

## **Deep Ocean Workshop: Observed and model-simulated property changes in the deep ocean of the Southern Hemisphere**

**21-23 June, 2010 Hobart, Australia**

The deep ocean is a significant component of the Earth's climate system. The world's abyssal ocean properties reflect the formation processes of dense water masses of the high latitude Southern and North Atlantic Oceans. The deep oceans play a crucial role in setting the rate and nature of global climate change and variability through their moderation of the planetary heat, freshwater and carbon budgets. Following on from WOCE/JGOFS the international community is conducting decadal repeat surveys of selected hydrographic sections. These sections provide the only global data for assessment of changes in the deep ocean below 2000m. Synthesis of these recent decadal property changes is needed at global and regional scales for consideration in the IPCC AR5.

The property changes observed by the hydrographic time series data indicate how the deep overturning circulation and anthropogenic tracer uptake is responding to changes in surface forcing (warming, freshening, winds, and ice melt). The majority of IPCC AR4 20<sup>th</sup> century simulations produce a warming rate that is too slow, and an unrealistic vertical distribution of heating due to global warming. Comparisons of models against global and regional data sets are needed to gain confidence in model projections and to help improve model simulation of climate variability by informing the development of coupled climate and decadal models.

Accurate estimates of the total sea level budget must include all components of the earth system that contribute to sea level rise. The deep ocean component (below the 2000-m sampling depth of Argo) of the observed sea level budget is highly uncertain. Comparison of repeat hydrographic sections has revealed statistically significant warming of the abyssal oceans. While the sparse data makes quantification of these changes difficult, they do appear large enough to be significant contributors to global heat, and sea level budgets. Carbon storage in the deep ocean is also uncertain. Accurate simulation of the abyssal ocean properties and circulation in climate models will enable us to use models to explore the processes governing the deep ocean warming, freshening, and carbon sequestration needed to provide reliable projections of global and regional carbon and sea level budgets.

This workshop will bring together scientists working on observational analyses and model simulations of abyssal water property changes originating in the Southern Ocean and spreading northward into the Indian, Pacific, and Atlantic Oceans. Synthesis manuscripts of changes are an expected outcome for consideration as input to the IPCC AR5 report. The workshop will also provide stimulus for future model and observation comparison studies, and consider improvements needed in global deep ocean observational systems and model simulations.

## **WORKSHOP DETAILS**

Date: 21-23 June, 2010

Place: Hobart, CSIRO Marine and Atmospheric Research (CMAR).

### **Workshop Format**

Day 1 and pre-lunch Day 2 will consist of short 15 - 20 minute presentations from workshop participants. These presentations will inform all participants of the individual's current and near-term research directions. These presentations will encompass the physical, chemical, and circulations changes of the Southern Hemisphere deep ocean, including changes in the formation and properties of Antarctic Bottom Water, from observation and models.

Significant discussion time will be allocated after the presentation sessions to allow for cross-cutting discussions among participants.

Afternoon Day 2 and Day 3 will be devoted to forming synthesis teams, then defining and allocating tasks needed to complete synthesis manuscripts.

The final agenda for the meeting will be determined once we have a confirmed list of workshop participants.

### **FUNDING**

CSIRO and the Wealth from Ocean National Research Flagship have provided funds to cover accommodation and per diem for approximately 25 participants.

Cost of travel to and from Hobart will need to be covered by workshop participants. However, to enhance graduate student and junior research scientist involvement, the workshop will provide funds for airfares for approximately 5 leading young scientists. Young scientists applying for travel support should send a CV and letter explaining research interests in deep ocean change to Bernadette Sloyan. The organising committee will consider all requests for travel support and notify successful applicants by 9 April 2010.

### **To Attend Workshop**

Email Bernadette Sloyan ([Bernadette.Sloyan@csiro.au](mailto:Bernadette.Sloyan@csiro.au)) to register as a participant of the workshop, please include the title of your presentation and research interests. Registration will close on 31 March 2010.

### **Workshop Organising Committee**

Bernadette Sloyan, CMAR

Bronte Tilbrook, CMAR

Greg Johnson, PMEL

Chris Sabine, PMEL