 °C |
| Dew point  temperature: | 13.5 °C |
| Relative humidity: | 66 % |
| Pressure: | 1012.5 mbar |
| Pressure change: | 1.5 mbar |
| PressureTendency: | Rising, (steadily or unsteadily). |
| Weather data indicator: | included |
| Seas surface temperature: | 27.2 °C |
| Present weather: | State of the sky on the whole unchanged. |
| Primary past weather: | Cloud cover 1/2 or less throughout period. |
| Secondary past weather: | Cloud cover 1/2 or less throughout period. |
| Cloud base height: | 2000 to 3299 feet. |
| Visibility: | 27 NM or more. |
| Cloud cover: | 3 eighths. |
| Lowest cloud cover: | 1 eighth or less, not zero. |
| CL: | Cu of moderate or strong vertical extent. |
| CM: | No Ac, As, or Ns present. |
| CH: | Ci in form of filaments not invading sky. |
| Wind waves period: | 6 seconds |
| Wind waves height: | 1.64 feet |
| Primary swell direction: | 230 degrees |
| Primary swell period: | 6 seconds |
| Primary swell height: | 6.56 feet |
| Secondary swell direction: | |
| Secondary swell period: | |
| Secondary swell height: | |
| Cause ice accretion: | Not Observed. |
| Rate ice accretion: | Not Observed. |
| Thickness ice accretion: | |
| Sea ice concentration: | Not observed or unable to observe. |
| Sea ice development: | Not observed or unable to observe. |
| Ice of land origin: | Not observed or unable to observe. |
| Bearing of principal ice edge: | Not observed or unable to observe. |
| Sea ice trend: | Not observed or unable to observe. |

NOAA

Also the dialog allows instant access to edit measured values clicking the button next to each edit field. This will take the user to the dialog associated with that value in the Met Observations Wizard.

**Observation > Output:** This menu is useful to save the observation as permanent record. When message is coded it is ready for transmission, and the message can be saved in binary or ASCII format.

**Observation > Output > To txt file…:** Use this command to saves the current message in ASCII format.
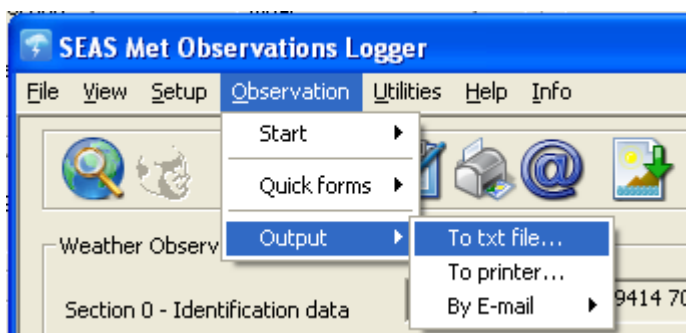


A **Save As** dialog appears that allows the user to store the message in a file on the hard drive of the computer, on a portable medium such as a floppy disk, or on a network drive.
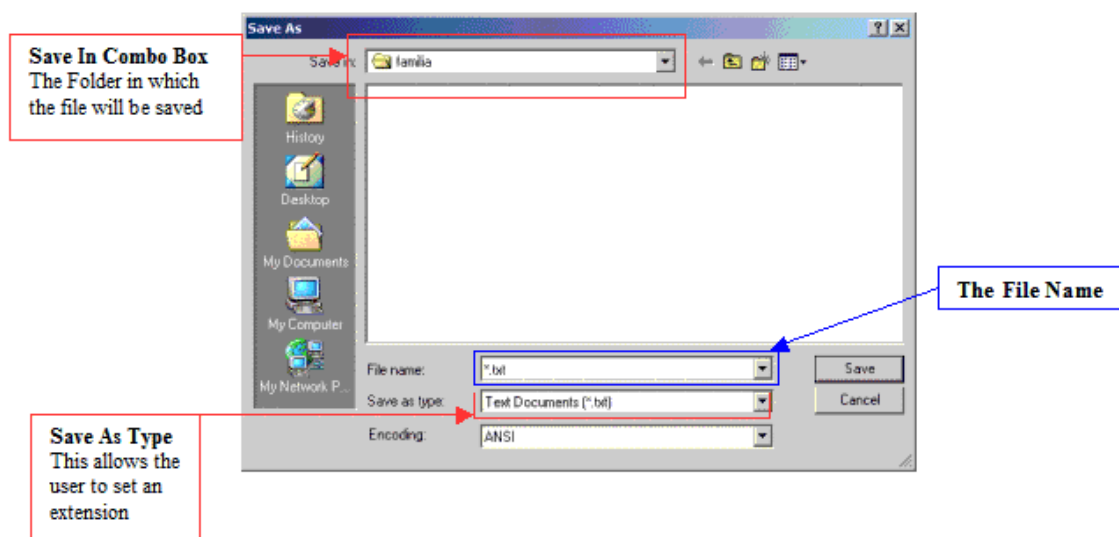
**Observation > Output > To printer…:** Use this command to print the current observation message in BBXX format.
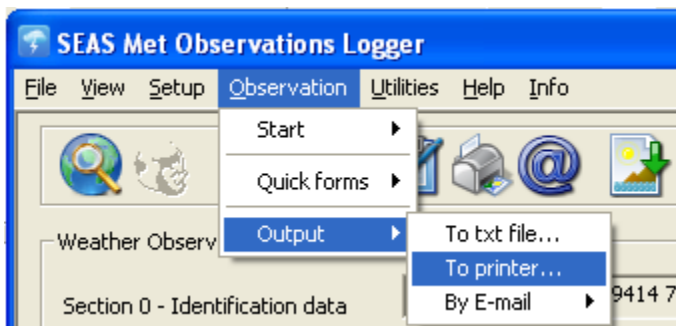


The **Print** dialog lets the user select particulars for the print job. For example, the user can specify the printer to use, the range of pages to print, and the number of copies.
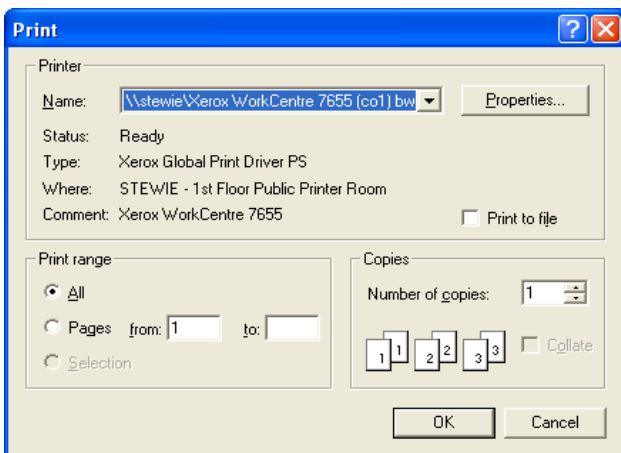


The following illustration shows a typical printed document.
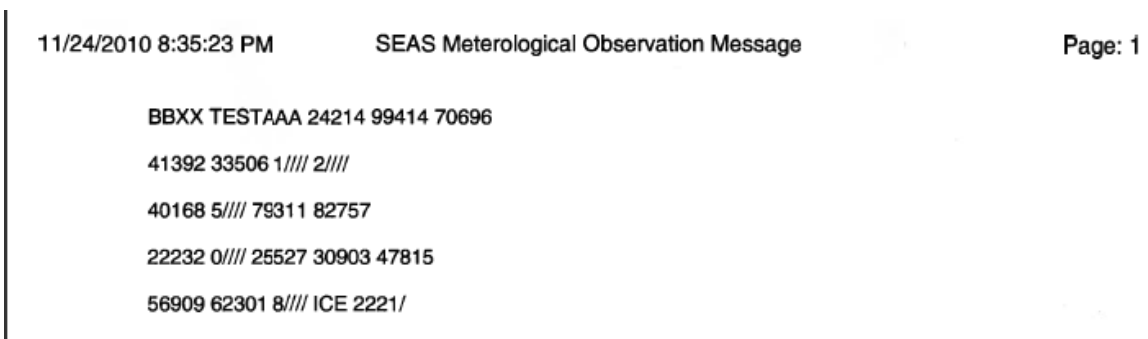
**Observation > Output > By E-mail…:** Using this menu you can send the observation via e-mail automatically or using the default email client.

**Observation > Outout > By E-mail|Auto…:** Use this command to send an e-mail message to an SMTP (*Simple Mail Transfer Protocol*) server for delivery.
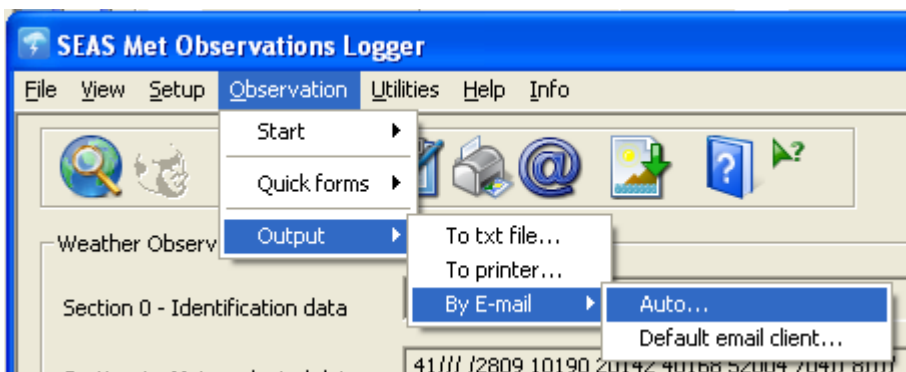


The dialog **Email** comes up and the user can verify the email.
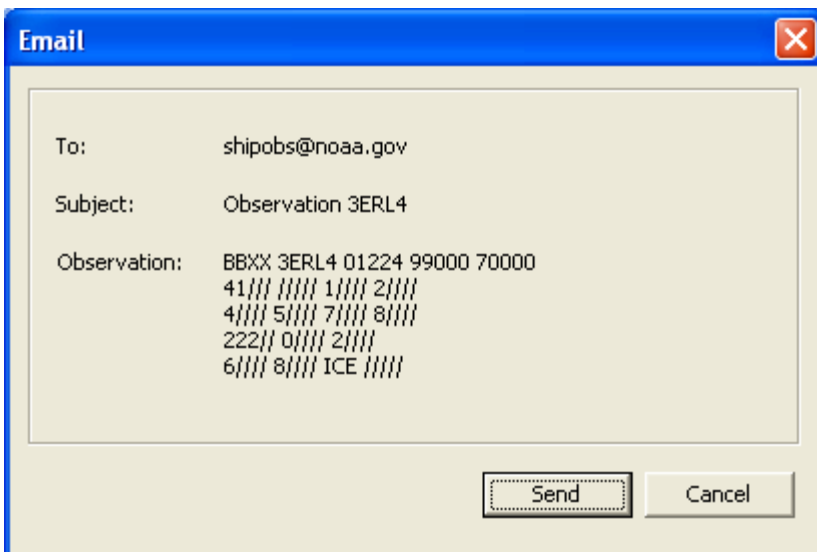


Note: By default McAfee blocks port 25 then McAfee settings have to be changed to work.

**Observation > Output > By E-mail > Default email client…:** Use this command to send an email using the system's default email client (Thunderbird, Outlook, etc.).
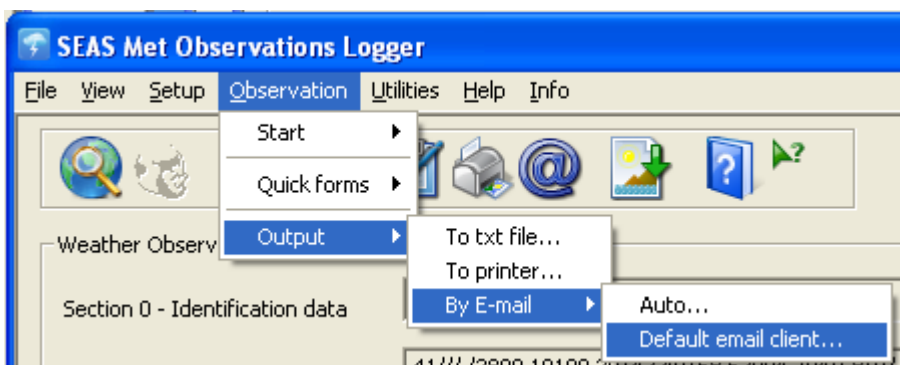


When the user clicks on this, the resident email client opens with the **To** and **Subject** lines with the previously set values, and as **Body** the observation message.
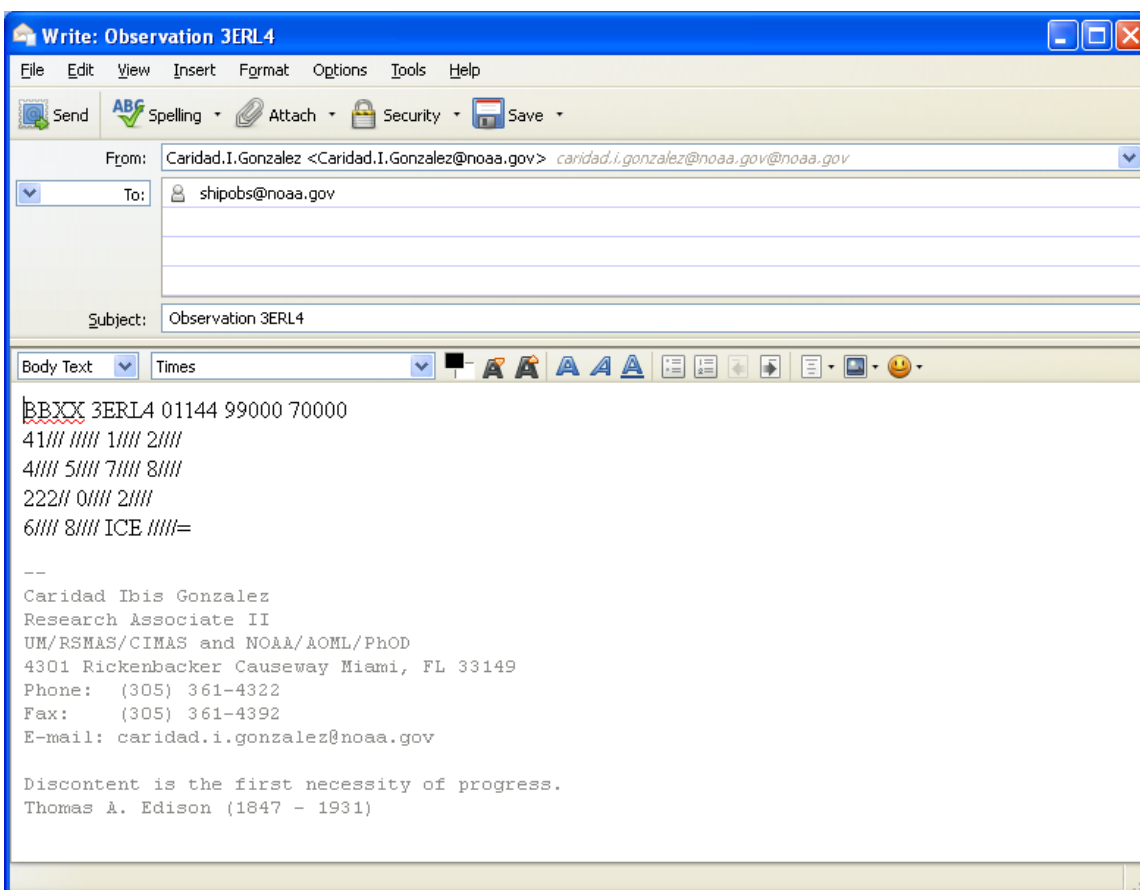


**Utilities:** The Utilities menu is designed to provide user with additional tools such as a true wind calculator, a conversion tool for metric to English units and a tool for archiving the meteorological data.

**Utilities > Calculator > Wind speed/direction**: Use this command to calculate true wind direction and speed.
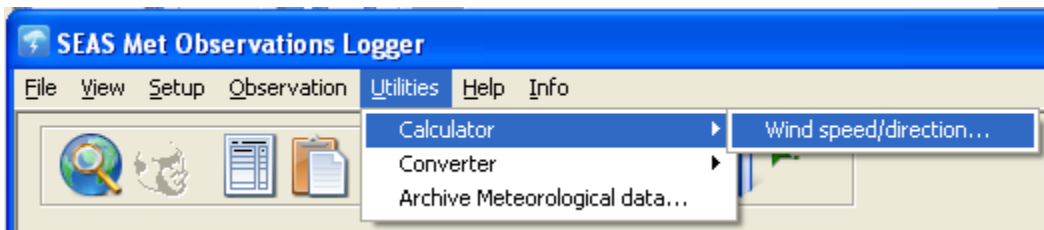


Once selected the window **True wind calculator** dialog appears. Input the correct ship and wind values in the edit boxes. The wind values are calculated by clicking the **Calculate** button. Click **Cancel** to go back.
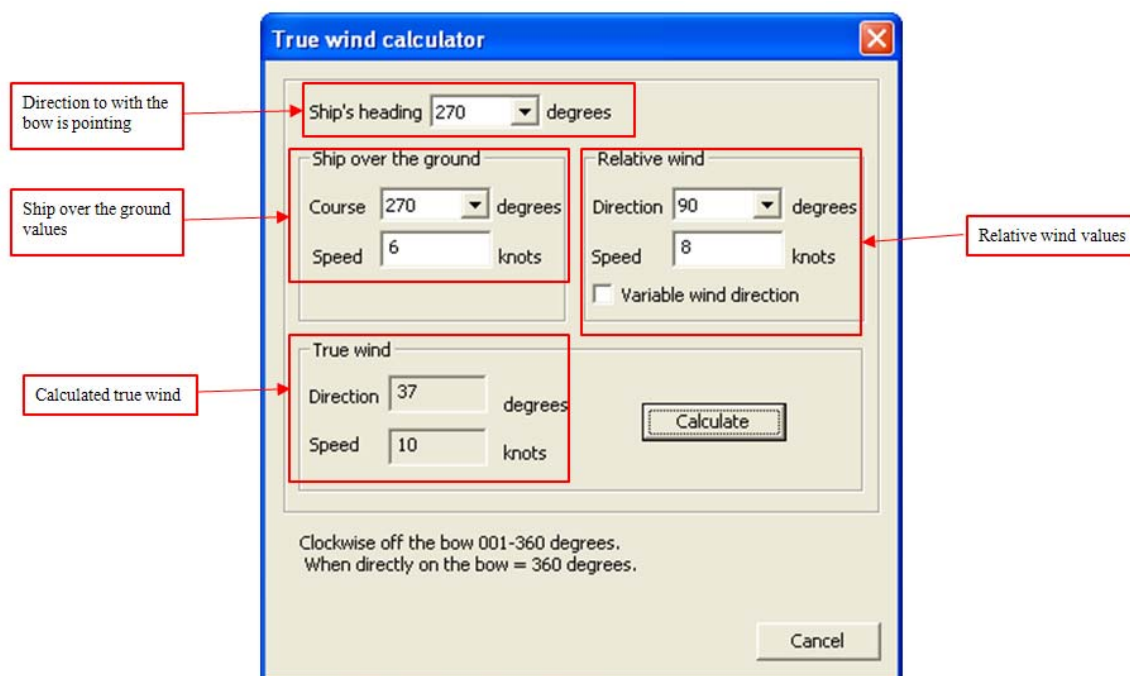


**Utilities > Converter > Fahrenheit – Celsius…**: Use this command to convert Fahrenheit to/from Celsius.
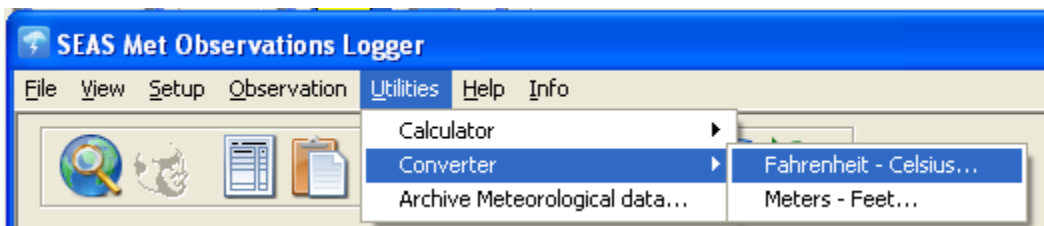
Once selected the **Conversion – Celsius and Fahrenheit** dialog appears. Input the values to convert in the edit box. Select the appropriate radio button for the value entered. The value is converted by clicking the **Convert** button. Click **Cancel** to go back.
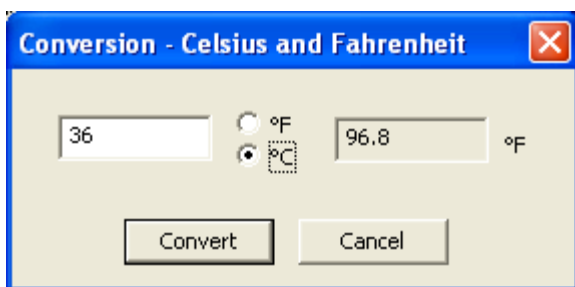


**Utilities > Converter > Meters – Feet…:** Use this command to convert feet to/from meters.
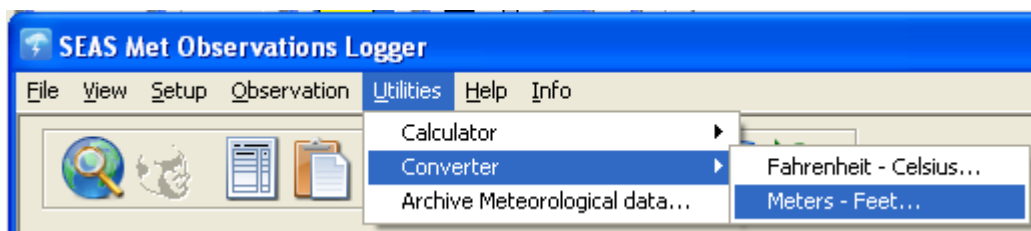


Once selected the window **Conversion – Meters and Feet** appears. Input the value to convert in the edit box. Then select the appropriate radio button for the value input. The value is converted by clicking the **Convert** button. Click **Cancel** to go back.
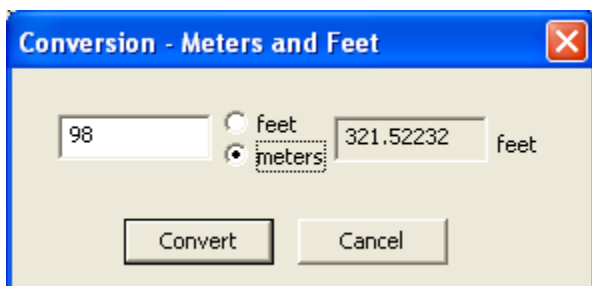


**Utilities > Archive Meteorological data…**: Use this command to save the observations. The utility allows the user to save the **IMMT.txt** file into a desired location.
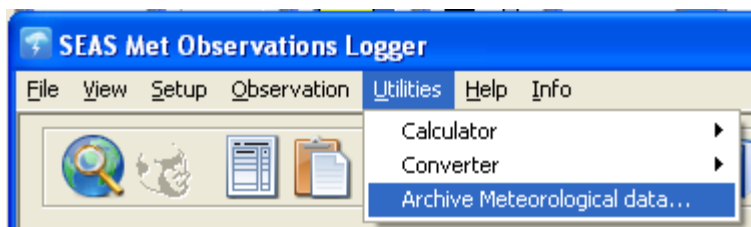
A **Save As** dialog appears that allows the user to store the **IMMT.txt** file on the hard drive of the computer, on a portable medium such as a floppy disk, or a USB pen drive, or on a network drive. Wherever the user want to save the file, it also always be saved in archive directory C:\Users\Public\Public Documents\AMVERSEAS_V9\Archive\ArchiveMet).

The **File name** and **Save as type** fields show default values. File name convention CallSign_TimeStamp_SEAS92_MET.txt.
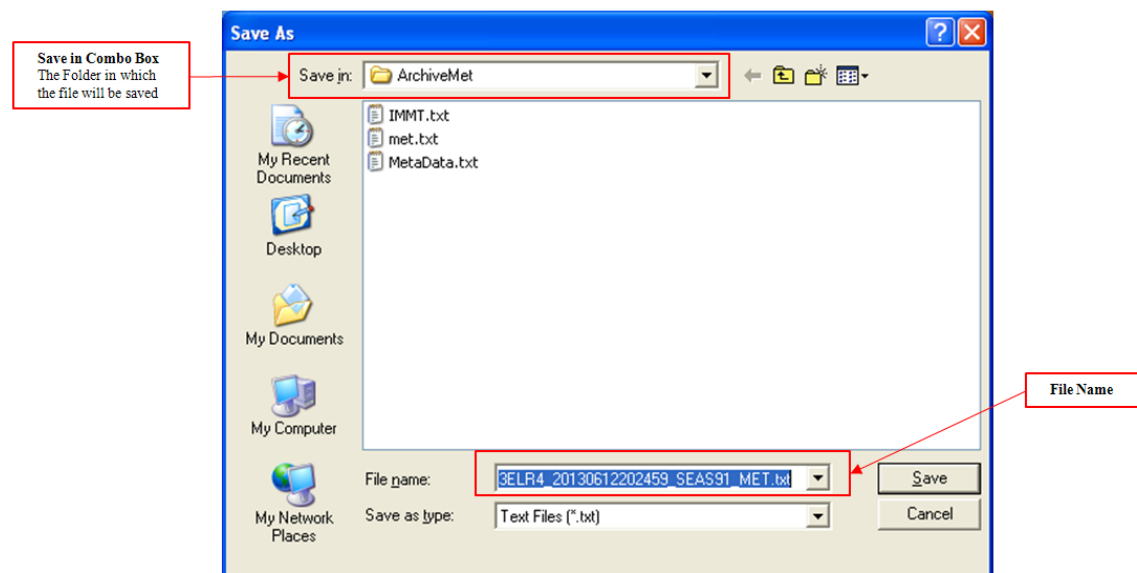


When the file is saved, an additional dialog box opens to prompt the user to send it via email using the default email client.
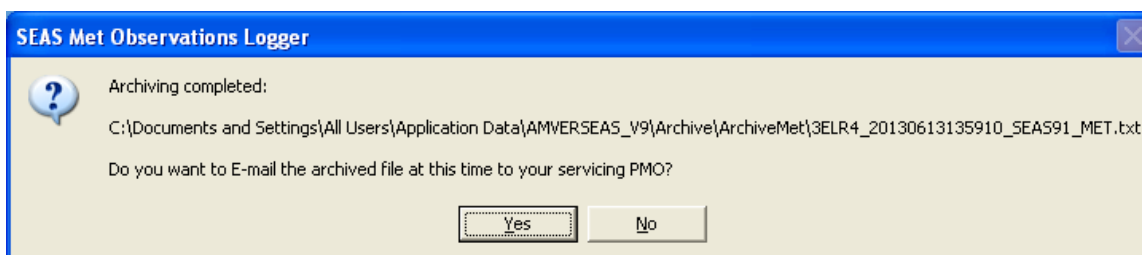
If the user click **Yes** the default email client opens with the archived file attached and subject line of **Archive Meteorological Data**. The user would type in the approriate PMO's email address.

Then follow these instructions:
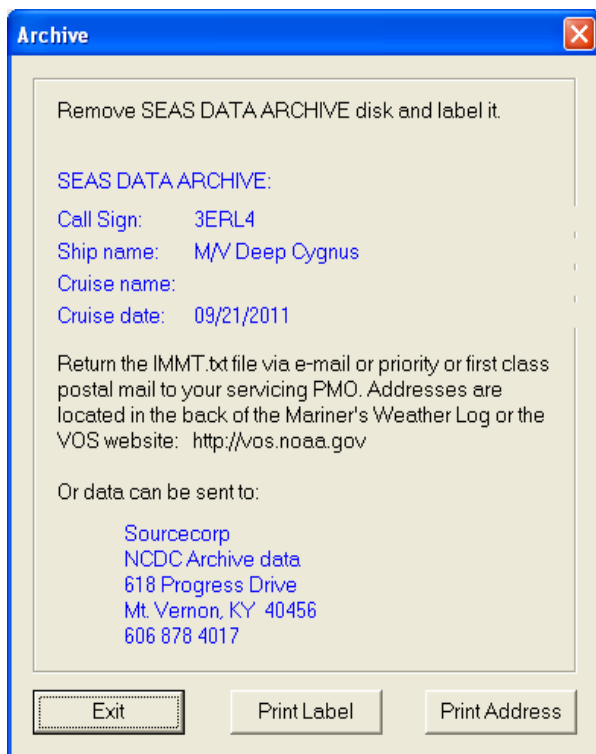


**Help > Help Topics**: Displays the opening screen of help. From the opening screen, you can jump to step-by-step instructions for using Met Observations Logger and various types of reference information.
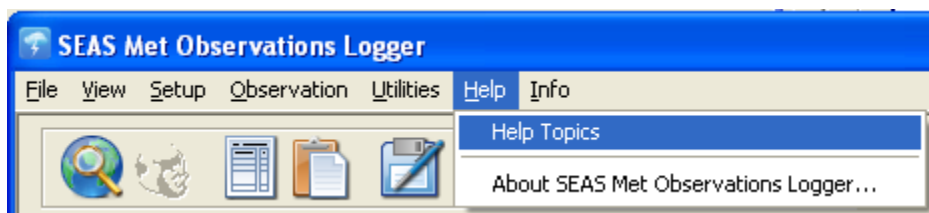


The Help topic file contains a Table of Contents and an Index to help users locate the information they need. These features appear in a separate, tabbed window.

Clicking on the **Contents** tab will open the Table of Contents, in which users can click on headings to see the topics available for them. The headings are marked with icons that look like small books, while the topics have icons that look like pages.
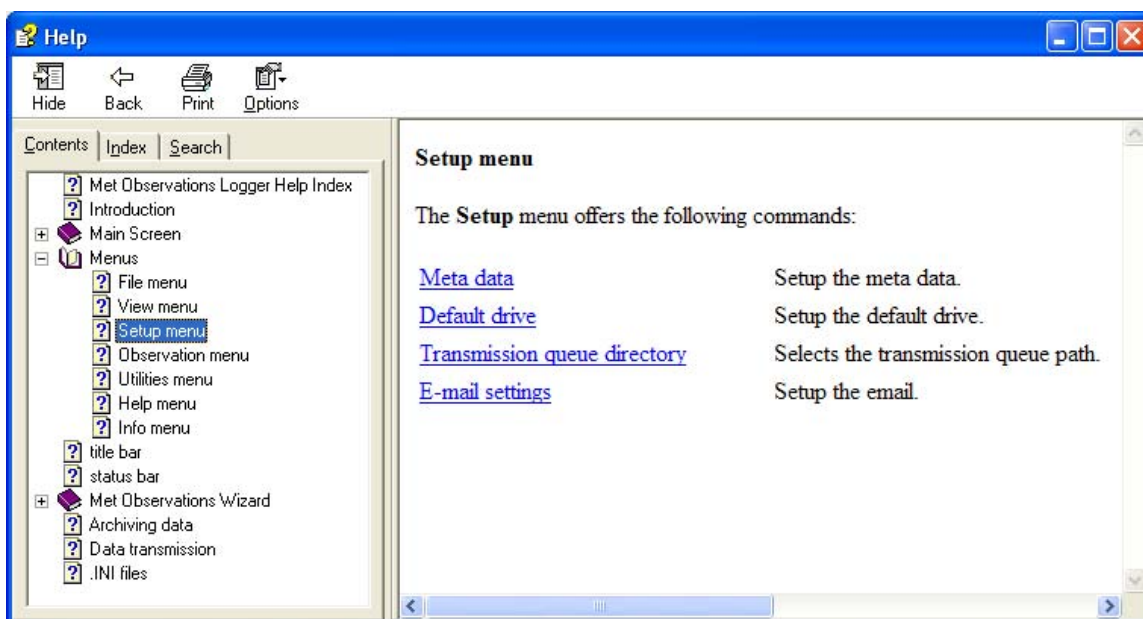
Clicking on the **Index** tab will open the index, which has a typing field and an alphabetical list of keywords. Typing in the typing field will automatically scroll the list of keywords to the closest match for what you typed. Double-clicking on a keyword will display the topic associated with that keyword (if there is only one) or bring up a list of all the topics associated with it (if there is more than one). The index is a very important tool in helping users locate the information they need.
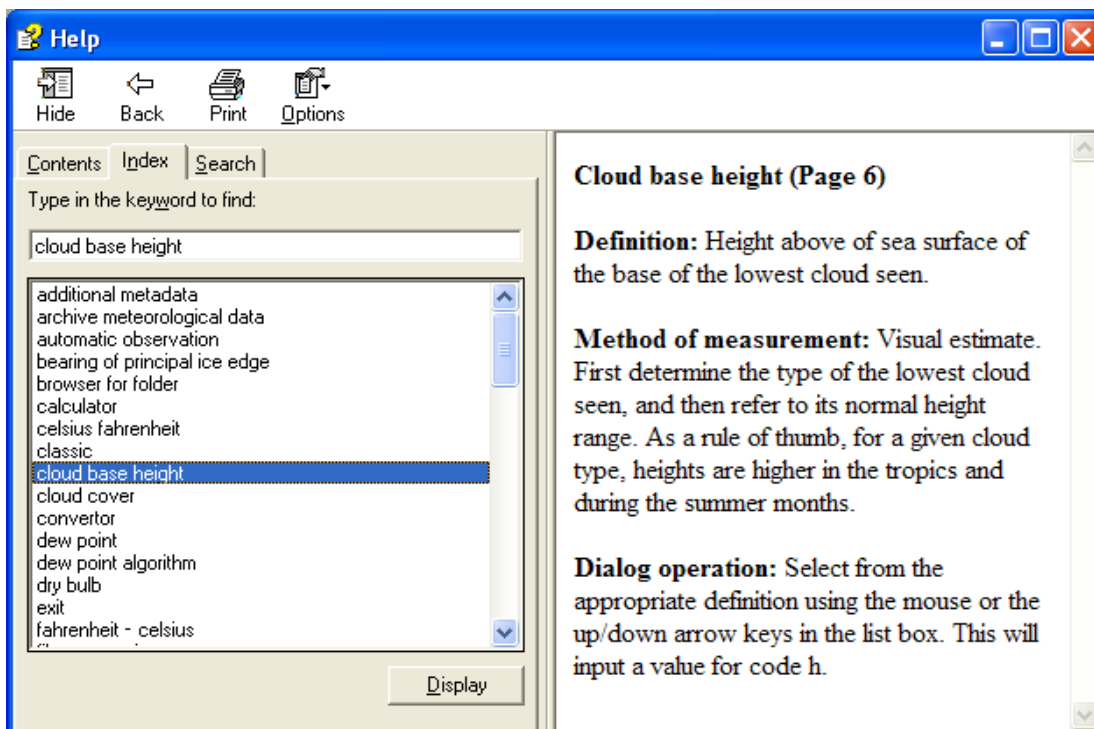
The Help topic file also has a **Search** tab, which allows the user to search for any word used in the text of the file, not just for keywords.
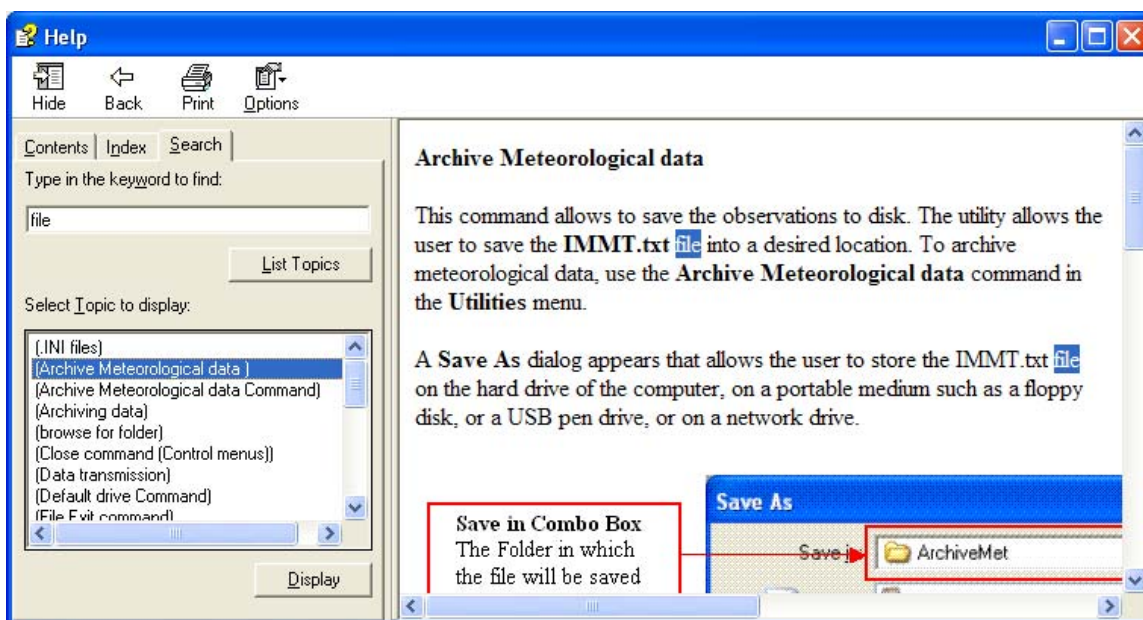


**Help > About SEAS Met Observations Logger…**: Use this command to displays the copyright notice and version number of your copy of Met Observations Logger.
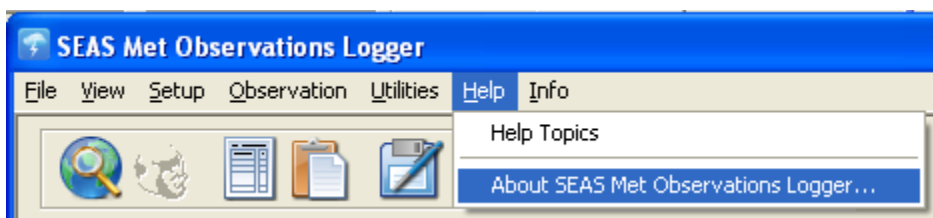


Once selected the **About** dialog appears.
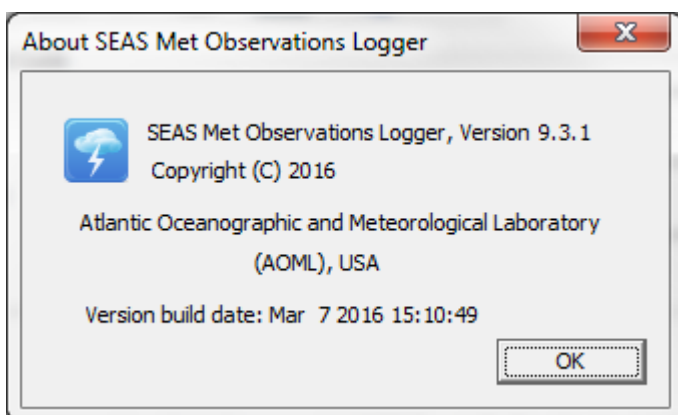
**Info:** This menu provides you link to documents that can help you work with Met Observations Logger.
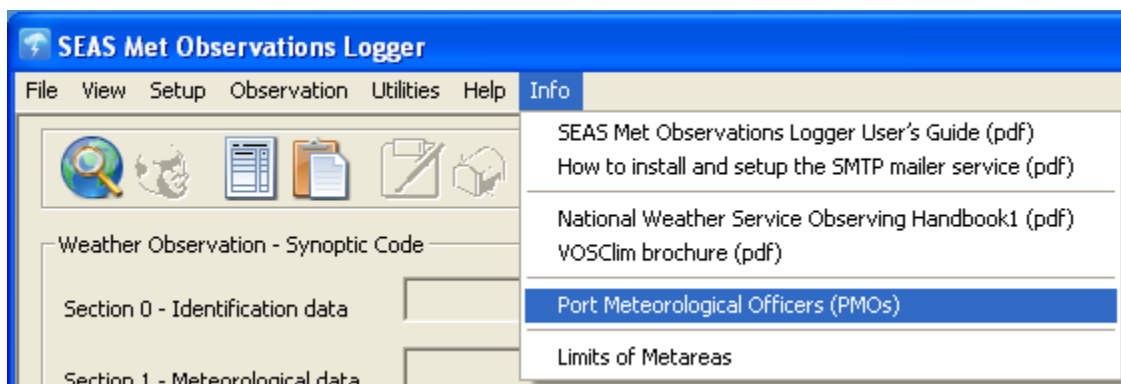


It contain following documents:

- SEAS Met Observations Logger User's Guide.
- How to install and setup the SMTP mailer service.
- National Weather Service Observing Handbook1.
- VOSClim brochure.
- Port Meteorological Officers.
- Limits of Metareas.

**Met Observations Wizard**

When the user selects the **Main Menu > Observation > Start > Manual…** option starts the Met Observations wizard. This wizard allows for the input of weather data. Sequences of dialog boxes are presented that guides the user through a series of well-defined steps. A key characteristic of this wizard is that the user navigates using **Next>, Quit, Finish**, **<Back**, and **Cancel** buttons.

*Note:* When the **Next>** button is pressed the input values are used to generate the BBXX message.

If the AutoIMET Data Logger application is running the user can choose between using the data read from Remote Computer System or not.

Then the wizard starts and the introduction page appears.
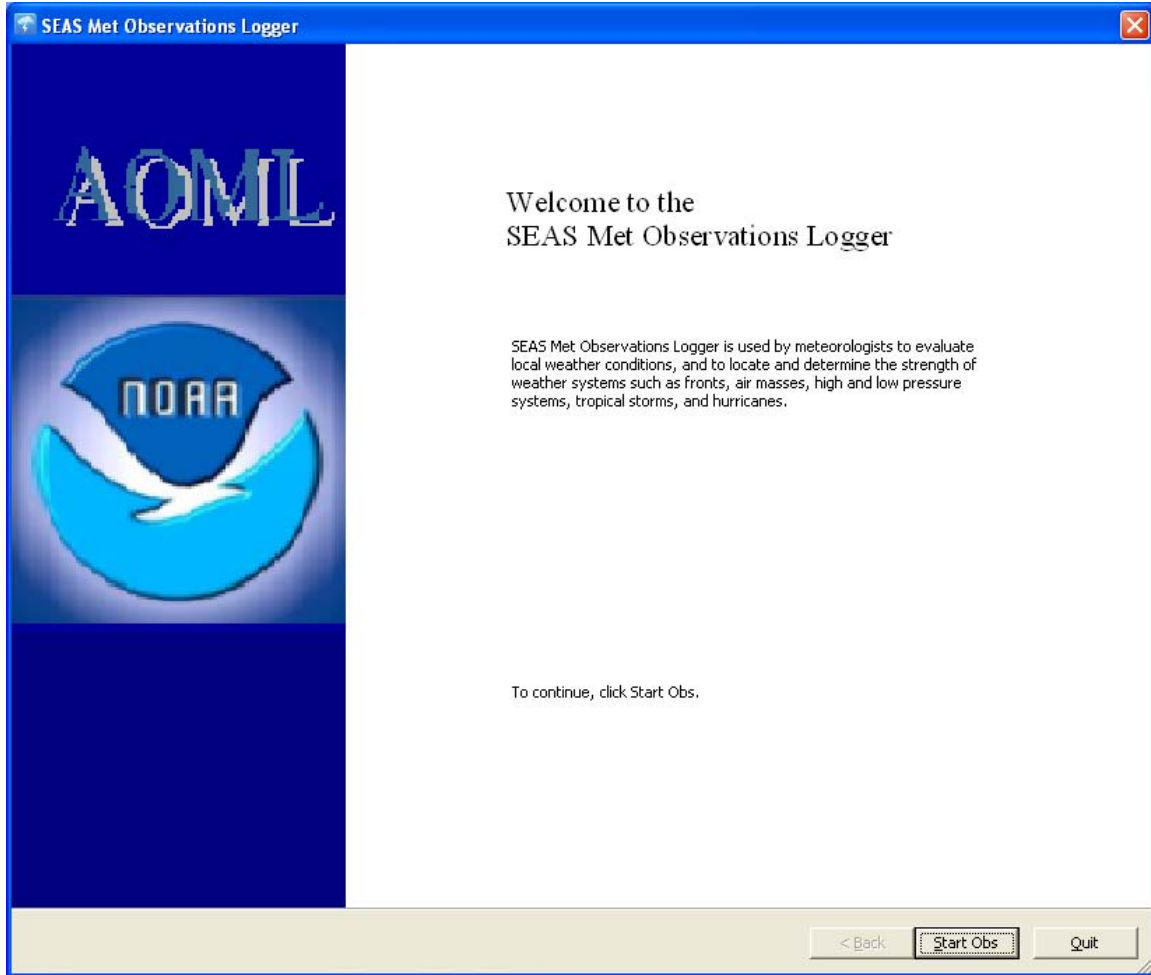
**Page 1:** Identification Data dialog allows for the input of day of month (code YY) and hour of observation (code GG), wind measurement type (code iw), weather data indicator (code ix), and ship's position (code LaLaLa, code LoLoLoLo, and code Qc). This dialog also allows for input of observer initials, determination of units used and comments. The map shows the observation position to decrease the possible user error.



**Radio Call Sign:** Ship's call sign consisting of one or more alphanumeric characters. This value is taken from the Meta data screen.

**UTC day of the month:** Day of month (UTC) on which the actual observation falls. It is calculated from the computer clock. It can be overwritten.

**UTC hour of the observation**: The actual time of observation (UTC) rounded to the nearest whole hour UTC. It is calculated from the computer clock. It can be overwritten.

**Wind indicator**: Indicating wind measurement was made (either estimated or measured).

**Latitude**: Ship's latitude, measured in terms of degrees north or south of the equator.

**Quadrant**: Quadrant of the globe.

**Longitude**: Ship's longitude, measured in terms of degrees east or east of the Greenwich Meridian.

**Weather data indicator**: Indicator for present and past weather data group. It tells whether the group is included or omitted from weather message.

**Observer initials**: Consisting up to 3 characters (numbers not allowed).

**Units:** Which type of unit user would like to use, feet, meters or Celsius and Fahrenheit. All values must then be input in the units selected. Descriptions will change to accommodate the units selected.

**Comments**: The user can type any comment that will not be transmitted but in MetaData.txt file archived.

When the user presses the **Next>** button, Met Observations Logger checks for position errors. It compares successive positions and flags a huge distance to alert to position errors.

**Error message**

In order to travel from last position transmitted to current position and time, ship speed must be 15.19 knots. This exceed maximum ship speed of 11.90 knots.

|  | Latitude | Longitude | Date | Time |
|---|---|---|---|---|
| Last transmitted position: | 02-23, S | 120-55, E | 2013/05/15 | 22:22 |
| Current position: | 22-34, N | 087-22, W | 2013/06/09 | 15:31 |

Distance between position: 9011.7    NM

Continue with current time and position data (even though it may be in error)?

Yes     No

However if the operator is sure that the data is correct then this error message can be overridden by clicking the **Yes** button.

**Page 2:** This dialog allows for the input of atmospheric pressure (code PPPP), the 3-hour characteristic of pressure tendency (code a), and amount of pressure tendency (code ppp).



**Sea level pressure**

    **Definition:** The atmospheric pressure at mean sea level in millibars.

    **Method of measurement:** Usually measured with a precision aneroid barometer, though a mercury barometer can also be used.

    **Dialog operation:** Input the atmospheric pressure into the edit box in millibars.

**3-hour pressure tendency**

> **Definition:** This is the characteristic of pressure tendency during the three hours preceding time of observation in hectopascals. It describes how the pressure has varied.
>
> **Method of measurement:** The barograph provides the best indicator of the pressure tendency characteristic. The shape of the trace determines which code to use.
>
> **Dialog operation:** It is determined from the appropriate description. Using the mouse or the up/down arrow keys select a description in the list box to determine code a.
>
> All traces may be viewed simultaneously by clicking the **Display all pressure diagrams** button.
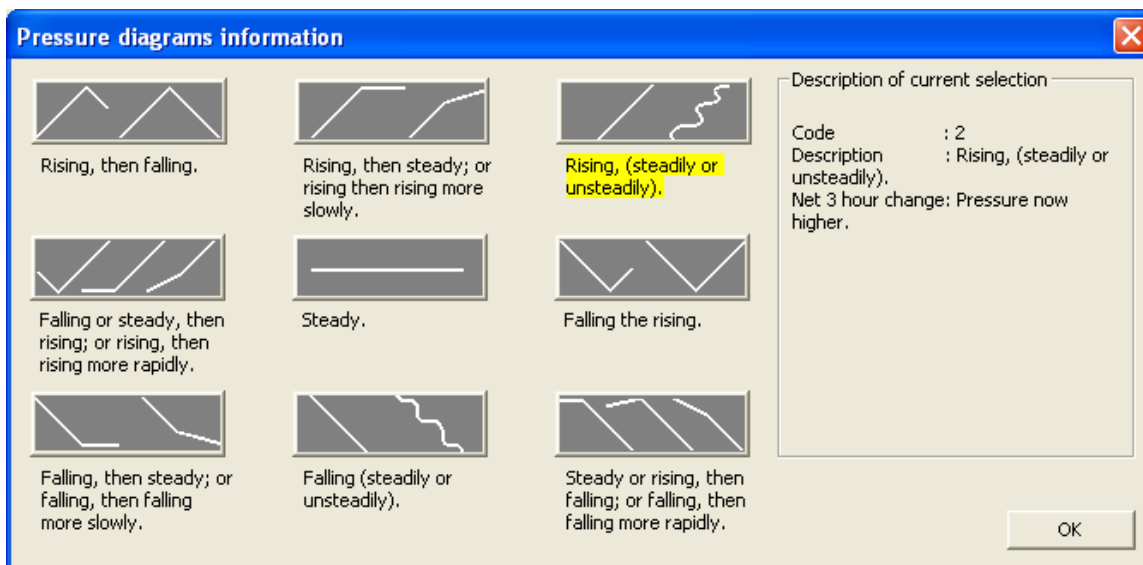


Make a selection by clicking on the appropriate picture. Click **OK** to return. Code a is automatically determined.

**3-hour pressure change**

**Definition:** Amount of pressure tendency during the three hours preceding time of observation. This is the net pressure change.

**Method of measurement:** Either using the barograph trace, or reading the barometer at the beginning and the end of a three-hour interval.

**Dialog operation:** Input the pressure tendency into the edit box in millibars.

**Page 3:** This dialog allows for the input of wind direction (code dd), wind speed (code ff), and dry bulb (code TTT), wet bulb (code TbTbTb). The dew point (code TdTdTd) is then calculated.



**Wind direction**

> **Definition:** True wind direction, from which wind is blowing. This is a mean direction averaged over a period of ten minutes.

> **Method of measurement:** It can be determined from the orientation of sea waves or from steaks and foam on sea surface or from the apparent wind observed aboard the ship. If apparent wind is used then the motion of the ship must be removed to obtain true wind. The wind can also be of type variable. The true wind can also be calculated using the **True wind speed/direction calculator**.

**Dialog operation:** Select the appropriate radio button depending if the wind direction is variable or determinable. If the wind direction is determinable input the wind direction into the edit box. If variable is selected then no wind direction is input and code 99 is automatically selected.

**True wind speed/direction calculator**



Once selected the window **True wind calculator** appears that allows the user to calculate true wind direction and speed. Input the correct ship and wind values in the edit boxes. The wind values are calculated by clicking the **Calculate** button. Click **OK** to go back using the calculated values. Click **Cancel** to go back without using the calculated values.

**Used algorithm:**

```cpp
bool CMetHelper::CalculateTrueWind(double dShipSog      /*meters/sec*/, double dShipCog      /*degree*/, double dShipHeading /*degree*/,
                                   double dRelWindSpeed  /*meters/sec*/, double dRelWindDir   /*degree*/,
                                   double& dTrueWindSpeed /*meters/sec*/, double& dTrueWindDir /*degree*/)
{
    bool bStatus = true;

    double dTWX;
    double dTWY;

    try
    {
        dTWX = dRelWindSpeed * sin((dRelWindDir + dShipHeading + 180) * PI / 180) + dShipSog * sin(dShipCog * PI / 180);
        dTWY = dRelWindSpeed * cos((dRelWindDir + dShipHeading + 180) * PI / 180) + dShipSog * cos(dShipCog * PI / 180);
        if (dTWY == 0) // avoid div by zero.
            dTWY = 0.0001;

        // compute angle of vector.
        dTrueWindDir = atan(dTWX / dTWY) * 180 / PI;

        // dependent on quadrant the angle must be corrected.
        if (dTWY < 0)          // Q2 and Q3
            dTrueWindDir = dTrueWindDir;
        else if (dTWX < 0)  // Q4
            dTrueWindDir = dTrueWindDir + 180;
        else                  // Q1
            dTrueWindDir = dTrueWindDir - 180;

        // make sure value is in range.
        if (dTrueWindDir < 0)
            dTrueWindDir = dTrueWindDir + 360;

        // compute length of vector - equivalent to the windspeed;
        dTrueWindSpeed = sqrt(dTWX * dTWX + dTWY * dTWY);
    }
    catch (CException* e)
    {
        e->Delete();

        dTrueWindSpeed = 0.0;
        dTrueWindDir = 0.0;
        bStatus = false;
    };

    return bStatus;
};
```

**Wind speed**

**Definition:** True wind speed in knots, measured or estimated as indicated by iw.

**Method of measurement:** Use either the appearance of the sea surface and the Beaufort scale, an anemometer, or the effects of the wind on people or objects aboard ship.

**Dialog operation:** It can directly be entered into the edit box. The true wind can also be calculated using the **True wind speed/direction calculator**. It can also be determined from the Beaufort scale. Only use Beaufort scale if wind speed is not available from instrument.

**How to determine from Beaufort scale:** Using the mouse or the up/down arrow keys select a description in the Beaufort scale list box. The associated sea state is shown in the diagram, a detailed description of the sea state is also displayed and code ff is determined. If the wind speed is greater than 64 knots then the wind speed must be manually filled into the edit box. Code ff is the wind speed if the wind speed is less than 99 knots. If the wind speed is greater than 99 knots, code ff is coded with 99 and code fff box should be filled in with appropriated wind speed greater than 99 knots.

All pictures may be viewed simultaneously by clicking the **Display all sea state pictures** button.
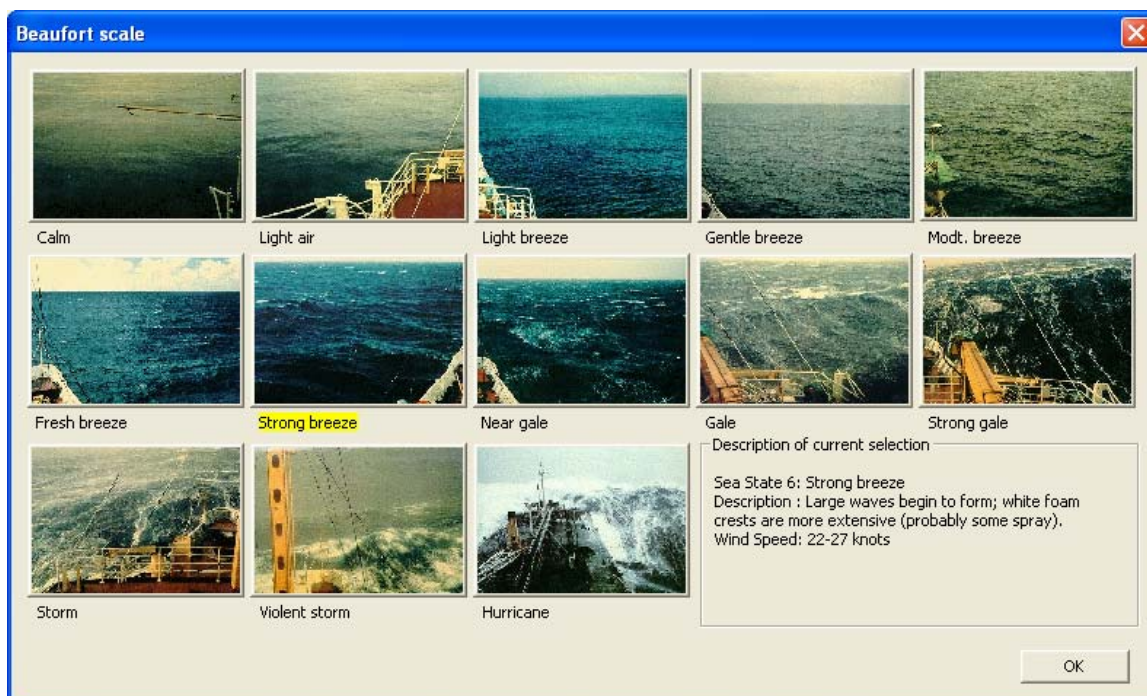


Make a selection by clicking on the appropriate picture. Click **OK** to return. Code ff is automatically determined with the exceptions mentioned above for wind speeds greater than 64 knots.

**Dry bulb**

**Definition:** Air temperature, in whole °C. It is the measurement of the heat content of the air.

**Method of measurement:** Thermometer of psychrometer. Take the reading on the windward side of the ship being sure to protect thermometer from radiation, precipitation, and spray.

**Dialog operation:** The signed dry bulb temperature is recorded into the edit box in Celsius up tenths of a degree. Code Sw automatically selected.

**Wet bulb**

**Definition:** Wet bulb temperature in °C. This is that temperature at which water evaporated into the air brings the air to saturation at the same temperature.

**Method of measurement:** Psychrometer. The thermometer must be read as soon as possible after ventilation or whirling has stopped. Moisten clean wet bulb muslin on

all sides with purest (distilled) water available. If temperature is below 0 °C, the muslin wicking should be covered with a thin coating of ice.

**Dialog operation:** The signed wet bulb temperature is recorded into the edit box in Celsius. The sign and type of wet bulb is selected from the list box using the mouse or the up down arrow keys. Code Sw automatically selected.

**Dew point**

**Definition:** This is the temperature in °C at which condensation will occur causing dew or frost to form. It corresponds to a relative humidity of 100%.

**Method of measurement:** It is computed from the wet bulb and dry bulb temperature.

**Dialog operation:** It is automatically calculated from the dry and wet bulb.

**Used algorithm:**

```
// function calculates the pressure dependency of the
// saturation vapour pressure
//
// IN:  pressure - given pressure for the calculation
// OUT: f_p      - pressure dependency
double CMetDataLoggerDoc::PressureDependency(const double& pressure)
{
    return 1.0016 + 0.00000315 * pressure - 0.074 / pressure;
};

// function calculates and returns the saturation vapour pressure
// in the pure phase with regard to water (e_w) or
// with regard to ice (e_i) at the given temperature
//
// IN:  pressure            - given pressure for the calculation
//      temperature         - given temperature for the calculation
//                             of the saturation vapour pressure
//      iced                - measurements over ice yes / no
// OUT: satVapourPressure  - saturation vapour pressure
double CMetDataLoggerDoc::SatVapourPressure(const double& pressure, const double& temperature, const bool& iced)
{
    double satVapourPressure;
    double f_p = PressureDependency(pressure); // pressure dependency

    if (iced == false)
        satVapourPressure = f_p * 6.112 * exp(17.62 * temperature / (243.12 + temperature));
    else
        satVapourPressure = f_p * 6.112 * exp(22.46 * temperature / (272.62 + temperature));

    return satVapourPressure;
};
// function calculates the actual vapour pressure (e_prime)
//
// IN:  pressure        - pressure of moist air in hPa
//      t_dry           - dry-bulb temperature in °C
//      t_wet           - wet-bulb temperature in °C
//      iced            - measurements over ice yes / no
// OUT: vapourPressure  - actual vapour pressure
double CMetDataLoggerDoc::VapourPressure(const double& pressure, const double& t_dry, const double& t_wet, const bool& iced)
{
    double vapourPressure;
    double satVapourPressure = SatVapourPressure(pressure, t_wet, iced);

    if (iced == false)
        vapourPressure = satVapourPressure - 0.000653 * (1 + 0.000944 * t_wet) * pressure * (t_dry - t_wet);
    else
        vapourPressure = satVapourPressure - 0.000575 * pressure * (t_dry - t_wet);

    return vapourPressure;
};
```

```
// function to calculate the dewpoint from the given values for
// pressure, dry-bulb and wet-bulb temperature
//
// all used formulas are taken from
// WMO-No.8, 7th edition, 2008, Part I, Annex 4.B
//
// IN:  pressure  - pressure of moist air in hPa (pressure at the height of the temperature measurements.)
//      t_dry     - dry-bulb temperature in °C
//      t_wet     - wet-bulb temperature in °C
// OUT: dewpoint  - dewpoint in °C
// Returns FALSE if the dew point can not be computed.
//
BOOL CMetDataLoggerDoc::CalculateDewPointWMO(const double& t_dry, const double& t_wet, const double& pressure, double& dewPoint)
{
    BOOL bReturn = TRUE;

    try
    {
        // iced - measurements over ice yes / no
        bool iced;
        if(t_wet <= 0)
            iced = true;
        else
            iced = false;

        double ln_value = VapourPressure(pressure, t_dry, t_wet, iced) / (6.112 * PressureDependency(pressure)); // interim value,
        if (ln_value <= 0)
            ln_value = 0.00000001;

        if (iced == false)
            dewPoint = (243.12 * log(ln_value)) / (17.62 - log(ln_value));
        else
            dewPoint = (272.62 * log(ln_value)) / (22.46 - log(ln_value));

        // Checks a given double-precision floating-point value for not a number (NAN).
        if (_isnan(dewPoint) != 0)
            bReturn = FALSE; // Dewpoint NaN;
    }
    catch (...)
    {
        bReturn = FALSE;
    };

    return bReturn;
};
```

## Relative humidity

**Definition:** The amount of water vapor present in air expressed as a percentage of the amount needed for saturation at the same temperature.

**Method of measurement:** It could be computed from the wet bulb and dry bulb temperature or measured if these values are not available.

**Dialog operation:** The relative humidity in thenths of percentage could be automatically calculated from the dry and wet bulb or it could be recorded into the edit box.

## Used algorithm:

```
// function to calculate the humidity from the given values for
// pressure, dry-bulb and wet-bulb temperature
//
// all used formulas are taken from
// WMO-No.8, 7th edition, 2008, Part I, Annex 4.B
//
// IN:  pressure  - pressure of moist air in hPa (pressure at the height of the temperature measurements.)
//      t_dry     - dry-bulb temperature in °C
//      t_wet     - wet-bulb temperature in °C
// OUT: humidity  - humidity in %
// Returns FALSE if the dew point can not be computed.
//
BOOL CMetDataLoggerDoc::CalculateRelativeHumidityWMO(const double& t_dry, const double& t_wet, const double& pressure, double& humidity)
{
    BOOL bReturn = TRUE;

    try
    {
        // iced - measurements over ice yes / no
        bool iced;
        if(t_wet <= 0)
            iced = true;
        else
            iced = false;

        humidity = 100 * VapourPressure(pressure, t_dry, t_wet, iced)/(SatVapourPressure(pressure, t_dry, iced));

    }
    catch (...)
    {
        bReturn = FALSE;
    };
    return bReturn;
}
```

**Page 4:** This dialog allows for the input of the present weather.



**Present weather**

    **Definition:** The present weather and refers to atmospheric phenomena occurring at the time of observation or within the last hour.

    **Method of measurement:** Visually or audibly determined. Report the most severe weather conditions observed.

    **Dialog operation:** Determine if precipitation is at the ship, select the appropriate radio button using the mouse. This will enable either the right or left list boxes at the top. Then select general weather description using mouse or up/down arrow keys. This will make all choices under that category appear to select the specific observed phenomena. This will input a value for code ww.

**Page 5:** This dialog allows for the input of the past weather.



**Past weather**

    **Definition:** The past weather refers to atmospheric phenomena occurring since the previous main synoptic hour or about 6 hours ago.

    **Method of measurement:** These values are visually or audibly determined.

    **Dialog operation:** Select from the appropriate definition in the list box using the mouse or the up/down arrow keys in both list boxes. If multiple weather types have to be reported, report the weather conditions with the highest code in W1 and the second highest code in W2.

**Page 6:** This dialog allows for the input of cloud height (code h) and visibility (code VV).



**Cloud base height**

**Definition:** Height above of sea surface of the base of the lowest cloud seen.

**Method of measurement:** Visual estimate. First determine the type of the lowest cloud seen, and then refer to its normal height range. As a rule of thumb, for a given cloud type, heights are higher in the tropics and during the summer months.

**Dialog operation:** Select from the appropriate definition using the mouse or the up/down arrow keys in the list box. This will input a value for code h.

**Visibility**

**Definition:** Visibility is the greatest distance an object can be seen and identified.

**Method of measurement:** Usually a visual estimate. Report prevailing visibility - the maximum visibility common to one half or more of the horizon circle. When visibility is uniform in all directions, prevailing visibility and visibility are the same. When visibility is not uniform in all directions, determine prevailing visibility by dividing the horizon circle into sectors of visibility. Estimate the highest visibility common to one half or more of the horizon circle.

**Dialog operation:** Select from the appropriate definition using the mouse or the up/down arrow keys in the list box. This will input a value for code VV.

**Page 7:** This dialog allows for the input of cloud cover (code N) and lowest cloud cover (code Nh).

**Cloud cover**

**Definition:** The total fraction of the sky covered by clouds of all types.

**Method of measurement:** Visually estimate how many eighths of the sky are covered by cloud, regardless of type. It is sometimes easier to estimate how much of the sky without clouds can be seen, i.e. if two eighths of the sky is clear, then 6 eighths is covered by cloud.

**Dialog operation:** Select from the appropriate definition using the mouse or the up/down arrow keys in the list box. This will input a value for code N.

**Lowest cloud cover**

**Definition:** Amount if all $C_L$ cloud present or, if no $C_L$ cloud is present, the amount of all the $C_M$ cloud present.

**Method of measurement:** Visual observation.

**Dialog operation:** Select from the appropriate definition using the mouse or the up/down arrow keys in the list box. This will input a value for code Nh. If $C_L$ clouds are present select fraction of sky covered by them. If $C_L$ clouds are not present then select fraction of sky covered by $C_M$ clouds.

**Page 8:** This dialog allows for the input of low cloud type (code CL), middle cloud type (code CM), and high cloud type (code CH).



L**ow cloud type**

>   **Definition:** Clouds of type Stratocumulus, Stratus, Cumulus and Cumulonimbus.

>   **Stratocumulus (Sc):** Gray or whitish patch, sheet or layer of cloud which almost always has dark pats, composed of tessellations, rounded masses, rolls, etc., which are nonfibrous, and which may or may not be merged; most of the regularly arranges small elements have an apparent width of more than 5 degrees.

>   **Stratus (St):** Generally gray cloud layer with a fairly uniform base, which may give drizzle, ice prisms, or snow grains. When the sun is visible through the cloud, its outline is clearly discernible. Stratus generally does not produce halo phenomena.

>   **Cumulus (Cu):** Detached clouds, generally dense and with sharp outline, developing vertically in the form of rising mounds, domes, or towers, of which the bulging upper

part often resembles a cauliflower. The sunlit parts are mostly brilliant white; their base is relatively dark and nearly horizontal.

**Cumulonimbus (Cb):** Heavy, dense cloud, with considerable vertical extent, in the form of a mountain or huge towers. At least part of its upper portion is usually smooth, fibrous, or striated, and nearly always flattened; this part often spreads out in the shape of an anvil or vast plume.

**Method of measurement:** Visual observation. Use the NWS cloud pictures or other suitable cloud atlas.

**Dialog operation:** Select the appropriate description using the mouse or the up/down arrow keys in the CL list box. As a selection is made in the list box, the associated picture and a full description is displayed and code CL is determined.

All CL cloud pictures can be viewed simultaneously by clicking the **Display all CL** button. When this cloud picture dialog is opened select the appropriate cloud formation by clicking the picture. Click **OK** to return. Code CL is automatically determined.
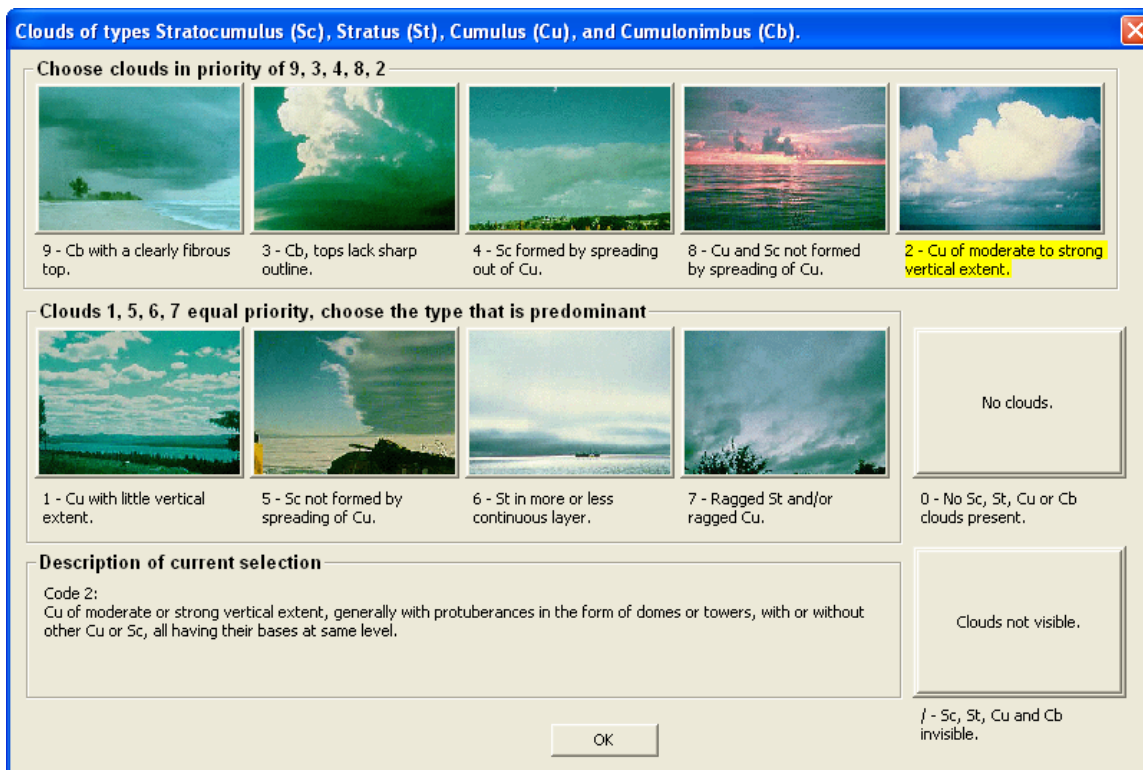
**Middle cloud type**

**Definition:** Clouds of type Altocumulus, Altostratus and Nimbostratus.

**Altocumulus (Ac):** White or gray patch, sheet, or layer of cloud, generally with shading, composed of laminae, rounded masses, rolls, etc, which are sometimes partly fibrous or diffuse, and which may or may not be merged; most of the regularly arranged small elements usually have an apparent width between one and five degrees.

**Altostratus (As):** Grayish or bluish sheet of layer of striated, fibrous, or uniform appearance, totally or partly covering the sky. And having parts thin enough to reveal the sun at least vaguely, as through ground glass. Does not show halo phenomena.

**Nimbostratus (Ns):** Heavy cloud layer, often dark the appearance of which is rendered diffuse by falling rain or snow, which in most cases reached the ground. It is thick enough to blot out the sun or moon.

**Method of measurement:** Visual observation. Use the NWS cloud pictures or other suitable cloud atlas.

**Dialog operation:** Select the appropriate description using the mouse or the up/down arrow keys in the CM list box. As a selection is made in the list box, the associated picture and a full description is displayed and code CM is determined.

All CM cloud pictures can be viewed simultaneously by clicking the **Display all CM** button. When this cloud picture dialog is opened select the appropriate cloud formation by clicking the picture. Click **OK** to return. Code CM is automatically determined.
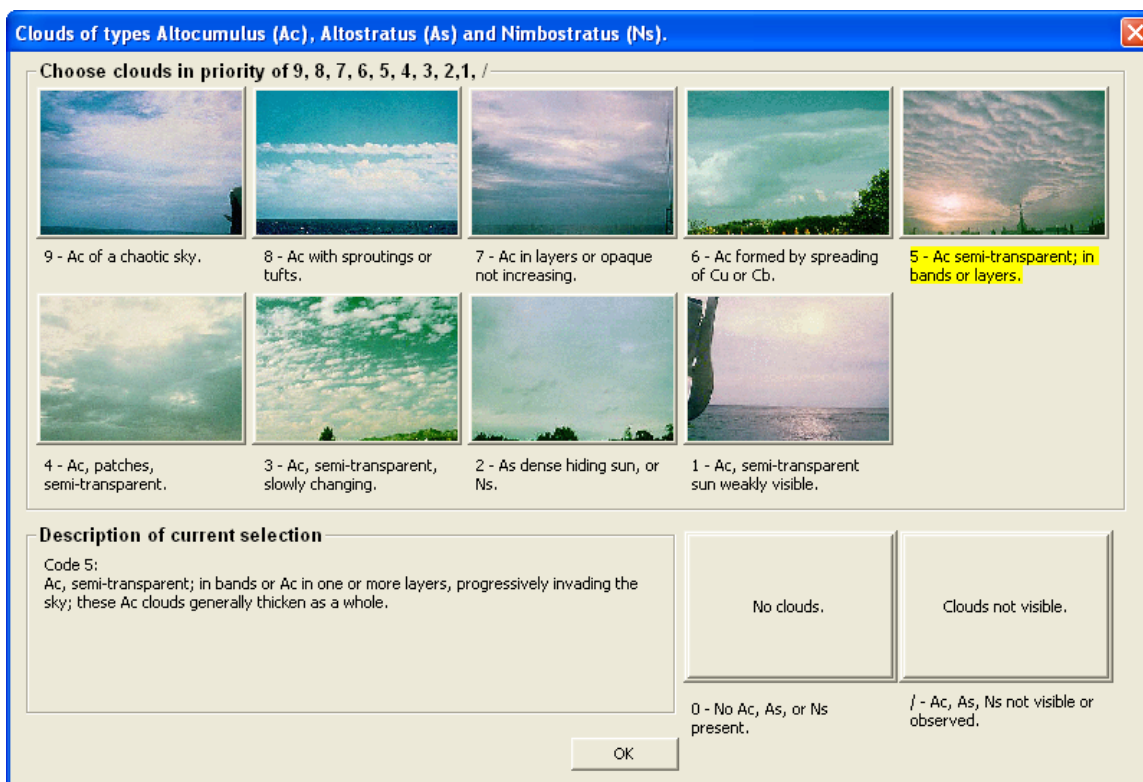
**High Cloud Type**

**Definition:** Clouds of type Cirrus, Cirrocumulus, Cirrostratus.

**Cirrus (Ci):** Detached clouds in the form of delicate white filaments or white or mostly white patches of narrow bands. These clouds have a fibrous appearance (hairlike), or a silky sheen, or both.

**Cirrocumulus (Cs):** Thin white patch, sheet, or layer of cloud without shading, composed of very small elements in the form of grains, ripples, etc., merged or separate, and more or less regularly arranged; most of the elements have an appearance width of less than one degree.

**Cirrostratus (Cs):** Transparent, whitish cloud veil of fibrous (hairlike) or smooth appearance, totally or partially covering the sky, and generally producing halo phenomena.

**Method of measurement:** Visual observation. Use the NWS cloud pictures or other suitable cloud atlas.

**Dialog operation:** Select the appropriate description using the mouse or the up/down arrow keys in the CH list box. As a selection is made in the list box, the associated picture and a full description is displayed and code CH is determined.

All CH cloud pictures can be viewed simultaneously by clicking the **Display all CH** button. When this cloud picture dialog is opened select the appropriate cloud formation by clicking the picture. Click **OK** to return. Code CH is automatically determined.
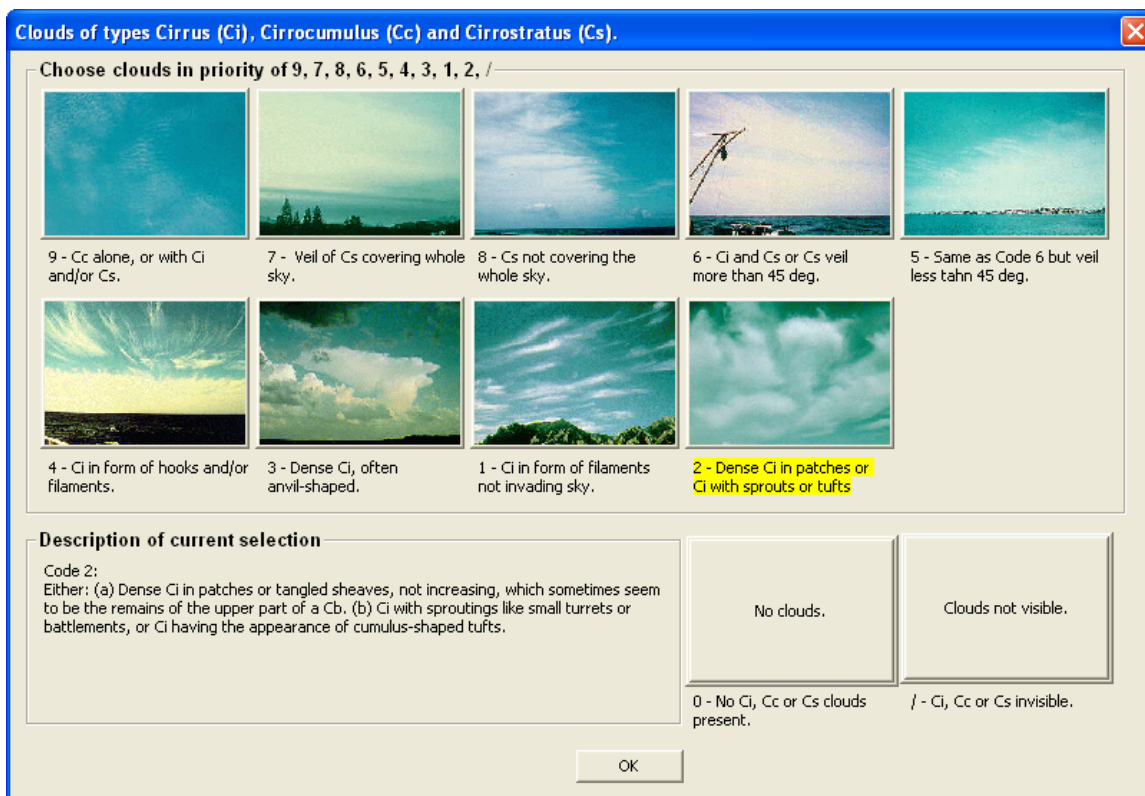
**Page 9:** This dialog allows for the input of ship's course (code Ds), ship's average speed (code Vs), and sea surface temperature (code TwTwTw).



**Ship's course**

**Definition:** It is the ship's course made good during the three hours preceding the time of observation.

**Method of measurement:** If the ships course has been constant during the three hours preceding the time of observation, then Ds is the actual course however if the course has altered then it is the course made good.

**Dialog operation:** Select the appropriate description using the mouse or the up/down arrow keys. Code Ds is then automatically determined.

**Ship's average speed**

**Definition:** It is the ship's average speed made good during the three hours preceding the time of observation.

**Method of measurement:** It is determined by calculating the distance traveled in nautical miles in during the three preceding hours and then dividing by three.

**Dialog operation:** Select the appropriate description from the list box using the mouse or the up/down arrow keys. Code Vs is then automatically determined.

**Sea surface temperature**

**Definition:** Sea surface water temperature in °C. The temperature to be observed is that of the sea surface representative of conditions in the near-surface mixing layer underlying the ocean skin.

**Method of measurement:** Engine room intake thermometer, hull mounted contact sensor thermometer, bucket thermometer.

**Dialog operation:** The signed sea surface temperature is recorded in the edit box in °C.

The code TwTwTw is the sea surface water temperature in tenths of a degree Celsius its sign and how it was measured being given by Ss that the application determines automatically.

**Page 10:** This dialog allows for the input of period of wind waves (code PwPw), vertical distance for wind waves (code HwHw), and swell information (code dw1dw1, code dw2dw2, code Pw1Pw1, code Hw1Hw1, code Pw2Pw2, and code Hw2Hw2).



**Period of wind waves (swells)**

**Definition:** The period of wind waves (swell) in seconds. Wave (swell) period is the time between the passages of two successive wave (swell) crests (or successive troughs) past a fixed point.

**Method of measurement:** Count seconds, preferably with a watch. Note a small object such as a piece of wood, foam or bird floating on the water. Watch the amount of time it takes for the object to move from crest to crest.
**Dialog operation:** Input the wave and swell period into the edit boxes as labeled. The codes PwPw, Pw1Pw1, and Pw2Pw2 are automatically coded with the input value.

**Height of waves (swells)**

**Definition:** Vertical distance between trough and crest for wind waves (swells) in units of meters or feet. The primary swells are higher than secondary waves.

**Method of measurement:** Visual estimate. It is best for observer to locate on side of ship from which the waves are coming.

**Dialog operation:** Input the height of wave and swells into the edit boxes as labeled. Use feet or meters, the correct units are shown next to the edit boxes (unit selection is made at the **Identification Data** dialog Page 1). The codes HwHw, Hw1Hw1, and Hw2Hw2 are automatically coded in half meters.

**Swell direction**

**Definition:** True direction in degrees from which primary and secondary swell waves are coming. Use swell wave height to distinguish primary from secondary swells. Swells are waves that have traveled into your area of observation after being generated by wind in other areas.

**Method of measurement:** Visual estimate. Sight along the swell wave crests. The direction the swell waves are coming from will be 90 degrees to the crestline.

**Dialog operation:** Determine if the swell direction is variable or not and select the appropriate radio button. If the direction of the swell is variable then the code value of 99 is given automatically. If a direction is determined then put that value in the edit box. The code is automatically determined.

**Page 11:** This dialog allows for the input of ice accretion cause (code Is), ice accretion rate (code Rs), and ice accretion thickness (code EsEs) on ship.



**Ice accretion cause on ship**

> **Definition:** Ice accretion refers to a deposition of ice on the ship superstructure or exposed surfaces, from freezing precipitation, ocean spray, supercooled fog, or cloud droplets.

> **Method of measurement:** Visual.

> **Dialog operation:** Use the mouse or up/down arrow keys to make a selection. Code Is is then automatically selected.

**Ice accretion rate on ship**

    **Definition:** Rate of ice accretion on ships.

    **Method of measurement:** Visual estimate.

    **Dialog operation:** Use the mouse or up/down arrow keys to make a selection. Code Rs is then automatically determined.

**Ice accretion thickness on ship**

    **Definition:** Thickness of ice accretion on ships, in centimeters or inches as labeled.

    **Method of measurement:** Visual estimate or measure with tape measure or ruler.

    **Dialog operation:** Input into the edit box the value in inches or centimeters. The correct units are shown next to the edit box (unit selection is made at the **Identification Data** dialog). The code EsEs is automatically calculated in centimeters.

**Page 12:** This dialog allows for the input of concentration or arrangement of sea ice (code ci), and sea ice stage of development (code Si).



**Sea ice concentration**

**Definition:** Concentration or arrangement of sea ice.

**Method of measurement:** Visual determination.

**Dialog operation:** Select the appropriate description from the list box using the mouse or the up/down arrow keys. Code ci is then automatically determined. Choose the coding which describes the condition, which is of the most navigational significance.

**Sea ice development**

    **Definition:** Stage of development of sea ice.

    **Method of measurement:** Visual determination.

    **Dialog operation:** Select the appropriate description from the list box using the mouse or the up/down arrow keys. Code Si is then automatically determined.

    The **Sea Ice Glossary** button brings up a page that describes the various sea ice formations.

**Page 13:** This dialog allows for the input of ice of land origin (code bi), and bearing of principal ice edge (code Di).

**Ice of land origin**

**Definition:** Ice of land origin.

**Method of measurement:** Visual determination.

**Dialog operation:** Select the appropriate description from the list box using the mouse or the up/down arrow keys. Code bi is then automatically determined.

**Bearing of principal ice edge**

**Definition:** True bearing of principal sea ice edge.

**Method of measurement:** Visual determination.

**Dialog operation:** Select the appropriate description from the list box using the mouse or the up/down arrow keys. Code Di is then automatically determined.

**Ice Berg Glossary** button brings up a page with various descriptions of icebergs.

**Page 14:** This dialog allows for the input of present sea ice situation and three-hour trend (code zi).



**Present sea ice situation and three hour trend**

> **Definition:** Present sea ice situation and trend of conditions over preceding three hours.

> **Method of measurement:** Visual determination.

> **Dialog operation:** Select the appropriate description from the list box using the mouse or the up/down arrow keys. Code zi is then automatically determined.

**Ice Berg Glossary** button brings up a page with various descriptions of icebergs.

The wizard's completion dialog appears when the observation is completed, and the message is ready for transmission. Then press **Finish** to continue.

# Ships synoptic code FM13-X

The ships synoptic code FM-13-X-SHIP is the form of the message as distributed on the Global Telecommunications System (GTS), and is the standard set forth by the World Meteorological Organization. This code is comprised of 23 groups of symbolic letters representing meteorological and oceanographic elements, report identification and ship location data. The code has three main sections - 0, 1, and 2.

**SECTION 0 — IDENTIFICATION DATA**
$$BBXX \quad D....D \quad YYGGi_w \quad 99L_aL_aL_a \quad Q_cL_oL_oL_oL_o$$

**SECTION 1 — METEOROLOGICAL DATA**
$$i_{Ri_x}hVV \quad Nddff \quad 00fff \quad 1s_nTTT \quad 2s_nT_dT_dT_d$$
$$4PPPP \quad 5appp \quad 7wwW_1W_2 \quad 8N_hC_LC_MC_H$$

**SECTION 2 — OCEANOGRAPHIC DATA**
$$222D_sv_s \quad 0s_sT_wT_wT_w \quad 2P_wP_wH_wH_w \quad 3d_{w1}d_{w1}d_{w2}d_{w2} \quad 4P_{w1}P_{w1}H_{w1}H_{w1}$$
$$5P_{w2}P_{w2}H_{w2}H_{w2} \quad 6I_sE_sE_sR_s \quad 8s_wT_bT_bT_b \quad ICE \quad c_iS_ib_iD_iz_i$$

**Section 0**, consisting of the first 5 code groups, contains the identification data (ship report identifier, ship's call sign, date, time, location), and units of wind speed used.

$$BBXX \quad D.....D \quad YYGGi_w \quad 99L_aL_aL_a \quad Q_cL_oL_oL_oL_o$$

**Section 1** consists of code groups 6-14 and contains most of the meteorological data of the report (precipitation and weather data indicators, cloud base height, visibility, cloud cover, wind direction and speed, air and dew point temperatures, sea level pressure, tendency, and amount of change, present and past weather, and cloud type).

$$i_{Ri_x}hVV \quad Nddff \quad 00fff \quad 1s_nTTT \quad 2s_nT_dT_dT_d$$
$$4PPPP \quad 5appp \quad 7wwW_1W_2 \quad 8N_hC_LC_MC_H$$

**Section 2** consists of code groups 15-23 and contains ships movement data (ships course and speed), oceanographic data (sea surface temperature, sea period and height, primary and secondary swell direction, period, and height), and ice data (for any ice accreting on ship or on the sea surface), and the wet bulb temperature group.

$$222D_sv_s \quad 0s_sT_wT_wT_w \quad 2P_wP_wH_wH_w \quad 3d_{w1}d_{w1}d_{w2}d_{w2} \quad 4P_{w1}P_{w1}H_{w1}H_{w1}$$
$$5P_{w2}P_{w2}H_{w2}H_{w2} \quad 6I_sE_sE_sR_s \quad 8s_wT_bT_bT_b \quad ICE \ c_iS_ib_iD_iz_i \text{ (or plain language)}$$

## Synoptic Code Symbols with Range of Values

| Symbol | Description | Range/Values |
|---|---|---|
| BBXX | Ship Weather Report Indicator | BBXX |
| D....D | Radio call sign | Call Sign |
| YY | Day of the month | 01-31 |
| GG | Time of observation | 00-23 |
| $i_w$ | Wind indicator | 3, 4 |
| $L_aL_aL_a$ | Latitude | 000-900 |
| $Q_o$ | Quadrant | 1, 3, 5, 7 |
| $L_oL_oL_oL_o$ | Longitude | 0000-1800 |
| $i_R$ | Precipitation data indicator | 4 |
| $i_x$ | Weather data indicator | 1, 3 |
| h | Cloud base height | 0-9, / |
| VV | Visibility | 90-99 |
| N | Cloud cover | 0-9, / |
| dd | Wind direction | 00-36, 99 |
| ff | Wind speed | 00-99 |
| fff | High Speed Wind | Knots (099-  ) |
| $s_n$ | Sign of temperature | 0, 1 |
| TTT | Dry bulb temperature | Celsius Degrees |
| $T_dT_dT_d$ | Dew point temperature | Celsius Degrees |
| PPPP | Sea level pressure | Actual Hp or Mb (omit 1 in thousandths) |
| a | 3-hour pressure tendency | 0-8 |
| ppp | 3-hour pressure change | Hp or Mb |
| ww | Present weather | 00-99 |
| $W_1$ | Past weather (primary) | 0-9 |
| $W_2$ | Past weather (secondary) | 0-9 |
| $N_h$ | Lowest cloud cover | 0-9, / |
| $C_L$ | Low cloud type | 0-9, / |
| $C_M$ | Middle cloud type | 0-9, / |
| $C_H$ | High cloud type | 0-9, / |
| $D_s$ | Ship's course | 0-9 |
| $V_s$ | Ship's average speed | 0-9 |
| $S_s$ | Sign/type sea surface temp. | 0-7 |
| $T_wT_wT_w$ | Sea surface temp. | Celsius Degrees |
| $P_wP_w$ | Sea period | Seconds |
| $H_wH_w$ | Sea height | Half Meters |
| $d_{w1}d_{w1}$ | Primary swell direction | 01-36, 99 |
| $d_{w2}d_{w2}$ | Secondary swell direction | 01-36, 99, // |
| $P_{w1}P_{w1}$ | Primary swell period | Seconds |
| $H_{w1}H_{w1}$ | Primary swell height | Half Meters |
| $P_{w2}P_{w2}$ | Secondary swell period | Seconds |
| $H_{w2}H_{w2}$ | Secondary swell height | Half Meters |
| $I_s$ | Ice accretion cause on ship | 1-5 |
| $E_sE_s$ | Ice accretion thickness on ship | Centimeters |
| $R_s$ | Ice accretion rate on ship | 0-4 |
| $S_w$ | Sign/type wet bulb temp. | 0-7 |
| $T_bT_bT_b$ | Wet bulb temp. | Celsius Degrees |
| $c_i$ | Sea ice concentration | 0-9, / |
| $S_i$ | Sea ice development | 0-9, / |
| $b_i$ | Ice of land origin | 0-9, / |
| $D_i$ | Ice edge bearing | 0-9, / |
| $z_i$ | Ice trend | 0-9, / |

More information can be finding into the National Weather serving Observing Handbook1

Any elements not reported or out of bound are normally coded with a slash (/) to indicated missing data.

In the first five groups, this is the Synoptic Code Section 0, all values are mandatory, if any error occurs or any data is missing, the entire report will be discarded.

## Archiving data

The SEAS Met Observations Logger collects marine weather data, which will be transmitted using the meteorological observation BBXX format. It archives the collected data in **IMMT.txt** file into the archive directory C:\Users\Public\Public Documents\AMVERSEAS_V9\Archive\ArchiveMet).

The IMMT.txt file is a recording of all observations taken on the vessel in International Maritime Meteorological Tape (IMMT) version IMMT-5 format. Port Meteorological Officers (PMO) should retrieve the archived file when they meet the ship and send the data to the National Climatic Data Center (NCDC).

If IMMT.txt file has not been prepared for shipment to the NCDC after **90 days**, the user is advised to do it.
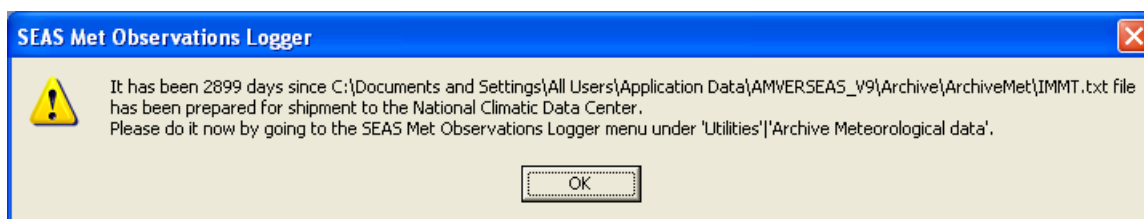


The supported Minimum Quality Control Standards (MQCS) version is the Version 7.

## Data transmission

It is very important that observations be transmitted quickly. This ensures that the report will arrive in time for use by the marine forecaster. The name of the binary formatted file is **CallSign_YYYYMMDDHHMMSS_MET.***. The messages can be transmitted pressing the **Save and Transmit** button.

The transmission process in SEAS Met Observations Logger application is a pseudo transmission process. It consists to post the generated CallSign_YYYYMMDDHHMMSS_MET.* file into the transmission drive previously selected for the user for the real transmission (see Main menu > Setup >Transmission method command).

## .INI files

The .ini files are plain-text files that contain configuration information. "INI" stands for *initialization*. The files will be created during the installation process. These should <span style="color:red">never be manually changed</span>.

- **MetObservationsLogger.ini** is used to save information about the application setup, and preferences.

## Directory structure

Archive directory

➢ C:\Users\Public\Public Documents\AMVERSEAS_V9\Archive\ArchiveMet.