Geophysical Research Abstracts
Vol. 13, EGU2011-5179, 2011
EGU General Assembly 2011

Composite tectonic model for the early Indian Ocean

Ana Gibbons, Dr Joanne Whittaker, and Prof. R. Dietmar Müller
The University of Sydney, Australia (ana.gibbons@sydney.edu.au)

When paleomagnetic and potential gravity data are coupled with tectonic plate reconstruction software, such as GPlates, we can begin to build models showing formation of an ocean in a regionally constrained context. Yet, this proves tricky for the early Indian Ocean as it encompasses many volcanic features (Kerguelen Plateau, Sonne and Sonja Ridges) and continental rafts (Naturaliste, Wallaby and Zenith Plateaus). Also, the individual interpretation of geophysical data in several abyssal plains (Argo, Gascoyne, Cuvier, Perth and Enderby), must avoid contradictions in the overall tectonic plate movement, as well as account for the tectonic features created.

Our composite re-investigation of the West Australian margin, which also includes the Argo abyssal plain, and the Enderby Basin, reveals that Greater India reached from the northern tip of the Exmouth Plateau to the Gunnerus Ridge and 'unzipped' from Australia following a southward ridge jump at 136 Ma in the Argo basin. Following the ridge jump, oceanic crust began forming in the Cuvier abyssal plain from 132 Ma, while stretching of the continental crust of the Exmouth Plateau ensued until 131 Ma, when the Gascoyne oceanic crust began forming. Oceanic crust in the Perth abyssal plain initiated at 130 Ma while the Enderby basin began forming at 126 Ma. This later onset for seafloor spreading in the Enderby allows our reconstruction to remove the earlier sinistral then dextral strike-slip motion between India and Madagascar, which has plagued previous reconstructions. Our model also offers plausible mechanisms for the formation of the plateaus via ridge jumps that match the magnetic and gravity potential data and we can also model the formation of the curved fracture zones in the Wharton Basin.

Our model has new implications for Greater India's Eurasian collision, as well as the motion and final collision of Argoland, which we propose is buried beneath Indochina, though some remanent may remain beneath the Woyla Terrane and the Sunda Shelf, which has remained uplifted throughout the Cenozoic following a thermo-tectonic event at about 90 Ma whose cause and extent remains unknown (Hall, 2002). Greater India and Eurasia's initial collision (c. 50 Ma) coincides with the major episode of granitoid intrusion of South Burma (Fan and Ko, 1994), but the main collision occurred at around 35 Ma.