

data summary

Southern Surveyor Voyage ss2010_t02



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ss2010_t02

Title

“Deep-water benthic biodiversity of the GAB Marine Park”

Principal Investigators

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Ports

Original schedule:

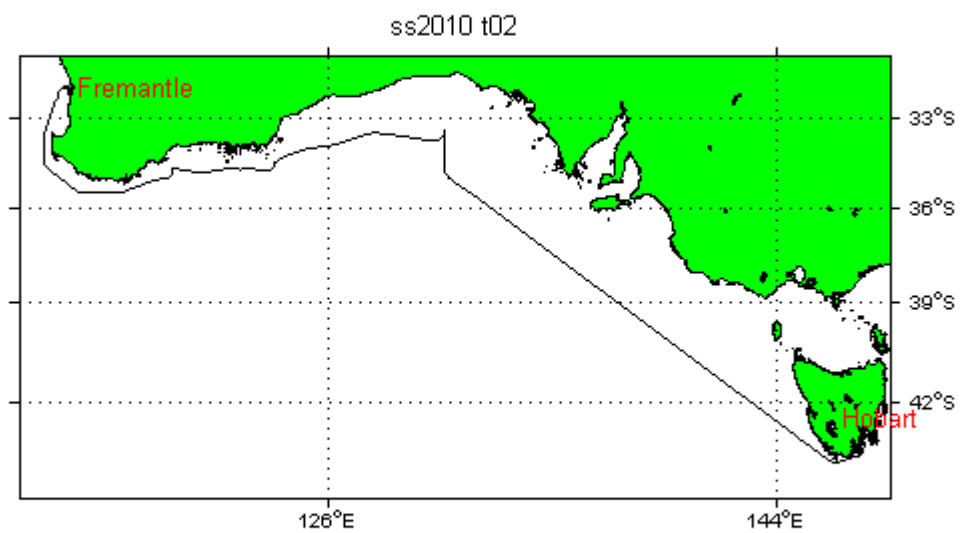
Depart Fremantle 1600hrs, Tuesday 10 August, 2010

Arrive Hobart 1600hrs, Friday 20 August, 2010

Date

10-Aug-2010 09:15 to 19-Aug-2010 22:00 (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. Echograms are also recorded using SonarData's Echolog software. Digital depth data can be re-picked using SonarData's Echoview software.

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 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 07-Mar-2011 by running a Java application, written by Lindsay Pender of CMAR, UwyMerger version 1.3 with data time range of 10-Aug-2010 09:15 to 19-Aug-2010 22:00 (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 and depth 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 0.6 degree otherwise both sensors gave very close reading with the mean absolute difference of about 0.038 degree). 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 air due to the ship becoming stationary or cooling of the air temperature due to the evaporation of the rain water around the sensor housing. It is unclear as to why there should be a notable temperature differential between the port and starboard temperature sensors.

A similar discrepancy (max differences of about 8.47%) between the port and starboard humidity sensors was observed. It should also be noted that the starboard humidity sensor

appears to consistently give a higher humidity reading with the mean absolute difference of about 1.37%. The recorded values appear to be within instrument tolerance.

A number of rapid temperature changes were noted (e.g. rise or drops of around 3-5 degrees during a short period of time) for both port and starboard temperature sensors.

These rapid temperature changes were most likely due to the warming up effect of the ship's metal structures and/or the engine exhaust blowing over the sensors, when the wind is blowing on the stern of the ship or the ship is stationary with little wind or being hit by a cold/warm front. The sensor values for the ship speed, uncorrected wind direction, wind speed and port/starboard temperature were closely examined for correlation and the following two conditions were identified as usually prevalent during the periods of rapid temperature changes (in particular temperature rise):

- 1) The ship stationary with no or low wind speed in the region of 5 knots blowing on the stern (i.e. uncorrected wind direction around 135 to 225 degrees).
- 2) The ship cruising at about 8-10 knots with wind speed in the region of 10-40 knots blowing on the stern (i.e. uncorrected wind direction around 135 to 225 degrees).

Periods of rapid changes are suspect for reasons highlighted above, otherwise the data is good.

The speedOG data appeared much noisier and more fluctuating than usual. This was investigated and attributed to the lack of DGPS (Differential GPS). A peak speedOG of 18.25 knots and occasional fluctuation in the region of 10 knots in 5 seconds was noted; given the capabilities of the Southern Surveyor, such values are improbable. This variability in the speedOG data is most likely due to the inaccuracies with the standard GPS and the rolling of the ship. The speedOG data was left as is with its QC flag set to {'suspect', 'none', 'userDefined'}. It is recommended that the speedOG data is used with reference to the Doppler velocity log that records the ships speed through water. The Doppler velocity log name is 'shipsLog' in the netCDF underway file (ss2010_t02uwy.nc). It should be noted that Doppler velocity is not QCed as part of the underway processing and there can be obvious anomalous spikes in this data. However as this data is less noisy than the recorded speedOG it could provide a point of reference when using the speedOG data.

The wind speed had a number downward spikes. These were investigated and the cause was attributed to anomalous raw wind direction data. The wind speed is derived from uncorrected wind speed and wind direction plus a few other parameters. Examination of the underlying data revealed possible anomalous wind direction data which coincided with the downward spikes in the derived wind speed. Most of the obvious anomalies were manually set to NaN with their QG flags set to {'bad','none','operatorFlagged'}. However due to the numerous number of spikes throughout the data it was not possible to ascertain if they were all caused due to the wind direction anomaly or not. Therefore due to this uncertainty it was decided to keep the rest of the data and its QCflag left in its initial {'noQC','none','preliminary'} state, otherwise the data is of good quality. Similarly 'uncorrWindDirQC', 'uncorrWindSpeedQC', 'windDirQC', 'maxWindGust' have been left in their original {'noQC','none','preliminary'} state without any processing.

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.

The readings from the foremast IMOSRain sensor (which is an optical type) when available, was notably higher than the readings from the foremast funnel/siphoning type rain sensor.

This was initially considered to be unusual because the optical IMOSRain sensor reading was expected to be similar to those from the foremast funnel/siphoning sensor. However, further investigation of this issue across a number of voyages indicated a very close correlation between periods of strong winds or rough sea/swells and the times that the optical IMOSRain sensor recordings indicated significantly higher rain level than the foremast funnel/siphoning rain sensor. It is suspected that the higher IMOSRain sensor recordings are due to water spray from the breaking of waves against the bow of the ship and wind-carried spray from the rough seas which are more likely to interrupt the optical sensor beam path and less likely to enter the funnel at the top of the funnel/siphoning sensor. The foremast rain sensors are virtually co-located.

It was noted that IMOS starboard Radiometer recordings were mostly about 3 (W/m^2) greater than the port Radiometer recordings throughout the voyage.

The depth data was re-picked using Sonar Data's Echoview software. Due to incorrect system settings occasionally no echogram data was recorded and therefore depth data could not be ascertained and QCed using echograms. Periods without echograms data were QCed using swath centre beam depth data whenever available. Two main periods where swath data was used for QCing the depth were on 12/8/2010 from 11:21 to 16:01 and from 16/8/2010 04:40 to 19/8/2010 00:49.

During the processing of recent voyages TSG/CTD calibration runs, the examination of the overlapped salinity plots have shown a notable discrepancy in the TSG salinity relative to the CTD salinity. The investigation of this anomaly has not been conclusive so far. However examination of TSG data has revealed that if the TSG conductivity is advanced by about 32 seconds relative to the TSG sensor temperature, when calculating the derived salinity, a significant improvement in TSG salinity relative to the CTD salinity is obtained. Whilst this issue is being investigated further, a conductivity lag correction factor is introduced as part of TSG calibration and utilised for the calculation and processing of TSG salinity. This lag factor is henceforth documented in this processing report.

The CTD calibration data for the primary sensor was obtained from file ss2010_t02005Ctd (i.e. CTD offset and scale factor of 0.000251943616596544, 0.999759315267028). This data was then used to derive the TSG salinity calibration against the calibrated CTD data. Using CTD/TSG calibration run in CTD ss2010_t02002tsgCtd.nc and ss2010_t02003tsgCtd.nc with a TSG conductivity lag of 32 seconds, an averaged salinity scaling factor of 1.000332555125775 was calculated for the CTD primary conductivity cell. This scaling factor was applied to the TSG salinity data and the thermosalinograph salinity QC was set to { 'good' , 'manually adjusted' , 'no error' }.

Note: All 2010 underway voyage data is acquired and preliminary processed by the TECHSAS and uwyMerger acquisition system respectively. It should further be noted that the following data and their QC flags are not supported in the TECHSAS/uwyMerger acquisition system: maxWindGustDir, maxWindGustDirQC, IMOSMaxWindGust, IMOSMaxWindGustQC, IMOSMaxWindGustDir, MOSMaxWindGustDirQC.

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
ss2010_t02uwy10.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, IMOSStbdPyranometer, IMOSStbdPyranometerQC, IMOSRainRate, IMOSRainRateQC, IMOSRain, IMOSRainQC, IMOSWindSpeed, IMOSWindSpeedQC, IMOSWindDir,IMOSWindDirQC, IMOSPortRadiometer, MOSPortRadiometerQC, IMOSPortPyranometer, IMOSPortPyranometerQC, IMOSUncorrWindSpeed,MOSUncorrWindSpeedQC, IMOSUncorrWindDir,IMOSUncorrWindDirQC rain, rainQC	10 seconds
ss2010_t02uwy5min.csv	Ditto 10 second data	5 minutes
ss2010_t02pdr10.csv	latitude, latitudeQC, longitude, longitudeQC, waterDepth, waterDepthQC	10 seconds

References

Subversion repository version of DPG Matlab generic tools 1488

Pender, L., 2000. Data Quality Control flags.

http://www.marine.csiro.au/datacentre/ext_docs/DataQualityControlFlags.Pdf

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