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Micro-continents offshore Western Australia: implications for East Gondwana reconstructions

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The southern part of the Western Australian margin formed at the nexus of rifting and breakup between the East Gondwanan continents India, Australia and Antarctica in the Early Cretaceous. However, understanding the basin evolution along this margin has been hampered by a lack of data from the offshore Perth Abyssal Plain, and from the conjugate Greater Indian margin, which was highly deformed during collision with Eurasia. The Batavia Knoll and Gulden Draak Knoll are two prominent, previously unsampled, bathymetric features located >1600 km offshore Australia that have typically been assumed to be igneous features. In late 2011, successful dredges on the western flanks of both knolls recovered continental basement rocks, revealing that both knolls are micro-continents. Felsic orthogneiss and granite from Gulden Draak and Batavia knolls yield 2.8 Ga, 1.3-1.2 Ga and 540-510 Ma U-Pb zircon ages. The affinity of these geological samples, coupled with existing geological sampling and geophysical data, allow us to test alternative reconstructions for East Gondwana breakup. A number of alternative models have been proposed for the pre-rift configuration of Australia and Antarctica. Competing models make very different predictions for the kinematics of Mesozoic rifting that produced the basins along the Southern Australian margin; the magnitude of extension during rifting; and how mapped Paleozoic and Proterozoic geological terranes and fault zones can be correlated between Australia and Antarctica. We will present reconstructions that reconcile our new samples from Indian Ocean micro-continents with observations from India, Antarctica, Australia, and the evolution of the Indian Ocean.