Voyage ss2010_v01

PINTS – Primary Productivity Induced by Nitrogen and Iron in the Tasman Sea. Role of iron and other micronutrients in controlling primary productivity in the Tasman Sea: bioavailability, biogeochemical cycling and sources

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Contribution to Australia's national benefit:

This research took place in the Tasman Sea, an area representing an important economical value both in terms of fisheries and recreational use. In addition, the Tasman Sea is predicted to be one of the most sensitive marine areas to temperature increases under IPCC climate change scenario. It is therefore urgent to understand the functioning of the Tasman Sea, a first step towards predicting its response to climate change.

The major outcome of this research will be a better understanding of the dynamics of the Tasman Sea undercurrent and future conditions, focused on the link between nutrient sources, availability and their impact on marine algae.

Marine algae are pivotal for the functioning of marine systems; they are the base of the food web and thus support fish stocks. In addition, marine algae can influence the Earth's climate. These small organisms are responsible for 30%-50% of the biological uptake of atmospheric CO_2, an important greenhouse gas.

Nitrogen and iron are present at low level in the Tasman Sea and are amongst the main factors controlling marine algal biodiversity and biological CO_2 uptake in the world oceans. This research promoted cross-disciplinary scientific collaborations at national and international levels to understand the role of these pivotal nutrients on oceanic algal biodiversity and biological CO_2 uptake, a research area that is still in its infancy. The research associated with this oceanographic voyage will contribute to the National Research Priority – An Environmentally Sustainable Australia: Sustainable Use of Australia's Biodiversity.

Scenarios relevant to possible climate evolution were also studied on marine algae and aquatic chemistry. Both current and increased levels of atmospheric CO_2 and atmospheric dust deposition were studied. Dust enrichment of the Tasman Sea mimicked the scenario of a dryer central Australia, promoting dust storm events such as the one recently experienced in Sydney, Canberra and Brisbane.

Since marine algae are intimately associated with CO_2 drawdown from the atmosphere to the ocean, the outcomes from our work can enable better representation and validation of biogeochemistry (e.g. carbon cycle and its feedbacks), facilitating discovery and modelling of key oceanic processes that drive Australian climate for improved climate predictions. As such, outcome of this research is related to the National Research Priority: Responding to Climate Change and Variability.

By improving the knowledge and management of sensitive Australian resources (Tasman Sea), as well as investigating new insights on how nitrogen and iron in the ocean can mitigate our climate, this project will also benefit human society in a broader sense.

Finally, the research on the RV *Southern Surveyor* is a GEOTRACES process study. GEOTRACES is an international scientific program (www.geotraces.org), promoting a decade long study of trace elements to identify and quantify fluxes that control their distributions in the ocean and establish the sensitivity of these distributions to changing environments. This project thus contributes to a larger global effort to advance oceanic biogeochemistry.

Itinerary

Departed Sydney,
Saturday 23 January 2010

Arrived Hobart, 17:30,
Monday 15 February 2010

> Transit voyage track ss2010_v01