



Voyage ss2012_t01

Expendable BathyThermograph (XBT) fall-rate experiments using XBT and Conductivity/ Temperature/ Depth (CTD) profiler intercomparisons

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As a result of this voyage:

1. We have a better understanding of the historical fall rate of Expendable BathyThermographs (XBTs), which are routinely used for upper-ocean temperature measurements by science agencies (such as CSIRO) and Navies worldwide. The XBT is a simple instrument with a thermistor in the nose that measures temperature as the probe falls through the water, passing the information to the surface via a thin copper wire. Calculation of the depth is based on a fall-rate equation. Variations in manufacture over time have resulted in variations in fall rate in the XBT. The data collected from XBTs since they were first used in 1966 comprises some 18% of available ocean temperature data. Since the historical ocean temperature record is used in modelling for climate prediction and estimates of sea-level rise, errors in the XBT data can have a large impact on these calculations. We will be able to use the results of these XBT/CTD intercomparisons to help pin down estimates of XBT fall rates from 1983-2003 for some Sippican probe types, and hence provide a correction to the historical XBT data set.
2. We have found that the construction of the older XBTs (pre-2003) results in a larger number of failures since the copper wire in these older probes easily tangles during shipping. When an XBT fails due to cracks or kinks in the copper wire, the temperature profile tends warm. This false warming, if not removed from the historical data record, can result in warmer estimates of ocean temperature. More modern probes have a better construction, resulting in less warm failures.
3. We will be testing a method of determining the fall rate of XBTs using the depth sounder and 'hit bottom' signals on the XBT trace. By comparing the depth sounder information with this signal, we can estimate the fall rate. We will also use a well-known method of determining the fall rate of XBTs by using the CTD data and comparing the small changes in temperature with depth between the two instruments. Each method has its' advantages and disadvantages, and by using a combination of both, we will be able to utilise all the results, including from the failed XBTs.

Itinerary

Departed Hobart
17:00 Wednesday 11 April 2012
Arrived Brisbane
15:00 Wednesday 18 April 2012

> Voyage track ss2012_t01

