data summary

Southern Surveyor Voyage ss2011_v06

CSIRO

MARINE NATIONAL FACILITY

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ss2011_v06

Title

"The Perth Abyssal Plain: Understanding Eastern Gondwana Break-up"

Principal Investigators

Dr Simon Williams (Chief Scientist) – University of Sydney

Email: Simon.Williams@sydney.edu.au Phone: 0415 180 182

Ports

Original schedule (local time):

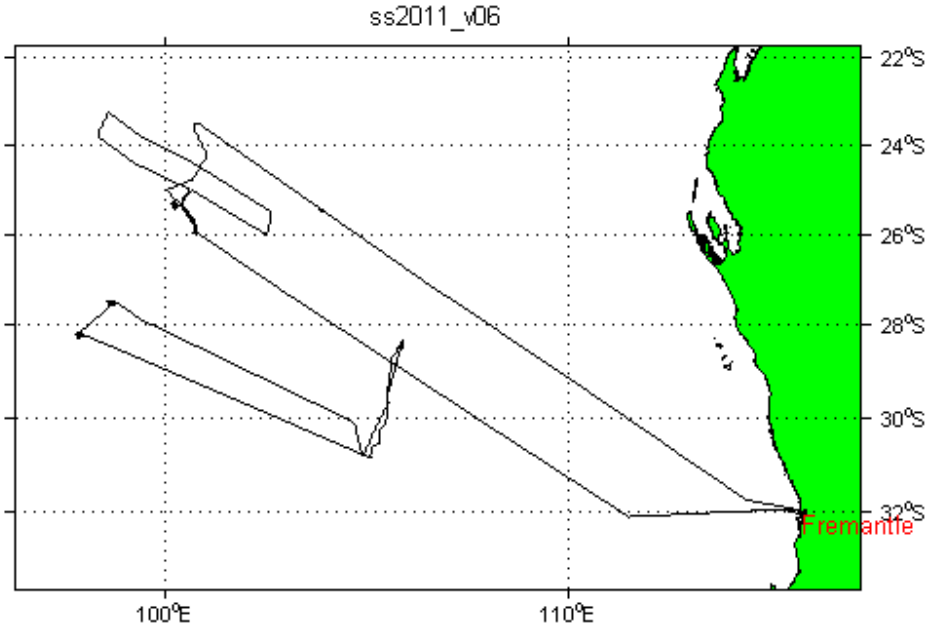
Depart: Fremantle (changed from Geraldton) 1400hrs Thursday 20 October 2011

Arrive: Fremantle 0800hrs Wednesday 9 November 2011

Date

20-Oct-2011 07:23 to 08-Nov-2011 23:50 (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 7 March2012 by running a Java application, written by Lindsay Pender of CMAR, UwyMerger version 1.3 with data time range of 20-Oct-2011 07:23 to 08-Nov-2011 23:50 (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 1.36 degrees, otherwise both sensors gave very close reading with the mean absolute difference of about 0.04 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 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 6.37%) 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 0.95%. 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 indentified 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 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 wind speed had a number downward spikes. These were investigated and the cause was attributed to apparent anomalous raw wind direction (uncorrWindDir) 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 raw wind direction data which coincided with the downward spikes in the derived wind speed.

After careful consideration of this problem by MNF electronics support, it was suggested that this is simply a phenomenon associated with disturbed airflow when the wind is generally from the stern of the vessel and the fact that this sensor is a wind vane or "weather-cocking" type (rather than ultrasonic).

Therefore obvious identifiable windSpeed spikes were manually set to NaN along with the corresponding values for uncorrWindDir, uncorrWindSpeed, windDir and maxWindGust with their QG flags set to {'bad','none','operatorFlagged'}. The QCing process was undertaken with reference to IMOSWindSpeed sensor.

It was noted that IMOS starboard Radiometer recordings were mostly about 1.87 (W/m^2) greater than the port Radiometer recordings throughout the voyage.

Whilst the IMOS rain and IMOS rainRate both recorded zeros throughout of the voyage the main mast rain gauge (syphon rain gauge) had recorded non zero values. There was nothing reported in either the Computing or the Electronics report for this voyage with regard to IMOS rain sensors. However, this problem was spotted during the next Southern Surveyor voyage (ss2011_t04) and the following notes were made in the Electronics report:

["It was noticed on November 18 when quite deal of rain fell that there was no rainfall displayed on the system. Further investigation showed that the Syphon Rain Gauge was working ok but was not being displayed. The Optical Rain Gauge however was not sending out a data stream. Efforts were made to restart the controller software for this sensor with no result. A power cycle also failed to re-start the instrument. It seems that the problem is most likely in the electronics package up the foremast. A task for the Hobart Port period."].

It was subsequently discovered, during port period maintenance, that there was a bad/lose connector to the IMOS rain sensor.
Therefore the whole data for IMOS rain and IMOS rainRate have been set to NaNs with their QG flags set to {'bad','none','operatorFlagged'}. The main mast rain gauge (syphon rain gauge) data has been accepted as good.

The depth data was re-picked using Myriax Echoview software.
Large portion of depth data was missing due to incorrect setting of the 12Khz sounder. The depth echograms greater than 1800m deep was missing for the initial part of the voyage (from 20-Oct-2011 13:10 until 29-Oct-2011 13:32), similarly echograms for depth greater than

5000m were also missing and therefore it was not possible to QC such depths and they have been set as NaNs. It should however be noted that the original raw unQCed depth data is available in the netCDF file as rawDepth and could be accessed if need be.
The notable approximate periods without QCed depth data are listed below:

20-Oct-2011 13:10:35 to 29-Oct-2011 13:32:25
29-Oct-2011 17:36:15 to 29-Oct-2011 20:19:30
30-Oct-2011 20:35:20 to 30-Oct-2011 22:24:10
04-Nov-2011 17:08:50 to 04-Nov-2011 19:52:05
05-Nov-2011 14:27:45 to 05-Nov-2011 19:13:30
06-Nov-2011 12:10:35 to 06-Nov-2011 13:27:30
06-Nov-2011 14:02:45 to 07-Nov-2011 01:09:25
07-Nov-2011 01:36:40 to 07-Nov-2011 20:39:35

NO CTDs were performed during this voyage, therefore the TSG calibration factor from the next voyage, ss2011_t04, was used. Hence, TSG salinity scaling factor of 0.999739154978439 along with the conductivity lag of 40 seconds was applied to the TSG salinity data and the thermosalingraph salinity QC was set to {‘good’ ,‘manually adjusted’,‘no error’}.

The waterTemp sensor was very noisy from time to time. The noisy data has been set to NaNs with their QG flags set to {'bad','none','operatorFlagged'}. For such period without good waterTemp data reference could be made to the TSG sensorTemp (in the netCDF file) which provides a good approximation to the waterTemp data with an averaged offset of -0.22845.

Note: All 2011 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
ss2011_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,	10 seconds

	IMOSStbdRadiometerQC, IMOStbdPyranometer, IMOSStbdPyranometerQC, IMOSRainRate, IMOSRainRateQC, IMOSRain, IMOSRainQC, IMOSWindSpeed, IMOSWindSpeedQC, IMOSWindDir,IMOSWindDirQC, IMOSPortRadiometer, MOSPortRadiometerQC, IMOSPortPyranometer, IMOSPortPyranometerQC, IMOSUncorrWindSpeed,MOSUncorrWindSpeedQC, IMOSUncorrWindDir,IMOSUncorrWindDirQC rain, rainQC	
ss2011_v06uwy5min.csv	Ditto 10 second data	5 minutes
ss2011_v06pdr10.csv	latitude, latitudeQC, longitude, longitudeQC, waterDepth, waterDepthQC	10 seconds

References

Subversion repository version of DPG Matlab generic tools 3427
Pender, L., 2000. Data Quality Control flags.
http://www.marine.csiro.au/datacentre/ext_docs/DataQualityControlFlags. Pdf

Processed by: A Sarraf , CSIRO Marine and Atmospheric Research, Hobart, Tasmania, Australia