Cruise 2009-006 SWL

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Germaine Gatien is processing the data set. This is a summary of the RINKO data in comparison to the SBE43 oxygen. There is currently no need to process or archive the RINKO data as the SBE43 is the primary oxygen and does not appear to have any issues.

Sensors

Rinko SN 5 (cal 25 June 2009) and SBE43 SN1438 (cal 3 Feb 2009)

SBE43 Oxygen

Processing included a 2.5 second lag in align, oxygen tau correction (variable lag based on pressure and temperature), oxygen hyseterisis correction (based on pressure and temperature?) and calibration to bottle data.

RINKO Oxygen

Applied Alec program RINKO.m to calculate percent saturation using Rinko voltage, and SBE temperature, salinity and depth. Next, after finding concentration of 100% saturation from given SBE temperature and salinity (using Gordan and Garcia equation) convert the percent saturation to concentration .

Comparison of SBE43 and RINKO oxygen

* The concentration difference between sensors is not quite linear, perhaps quadratic or log might be best.
  + At 9ml/l RINKO oxygen is less than SBE oxygen by 0.7ml/l
  + At 7ml/l RINKO oxygen is less than SBE oxygen by 0.4ml/l
  + At 0ml/l RINKO oxygen is less than SBE oxygen by 0.05ml/l
* Rinko temperature is unreliable with a shift of -4C mid-cruise. This difference changed oxygen by about 1.0 ml/l in the top 100m. So best to continue to use the SBE temperature.
* To match the SBE43 oxygen, the Rinko volts needs to be lagged by ~-3 dbar (ie the downcast profile is moved towards the surface) before calculating oxygen.

With FIGURES

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At 7ml/l RINKO oxygen is less than SBE oxygen by 0.4ml/l

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Figure 1. Units are ml/l. Difference is SBE43 - RINKO. RINKO is calculated using the SBE temperature.

1. Rinko temperature is unreliable with a shift of -4C mid-cruise. This difference changed oxygen by about 1.0 ml/l in the top 100m. So best to continue to use the SBE temperature to calculate RINKO oxygen.

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Figure 2. SBE CTD temperature.

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Figure 3. RINKO temperature. Shift of -4C (easy to see in the deeper water) is not real.

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Figure 4.This is the difference between RINKO oxygen calculated with the RINKO temperature and the SBE43 oxygen. Compare this figure with the earlier figure to see change in oxygen concentration. The shift in the green casts at 6ml/l is about -0.7ml/l, and the shift in the red casts at 9ml/l is about 1 ml/l.

1. To match the SBE43 oxygen, the Rinko volts needs to be lagged by about -3 dbar (ie the downcast profile is moved towards the surface) before calculating oxygen.

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Figure 5. Comparison of SBE 43 oxygen (solid lines) and RINKO oxygen (dotted lines). Units in ml/l

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Figure 6. Comparison of SBE 43 oxygen (solid lines) and RINKO oxygen (dotted lines). Unilt in ml/l.