The Mesozoic Southern Rift System: Insights into the Mode of Gondwana Breakup from Integrated Multidisciplinary Datasets

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The rifted margins between Australia and East Antarctica are fundamental structures arising from Mesozoic Gondwana breakup. Separation of Greater India from Australia-Antarctica (38-98oE), was volcanically active and complete by the Valanginian (~134 Ma); subsequent early Campanian (~83 Ma) separation of Australia -Antarctica formed the magma poor Southern Rift System (SRS) between longitudes 90 to 152oE.

In 2001 and 2002, the Australian Government acquired approximately 9 000 km of high-quality geophysical data over the margin of East Antarctica between 110–142°. The data comprise 36-fold deep-seismic, gravity and magnetic data and refraction/wide-angle reflection sonobuoys. These data are complemented by similar datasets on the conjugate Australian margin, and a comparative dataset from the Exmouth-Cuvier margin.

We present new results from Pre-Stack Depth Migration of deep MCS data for conjugate seismic lines in the central part of the SRS. The deep crust is also probed through a combination of potential field models informed by sparse dredge hauls on both margins. The structural style is controlled by mechanical extension and slow seafloor spreading between Antarctica and Australia from the early Campanian until the Eocene, and has developed a broad (50-100 km wide) COT along a strike distance of about 1000 km.

Current models for magma-poor margin formation are based on intensive, but also spatially limited, studies of margins such as Iberia and the Labrador Sea. Study of the SRS reveals a diversity of internal architecture which will be important in evaluating global models for continental rifting and breakup.