

Eastern Gondwana breakup: Rifting and subsidence from the Tasman Basin through Lord Howe Rise

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During the Late Cretaceous, the eastern Australian margin rifted to form the Lord Howe Rise continental ribbon. To understand the history of this region since rifting we use reflection seismic data collected in 2016 onboard R/V *Kairei*. We focus on processing and interpreting a regional ~900-km-long east-west oriented seismic reflection profile at 27.2°S. The seismic data were processed through pre-stack depth migration and interpretation shows the structure and evolution of this margin. The profile covers the oceanic Tasman Basin through the continental Lord Howe Rise. Sediment-filled depressions are found within the Tasman Basin and likely relate to early transform faulting with later deposition. The Lord Howe Rise is largely made up of syn-rift and post-rift sedimentary sequences in multiple structurally controlled basins. Two additional features are found between these regions, the Dampier Ridge and the Middleton Basin. The Dampier Ridge has a sharp, probably transform, boundary against the eastern edge of the Tasman Basin. Within the ridge are multiple rift basins up to 3 km deep that are comparable in size and structure to those found on the Lord Howe Rise. Between the Dampier Ridge and the Tasman Basin is the Middleton Basin which contains well-stratified sediments that are up to ~3.5 km thick. Stratal relationships indicate that the Middleton Basin formed during a post-rift event with large amounts of subsidence. Deep reflections beneath this basin reveal mantle at a shallow depth. The results have important implications for the evolution of the margin from initial rifting, opening of the Tasman Basin, and subsequent deformational processes.