Voyage ss2009_v06

Perturbation Flow Processes Over Seamounts in the East Australian Current Outflow in the Tasman Sea

Professor Jason Middleton (Chief Scientist), University of New South Wales

Contribution to Australia's national benefit:

The aim of this project was to investigate flow perturbations over and around seamounts in stratified waters. The moderate currents of the East Australia current outflow impinging on seamounts in the Tasman Sea provide a unique laboratory for the study of oceanic stratified flows over and around topographic features. This study is significant as a study in fundamental physical oceanography in its own right because of the complexity of stratified rotating flows over topography, the need to accurately encapsulate such effects in regional and larger scale models and because of the implications of nutrient uplift to biological productivity. This work will build substantially on that undertaken during Voyage SS09/2006 where we studied flow perturbations around reefs and islands of the Lord Howe Rise. In this project we utilise both modelling and field work approaches.

As a result of this voyage:

1. We have thoroughly documented observations of the flow properties incident to, over, around and in the wake of a large seamount embedded in a strong baroclinic oceanic flow.
2. While we have not yet had time to digest all of the implications of the salient features it is clear that the presence of the large seamount in the strong current induces processes including:
   - Upwelling in the incident flow upstream of the seamount.
   - A depression of isotherms in the flow over the seamount top.
   - A further raising of isotherms downstream of the seamount top.
   - Recirculating wake flows downstream of the seamount at depth.
   - Strong vertical shear in horizontal velocity just below the level of the seamount top.
   - Constant temperature layers in the wake probably due to vertical and horizontal mixing due to shear instabilities.
   - Internal waves and internal tides emanating from the Seamount sides.

Itinerary

Departed Sydney, 09:00, Thursday 29 October 2009

Arrived Sydney, 09:00, Monday 9 November 2009

>Transit voyage track ss2009_v06