

Presentation Time: 8:00 AM-12:00 PM

GEOPHYSICAL EVIDENCE FOR A NEOPROTEROZOIC RIFT BASIN UNDERLYING THE BURKE RIVER STRUCTURAL BELT, EASTERN GEORGINA BASIN, CENTRAL AUSTRALIA

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We use regional geology and previously established structural patterns, integrated with aeromagnetic and gravity datasets, to identify a major Neoproterozoic rift basin underlying Pz strata of the eastern Georgina Basin. Aeromagnetic datasets show N-S elongate highs adjacent to a prominent low and separated by a steep gradient that coincides with the Pilgrim Fault, a Mesoproterozoic terrane boundary in the Mt. Isa region that continues southward for at least 180 km as a high-angle dip-slip fault offsetting Pz strata. South from the Mt. Isa region discontinuous, patchy magnetic highs interspersed with magnetic lows merge into NW-trending, linear highs east of the fault trace, while a single, large magnetic low is present west of the fault. First vertical derivative data shows a similar pattern, but emphasizes how the textural definition of the magnetic signature produced by the exposed basement in the Mt. Isa region becomes less defined and broader to the south with increasing sedimentary cover. Gravity data shows broad linear bands roughly parallel to the magnetic signature, but encompassing larger basement blocks.

We interpret the prominent magnetic highs to indicate the shallow footwall block and the magnetic low the down-dropped hanging wall block of the Pilgrim Fault. The data indicate the presence of a large Neoproterozoic rift basin, bounded to the east by the Pilgrim Fault, that trends N20W, is at least 200 km long by 40 km wide, and plunges to the south. In this region we interpret the Pilgrim Fault as a west-dipping Neoproterozoic normal fault that was reactivated as a reverse fault during the mid-Pz Alice Springs Orogeny. The rift basin is a subsurface analog of Neoproterozoic rift basins exposed to the west, e.g. in the hanging walls of the Toomba and Lucy Creek Faults.

The rift basin is truncated to the south by a NE-striking segment of the Tasman Line, the Neoproterozoic rifted margin of Australia. The rift basin formed due to NE-directed extension, probably during separation of Australia from other elements of the Rodinian supercontinent, and suggests that the Australian continental margin consisted of NW-striking rift segments offset by NE-striking transform faults. Such a configuration is incompatible with reconstructions of Rodinia such as AUSWUS that imply a conjugate margin with NE-striking rift segments.

[Cordilleran Section \(104th Annual\) and Rocky Mountain Section \(60th Annual\) Joint Meeting \(19–21 March 2008\)](#)
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