



Voyage ss2012_v06

Tectonic framework for the easternmost Coral Sea and northern extent of the Lord Howe hotspot

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Contribution to Australia's national benefit:

The eastern Coral Sea is a little explored part of the SW Pacific with an incomplete and poorly understood tectonic evolution. The aim of ss2012_v06 was to develop a tectonic framework for the eastern Coral Sea by obtaining gravity, magnetic and bathymetric data and targeted dredge samples to address: 1. the nature and age of the crust of the ridges and plateaus in the area; 2. the age and spreading histories of the two basins in the area and explore whether they share a common history; and 3. the northernmost extent of the Lord Howe hotspot.

The scientific aims of the voyage were achieved through the collection of 14 (out of 18) dredges that recovered useable samples from the Rennell Ridge, West Torres Plateau, South Rennell Trough, Loyalty Ridge, Le Noroit Seamounts, Bellona Plateau and Fairway Ridge. Continental rocks were recovered from the Le Noroit Seamounts and Fairway Ridge providing constraints on the geological history of eastern Australia. Volcanic rocks recovered from the Rennell Island Ridge, West Torres Plateau and South Rennell Trough will help constrain the Cenozoic extensional history of the area. Three full and four partial magnetic profiles in the Santa Cruz Basin and four full profiles across the d'Entrecasteaux Basin will help determine opening rates and timing, particularly since we can now confirm that each basin has a distinct spreading history.

This project contributes to Australia's national benefit under National Research Priority Goal 1.6, developing deep earth resources, by mapping areas of

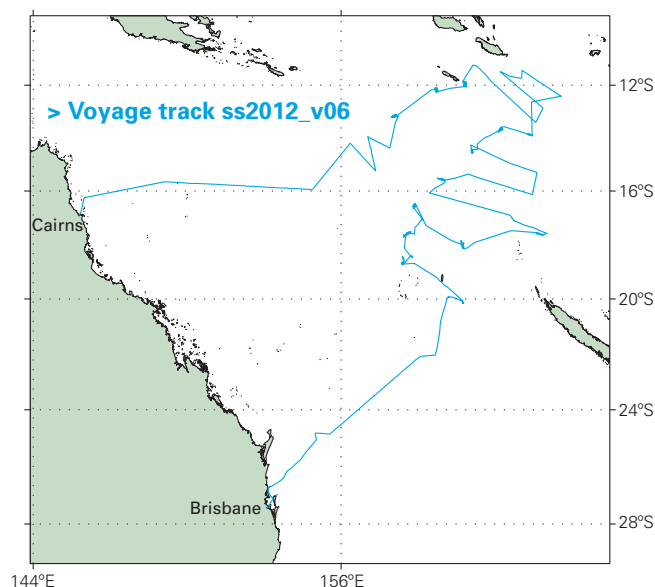
unexplored seafloor to the northeast of Australia. The continental rocks recovered from the Fairway Ridge are potentially the first continental rocks from the Lord Howe Rise, a prospective frontier hydrocarbon region. In addition, a minor result of the voyage, namely the "undiscovery" of Sandy Island captured the attention of the Australian public (most read story of 2012 in the Sydney Morning Herald) highlighting the genuine interest of the public in marine scientific research.

As a result of this voyage:

1. We have found the first continental rocks from the Le Noroit Seamounts and Fairway Ridge and extensive volcanic rocks along the Rennell Island Ridge, West Torres Plateau and South Rennell Trough from a Cenozoic extensional event.
2. We have a better understanding of the seafloor spreading processes that formed the eastern Coral Sea

and can now constrain the location of plate boundaries in the area from the Cretaceous to the present day.

3. We have mapped gravity, magnetic and bathymetry data across the little explored eastern Coral Sea, and successfully collected useful rock samples from 14 locations (our of 18) to understand the crustal nature of the seafloor.
4. We have commenced programs of geophysical data processing and interpretation and analyses of the rock samples obtained to understand the timing and mechanism of their formation. Together these data will enable us to refine tectonic reconstructions of the eastern Coral Sea and more broadly, the SW Pacific. We have also initiated a program to update several global coastline and bathymetry datasets as a result of our transit near Sandy Island.



Itinerary

Departed Cairns, 16:00,
Friday 26 October 2012
Arrived Brisbane, 13:00,
Tuesday 20 November 2012