SCS-SAMOS
Standard Data Submission Operating Procedure

Friday, May 03, 2013

Introduction and Background

SAMOS (*Shipboard Automated Meteorological and Oceanographic System*) is a program operated by the Florida State University Center for Ocean-Atmosphere Prediction Studies (COAPS) to receive meteorological and oceanographic data from ships at sea in near real time, to verify the quality of that data, and provide feedback on the data quality to the ship.

NOAA OMAO has agreed to participate in this effort beginning in the fall of 2006.

Aboard NOAA ships the SCS event logger will execute the "SAMOS" event to assemble the necessary data into an observations file. Then, a standalone program, the "SAMOS Mailer" application will reformat the event log observations into a format appropriate for submission to the SAMOS project.

Standard SAMOS Data

The SAMOS program has defined a series of standards governing what data is to be submitted and the format of the submitted data.

In the SAMOS submission each sensor observation is reported as data value that is an average of the previous 60 seconds of sensor data. The SAMOS program requests at least 12 samples to be averaged over the 60 second period

Data values are to be computed once per minute continuously throughout the day (1440 samples per day), and an entire day's data is to be mailed to the SAMOS project once per day at time 0001 GMT.

Each sensor observation consists of a designator and a sensor value separated by a colon. For example for true wind direction the designator is TWDIR and a sample observation would look like "TWDIR:214." Each kind of data will have a NOAA-wide keyword assigned to it, and a standard unit of measurement. The following table summarizes the data to be submitted:

Designators	Data Type	Units
CS	Ship's Call Sign	
LAT	Latitude	Signed Decimal Degrees (-for South)
LON	Longitude	Signed Decimal Degrees (-for West)
GYRO	Ship Heading	Decimal Degrees
SOG	Speed Over Ground	Knots
COG	Course Over Ground	Decimal Degrees
ATEMP	Air Temperature	Degrees C
BARO	Barometric Pressure	hPa (NOT adjusted for Sea Level)
RELH	Relative Humidity	Percent
RWSPD	Relative Wind Speed	Knots
RWDIR	Relative Wind Direction	Decimal Degrees (from which wind is blowing)
TWSPD	True Wind Speed	Knots
TWDIR	True Wind Direction	Decimal Degrees (from which wind is blowing)
TSGWT	TSG Water Temperature	Degrees C
TSGS	TSG Salinity	Psu
TSGC	TSG Conductivity	S/M
TSGSV	TSG Sound Velocity	m/s

Configuration for SAMOS

The SCS Configuration file, \EXE40\SCS40.CFG, must be edited to include the following parameters: (This will be changed next version. But don't worry!)

- *SAMOS_EMAILSYSTEMNAME* is the name of the ship's mail server. Typically this parameter has the same value as *SHIP_EMAILSYSTEMNAME* in the file.
- *SAMOS_MAIL_BODY* defines a short text string you would like to include in the body of the emails.
- *SAMOS_MAIL_FROM* is the 'from' address which appears in the email.
- *SAMOS_MAIL_TO* is the email address to send the data files to. Note: ships of the NOAA fleet must send SAMOS email to SamosShip.SCS@noaa.gov, a forwarding account that sends the mail on to its final destination.
- *SAMOS_MAIL_SUBJECT* is a string which to appear in the subject line. It must contain the name of the ship and the ship's call sign.

Example settings appear below. They are specific to a SAMOS setup on the NOAA Ship Oscar Dyson.

```
SAMOS_EMAILSYSTEMNAME=mail.nems.noaa.gov;
SAMOS_MAIL_BODY=SAMOS data from the NOAA Ship OSCAR DYSON (WTER);
SAMOS_MAIL_FROM=chiefst.oscar.dyson@noaa.gov;
SAMOS_MAIL_TO=SamosShip.SCS@noaa.gov;
SAMOS_MAIL_SUBJECT=SAMOS data From the NOAA Ship Oscar Dyson (WTER);
```

Setting up ACQ and SAMOS Derived Sensors

Using CFE-DB you must define a set of derived average sensors to compute the average for the previous 60 seconds. A new feature in SCS 4.x is the ability to compute averages over a specified time interval, independent of how many samples are sent by the sensor.

The Log Rate for the SAMOS average sensors should be set to 60 seconds, and the Timeout Sensor Parameter must be set to not less than 60 seconds (This is enforced by CFE-DB.

The Name of the SAMOS average sensors should start with the word SAMOS to distinguish them easily from the other sensors. For example, SAMOS_LATITUDE. Since in SCS 4.0 sensor lists are alphabetized this serves to group all SAMOS sensors together in the list.

NOTE: If your sensor reports its data in units not in the above table, you will have to define another sensor, of type Derived Line Equation, to convert the native sensor units to the units in the table.

Create SAMOS Event Log

** It is important that you follow these specs exactly. The correct operation of the SAMOS Mailer depends on it.

Template Name

The name of the event template should be **SAMOS**.

Sensor Metaitems

- You must create a sensor metaitem for each kind of data to be submitted as follows:
- The name of the metaitem will be the designator shown in the table above.
- You will connect this metaitem to the sensor you chose to provide the data value, and this must be one of the SAMOS derived average sensors you set up previously in the sensor configuration file.

Notes: The order of the metaitems does not matter. Metaitems may be put in separate tab groups at your convenience.

- In addition to the sensor metaitems, there should be one manual metaitem whose name is "CS", meaning "call sign". The value of this metaitem will be the four-letter radio call sign of the ship, for example, "WTER". This is important because the SAMOS database tracks submissions by call sign, not ship name.

SAMOS Data Log File

You must define a *continuous output* as follows:

- Name is SAMOS_OBS
- Type is continuous
- Log rate is 1 minute
- Select the "Lat/Lon format Decimal Degrees" radio button.
- The list of selected output elements should consist of all SAMOS derived average sensors you defined in the sensor configuration file above.

Note: The order of the output elements in the output definition does not matter.

Important Files Created by the Event Logger

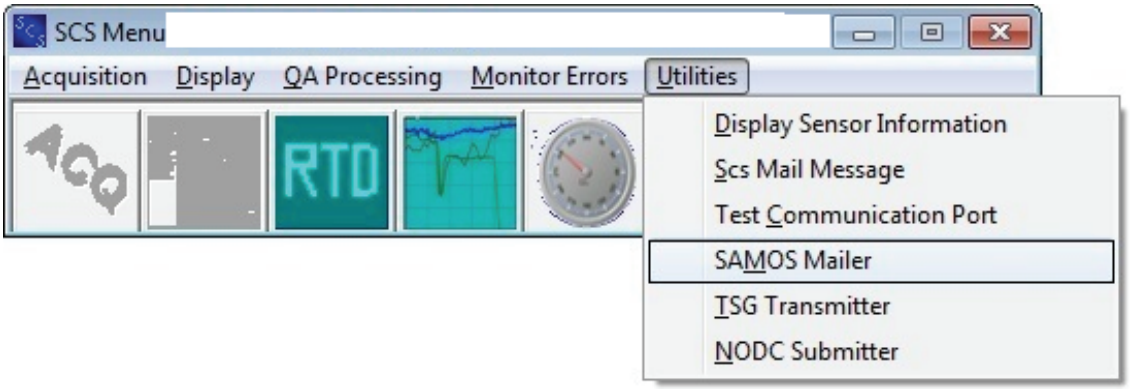
The Event Logger creates two files in the *EventTemplates\SAMOS* subfolder of your *Datalog* directory as defined in the SCS Configuration file.

- SAMOS_OBS_NNN.ELG, where NNN is the Event index number. This contains the observed data for all the SAMOS sensors. The first line in this file contains the names of the sensors that were logged.
- METADATASENOSDESCRIPTION_NNN.CSV, where NNN is the Event index number. This file contains a list of all metaitems and the sensors that you connected to them when you created the event template.

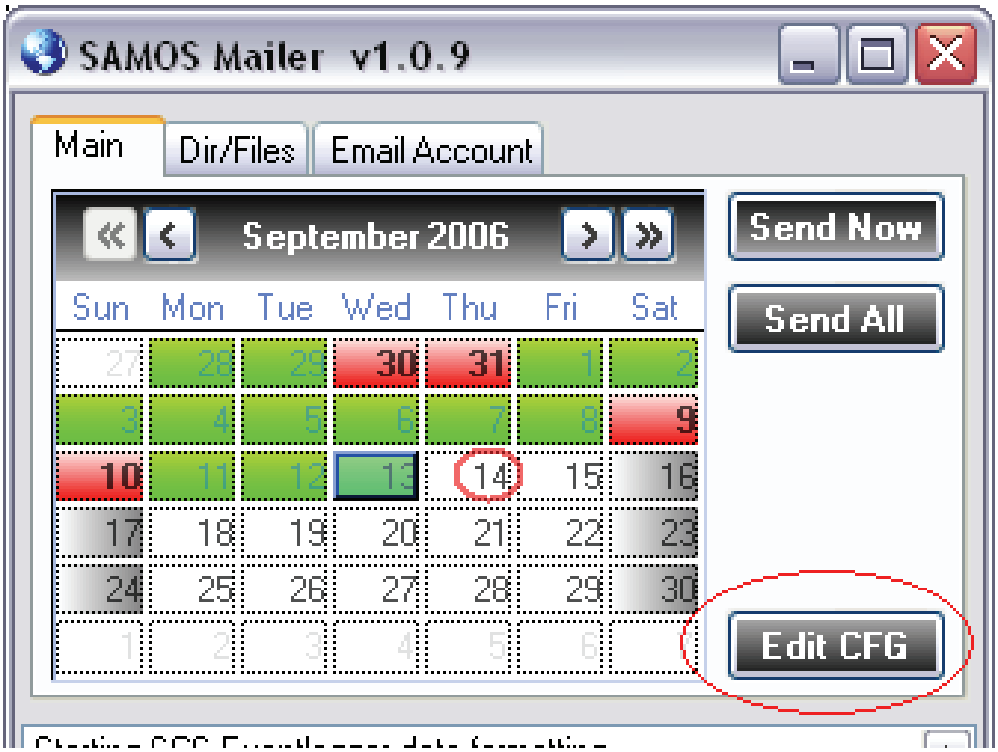
Running the SAMOS Event

- You should start the SAMOS Event as soon as you start ACQ; preferably as soon as possible after you leave port. Continue as long as you are at sea.
- The SAMOS Event Logger can be stopped at any time, for example if ACQ needs to be stopped. However to avoid large holidays in the data it should be restarted as soon as possible. This will create data files with different event index numbers, but the SAMOS mailer software will handle that easily.

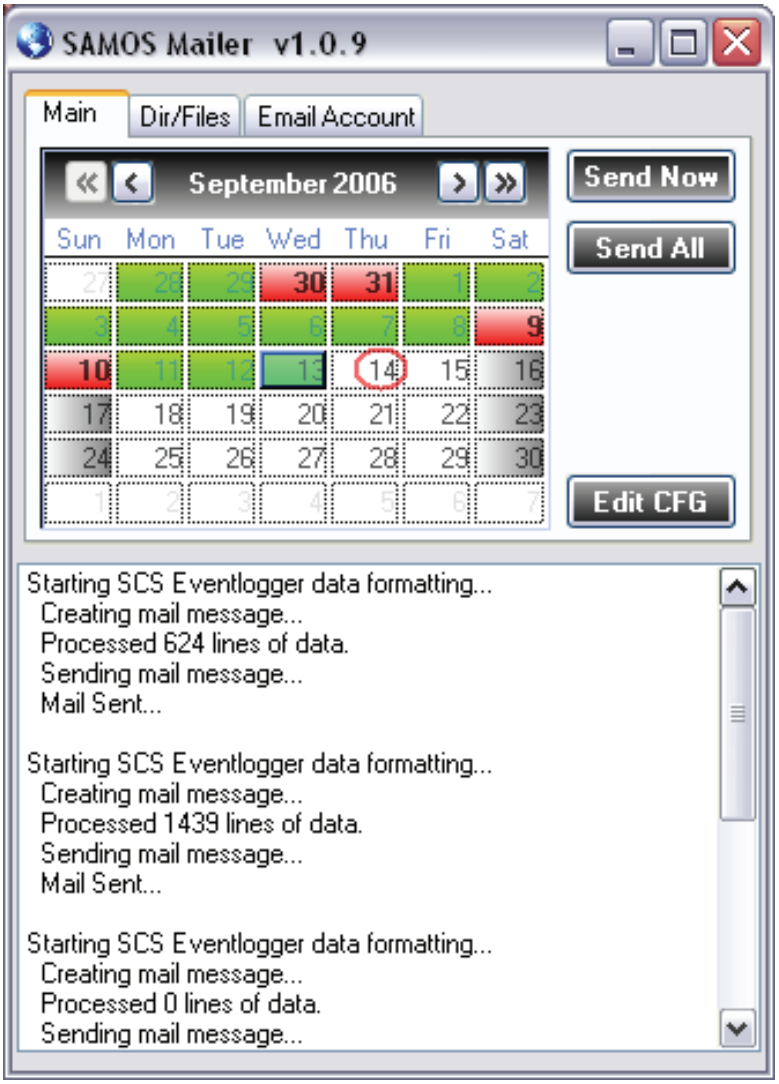
Operation of the SAMOS Mailer



The mailer app is run independently of the Event Logger. It may be brought up or down as needed during the cruise. The main window comes up like as shown below. The "Main" tab consists of a calendar, a few action buttons, and a log display.



Note: The configuration file can be edited from the Event Log Mailer by clicking on the Edit CFG button on the main tab.



Calendar

The calendar displays the current month with a red circle around the current day. All prior dates in which data was sent are set to green (see Sept 8th). If a date was missed, it is marked red (see Sept 9th).

You also use the calendar to navigate to previous dates using the arrow buttons displayed next to the month at the top of the calendar. You can select a prior date and using the 'Send' buttons as described below to email the data for that date.

The Action Buttons- Send Now and Send All

NOTE: The default operation of this app is to send an email of the previous day's data every day at 0001 GMT.

In addition, the two Send buttons allow for manual interaction with the SAMOS Mailer software. They are located on the Main screen tab; their results may be displayed in the log window.

NOTE: Use of these buttons does not affect the default operation of the app. Mail will always be sent at 0001 GMT.

The *Send Now* button sends data for the currently selected date on the calendar. It only sends the 24 hours of data for that date. This button is useful if data that was sent was not received, or if the data was corrupted for some reason. Also this button comes into play if data was never sent (red days on the calendar) to begin with.

In searching for past data, the Mailer searches through all versions of the file SAMOS-OBS_NNN.ELG ("NNN" here represents the SAMOS event's index number.

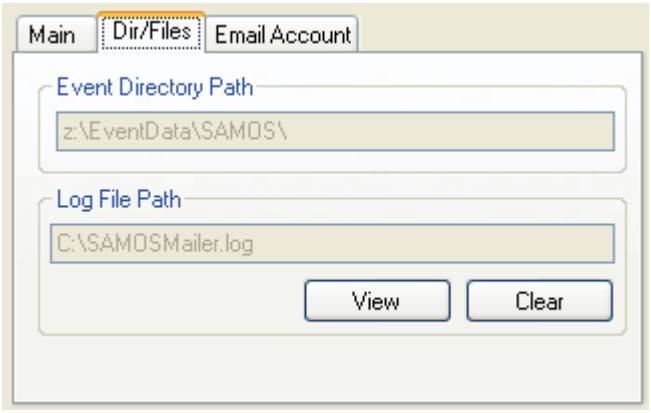
The *Send All* button sends ALL available data to the designated email address. The data in SAMOS-OBS_NNN.ELG is wrapped and sent, for *all* index numbers of this file.

NOTE: This may take some time to process and it may create an email which exceeds your server's size quota/limit.

As with the *Send Now* button, *Send All* does not impede the normal 'send cycle' (the previous day's data will still be emailed at 0001 GMT, regardless of whether you click this button).

This button opens up the SCS Configuration file editor. Unlike editing this file with the SCS Configuration File Editor app, this button provides that changes made to the file will be reflected in the SAMOS Mailer software immediately. A restart of the Mailer app is not necessary.

Dir/Files tab



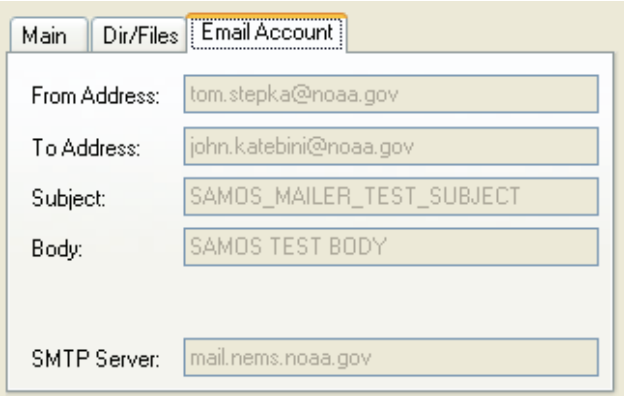
This tab displays information pulled from the SCS Configuration file. Namely the location of the SAMOS event logger data repository and the path to the log file.

Click on 'View' in order to view the complete log file. Click on 'Clear' to empty the log and start a fresh one.

Note: This is for display purposes only. To change values, please edit the SCS Configuration file as described above.

Email Account

The Mailer app generates email using the SMTP mail protocol.

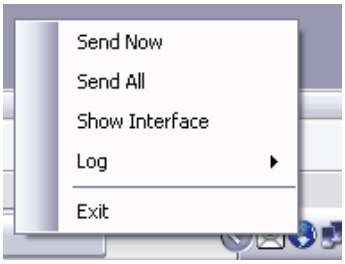


This tab displays information pulled from the SCS Configuration file; namely the settings regarding SMTP and mail information. The server, to/from email addresses, a subject and body are available for preview.

Note: This is for display purposes only. To change values, please edit the SCS Configuration file as described above.

System Tray

SAMOS Mailer resides mainly in the system tray. Since the software should run continuously and behind the scenes, you can always find its status and quick functions available via its icon of the globe. If the globe is blue then all is well, if however the globe is red, then a problem has been encountered within the last 24 hours and you might want to open the main interface or log to see if it is an issue.



Right click on the icon to access common functions.

The action buttons which send data are available, as well as access and control of the log. Clicking 'Exit' will exit SAMOS Mailer and stop the 'send cycle' for good until the software is restarted.

Note: When you click on the red X on the main interface, or attempt to close SAMOS Mailer in the normal ways, it will not close, simply minimize back to its system tray icon.

Data Processing

Reformatting the Data

The mailer reads the SAMOS_OBS data file and the Metadata Sensor Description file and combines them into the SAMOS formatted data file. Again the order of the sensors and the metaitems in these files is not important.

The name of this file is constructed from the ship's call sign and the date of the observations.

A typical line in the reformatted SAMOS file looks like this (line wrapping in effect here).

```
$SAMOS:001, CS:WTDM, YMD:20070301, HMS:143450, LAT:55.47518, LON:-160.41834,
GYRO:64.1, COG:, SOG:, RWDIR:225.25, RWSPD:5.95, TWDIR:, TWSPD:, RELHUM:59.3,
TSGTEMP:, TSGSAL:30.48, ATEMP:12.05
```

It is a series of comma delimited observations. Each observation consists of the Designator for the data type and the data value, separated by a colon. In addition to the sensors you defined there are two fields, "$SAMOS:001" and "YMD:20070301" generated by the mailer. The former contains the file format indicator, the latter contains the time of observation.

Each data file will contain data from one calendar day, 1440 lines in all.

Compressing the SAMOS File for Mailing

Before sending the data to the ship's mail server, it compresses the data into a ZIP file to save mailing costs. For 24 hours of data the ZIP file size is about 40K to 50K bytes, depending on the number of sensors.

Examining the ZIP File

The SAMOS mailer will always delete the ZIP file after the file is successfully sent to the mail server. If you have any questions on what is being mailed to shore you can examine the file by temporarily changing the destination mail address to yourself, as follows.

- On the SAMOS Mailer main window, click on the Edit CFG button. This opens the SCS Configuration File Editor app. You can also access the editor from the SCS Menu.
- Change the SAMOS_MAIL_TO parameter to your own email address.
- Save the file and exit the SCS Configuration editor app.
- Restart the SAMOS Mailer app.
- Conduct a test mailing by pressing the Send Now button or Send All button. You should now have the zip file in your in box as an attachment.
- Reset the SAMOS_MAIL_TO parameter appropriately.
- Restart the SAMOS mail app.