data summary

Southern Surveyor Voyage ss2013_v06
Underway

CSIRO

MARINE NATIONAL FACILITY

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ss2013_v06

Title

"**Integrated Marine Observing System (IMOS) Facility 3 Southern Ocean Time Series (SOTS) moorings for climate and carbon cycle studies southwest of Tasmania (47ºS, 140º E)**"

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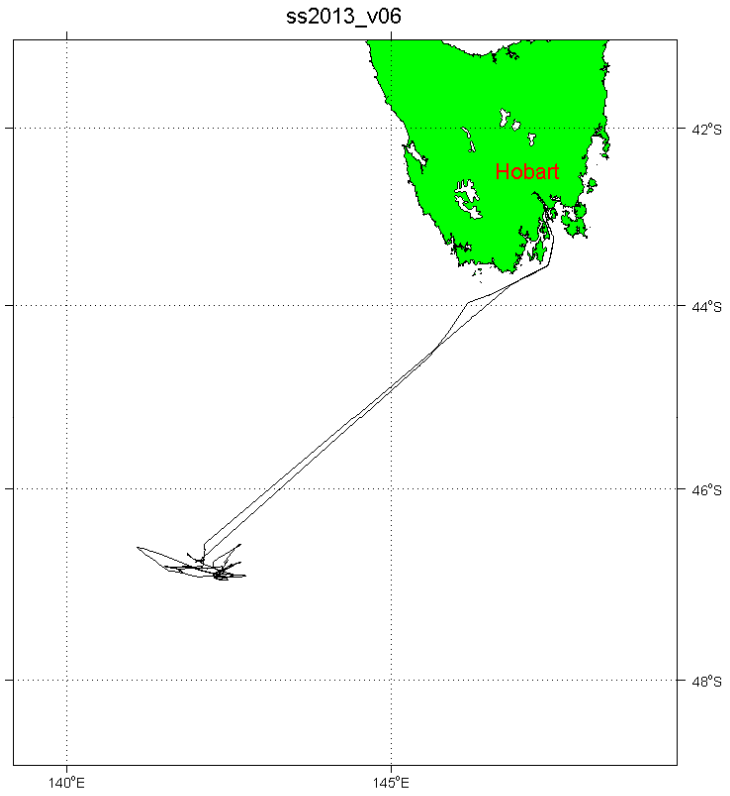
Ports

Depart*:* Hobart 0800hrs 07th October 2013
Arrive*:* Hobart 0800hrs 17th October 2013

Date

06-Oct-2013 21:03:00 to 16-Oct-2013 21:27:00 (UTC)

Voyage Track



Underway Data

Navigation data is acquired using the Seapath 200 position and reference unit, which is also differentially corrected by data from the FUGRO DGPS receiver.

The Meteorological data consists of 2 relative humidity and temperature sensors; a barometer, wind sensor, and licor light sensor.

Thermosalinograph data is acquired with a Seabird TSG and remote temperature by SBE 3T. Data from a flow meter is also recorded.

Digital depth data is recorded from a Simrad EK60 sounder.

Data from “IMOS” (Integrated Marine Observing System) sensors are also included. The sensors are port and starboard radiometers and pyranometers, wind speed and direction; rain and rainrate.

See Electronics report for this voyage for instruments used and their serial numbers.

Navigation, meteorological, thermosalinograph, IMOS and depth data are preliminary quality controlled by combining all data from hourly recorded files to 5 second values in a netCDF formatted file. The combined data is referred to as “underway data”.

A combined file was made on 29 Nov 2013 and final by running a Java application, written by Lindsay Pender of CMAR, UwyMerger version 1.8.0 with data time range of 06-Oct-2013 21:03:00 to 16-Oct-2013 21:27:00 (UTC).

Completeness and Data Quality

Navigation data (latitude and longitude, speed over ground, ship heading and course over ground); meteorological data (port and starboard air temperature, port and starboard humidity, wind direction and speed, maximum wind gust, light, atmospheric pressure, uncorrected wind direction, rain and speed) and IMOS data (port and starboard radiometers, port and starboard pyranometers, derived wind direction and speed, uncorrected wind direction and speed, rain and rain rate), thermosalinograph (salinity and water temperature) data were evaluated and quality controlled.

Processing Comments

A number of minor discrepancies between the port and starboard air temperature sensors were noted (max differences of about 0.4 degrees, otherwise both sensors gave very close reading with the mean absolute difference of about 0.08 degrees). These occurred usually during periods of rapid temperature increase or decrease. Investigation of these indicated that they have usually occurred when the ship was stationary with little wind or during/following periods of rainfall. This phenomenon has probably come about due to the rapid warming of the ships metal structure and air due to the ship becoming stationary or cooling of the air temperature due to the ship speeding off from stationary or due to the evaporation of rain water around the sensor housing. It is unclear as to why there should be a temperature differential between the port and starboard temperature sensors.

A similar discrepancy (max differences of about 6.2%) between the port and starboard humidity sensors was observed. It should also be noted that the port humidity sensor appears to give a lower reading with the mean absolute difference of about 1%. The recorded values are within instrument tolerance.

The courseOG values when the ship is stationary are not true values as the ship is not travelling a course however this is a feature of the current acquisition system. The QC flags have been set as good however this feature should be noted if the values during the stationary periods are to be used.

There were unusual spikes in the speedOG causing erroneous spikes in other derived data (i.e. windSpeed, maxWindGust, IMOSWindSpeed). Similarly there were some erroneous CourseOG, ShipHeading, longitude, latitude. All erroneous sensor data was set to NaNs and their QG flags set to {'bad','none','operatorFlagged'}.

The optical rain sensor (which provides IMOSRain and IMOSRainRate) was not functional during this voyage. Therefore IMOSRain and IMOSRainRate have been set to NaNs and their QG flags set to {'bad','none','operatorFlagged'}. The main mast rain gauge data (syphon rain gauge) has been accepted as good.

It was noted that values recorded by the IMOS port and starboard Radiometer and Pyranometer had a mean absolute difference of 2.29 and 15.16 W/m^2 respectively and in particular the port Radiometer values were mostly smaller than the starboard sensor.

The CTD calibration data for the primary conductivity sensor was obtained from the processed CTD file ss2013_v06002Ctd (i.e. CTD offset and scale: 0.000207948917416267, 0.9998486125348). This data was then used to derive the TSG salinity calibration against the calibrated CTD data.

Using CTD/TSG calibration run ss2013_v06001Ctd.nc with a TSG conductivity lag of 77.86, the salinity scaling factor of 1.000212662913605 was calculated against the primary CTD conductivity cell. This was then applied to the TSG salinity data from the start of the voyage until 10-Oct-2013 05:07 and the thermosalingraph salinity QC flag was set to {'good', 'manually adjusted', 'no error'}.

On 10-Oct-2013 05:07 the TSG failed (pls see ss2013_v06 computing/electronics report). This also disabled the seawater surface temperature (SST) recording for the remainder of the voyage.

An improvised CAP/CTD acquisition system was set up to enable the recording of salinity. This data was calibrated using the CTD calibration above and spliced into the underway salinity data. The salinity QC flag was set to {'good' ,'manually adjusted','no error'}. All erroneous salinity spikes were NaNed and the salinity QC flag set to {'bad','none','operatorFlagged'}.

TSG temperature (sensorTemp in the UWY netCDF) was recorded throughout the voyage. This sensor provides very similar values as the SST sensor. The sensorTemp data has been QCed for this voyage to assist in determining the approximate SST. However it is **crucial** to note that the sensorTemp (i.e. sea water temperature inside the TSG canister) is on average about 0.27 degrees warmer than SST. This is mainly due to the warming up of the sea water running through the pipe work on the ship.

The main gaps in the salinity data, following the TSG failure, are detailed below:

10-Oct-2013 05:07:55 to 12-Oct-2013 02:02:30
12-Oct-2013 13:46:20 to 12-Oct-2013 18:54:55
13-Oct-2013 08:22:35 to 13-Oct-2013 08:51:25
14-Oct-2013 04:54:15 to 14-Oct-2013 08:42:10
15-Oct-2013 03:35:45 to 15-Oct-2013 07:35:10

All the data during the above period are set to NaNs and the salinity QG flags set to {'bad','none', hardwareError'}.

Note: Depth data is no longer processed. The non QCed data is available in the underway data. QCed depth data could be obtained from processed Swath dataset for this voyage. Moreover please note that the EM300 centre beam depth is measured from the transducer rather than below the waterline. The transducer is 6.5m below the waterline.

Final Underway Data

The navigation, meteorological, thermosalinograph, IMOS and depth data will be entered into the CMAR divisional data warehouse. All data timestamps are in UTC.

Filename	Parameters	Resolution
ss2013_v06uwy10.csv	latitude, latitudeQC, longitude, longitudeQC, speedOG, speedOGQC, courseOG, courseOGQC, shipHeading, shipHeadingQC, uncorrWindDir, uncorrWindDirQC, uncorrWindSpeed, uncorrWindSpeedQC, waterDepth, waterDepthQC, portAirTemp, portAirTempQC, stbdAirTemp, stbdAirTempQC, portHumidity, portHumidityQC, stbdHumidity, stbdHumidityQC, windSpeed, windSpeedQC, maxWindGust, maxWindGustQC, windDir, windDirQC, PAR, PARQC, atmPressure, atmPressureQC, waterTemp, waterTempQC, salinity, salinityQC, IMOSStbdRadiometer, IMOSStbdRadiometerQC, IMOStbdPyranometer, IMOSStbdPyranometerQC, IMOSRainRate, IMOSRainRateQC, IMOSRain, IMOSRainQC, IMOSWindSpeed, IMOSWindSpeedQC, IMOSWindDir,IMOSWindDirQC, IMOSPortRadiometer, MOSPortRadiometerQC, IMOSPortPyranometer, IMOSPortPyranometerQC, IMOSUncorrWindSpeed,MOSUncorrWindSpeedQC, IMOSUncorrWindDir,IMOSUncorrWindDirQC rain, rainQC	10 seconds
ss2013_v06uwy5min.csv	Ditto 10 second data	5 minutes

References

Subversion repository version of DPG Matlab generic tools 3974
Pender, L., 2000. Data Quality Control flags.
http://www.marine.csiro.au/datacentre/ext_docs/DataQualityControlFlags. Pdf

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