

## Rift-related volcanism at Naturaliste Plateau, Indian Ocean

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Seismic reflection and dredging data indicate that extensive volcanism on and around the Naturaliste Plateau accompanied Early Cretaceous rifting between Australia-Antarctica and Greater India during the breakup of Eastern Gondwana. However, no direct stratigraphic evidence for this was available until International Ocean Discovery Program drilled into the volcanic sequence at Site U1513. We report petrological, petrophysical, paleomagnetic, and geochemical data from this volcanic sequence and discuss their: (1) petrogenesis and emplacement history; (2) lithostratigraphy; and (3) relationship with onshore and previously dredged basalts in Australia and the Naturaliste Plateau, respectively. The volcanic sequence consists of interlayered lava flows and volcanoclastic flows, cut by multiple intrusions. Baked and depositional contacts suggest that at least five phases of eruption took place, possibly in response to episodic rifting events. Petrological and textural evidence suggest subaerial to shallow water eruption. Primary magma composition derived from the most primitive basalts (high MgO, Ni, and Cr) could be parental to most of the flows and, by extension, to dredged basalts and onshore Bunbury Basalt based on geochemical similarity. Petrogenetic modeling indicates origin from magmas generated by ~20% partial melting at 1.5 GPa and a mantle potential temperature of 1398°C, indicating a more fertile than normal ocean ridge mantle source, which corroborates chemical affinities with basalts generated by the Kerguelen plume. Magnetostratigraphy of overlying volcanoclastic-rich sedimentary unit indicates contemporaneous emplacement of Site U1513 basalts with the oldest Bunbury Basalt flows and the reported age of the earliest seafloor magnetic anomalies in the Perth Abyssal Plain. Available evidence indicates that Site U1513 were erupted near sea level during the last stages of extension on this part of the southwest Australian margin, after seafloor spreading had begun on the Perth Abyssal Plain but before the onset of seafloor spreading west of Naturaliste Plateau. The timing of emplacement and the relatively fertile source derived from petrogenetic modeling suggest an influence of a thermal anomaly during rifting.

Keywords: Naturaliste Plateau basalts, East Gondwana breakup, Kerguelen plume, IODP Site U1513