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Oroclines in the Tasmanides of eastern Gondwana

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Orogenic curvature is a prominent and clearly recognisable feature of the Tethyan orogens of Eurasia. By contrast, the Tasmanides, a series of convergent orogens with overlapping active cycles spanning the whole of the Palaeozoic, have until recently been viewed as a largely linear system roughly paralleling the Proterozoic rift margin to which it is accreted. Oroclinal curvature was only recognised in the youngest part of the Tasmanides system, the New England Orogen, where mappable geology and palaeomagnetism confirm the existence of multiple, tightly refolded limbs. Much of the rest of the Tasmanides is covered by thick Mesozoic to recent platform cover, and only the acquisition of high-resolution aeromagnetic data, enhanced by the use of the tilt filter, has enabled the recognition of the Lachlan Orocline, a previously unsuspected feature that explains the apparent repetition and mirror-reflection of terranes in the southernmost part of the Tasmanides system. Radial structures in the core of the Lachlan Orocline, imaged as long-wavelength magnetic anomalies, resemble the radial conical folds resulting from compression on the inner arc of the orocline that have been modelled for the Iberian-Armorican Arc. No direct palaeomagnetic test is yet available for the Lachlan Orocline, but palaeomagnetic directions from second-order curved structures developed along the lithosphere-penetrating strike-sip fault that bounds the orocline record a related Silurian clockwise rotation. Rotation around a small-scale suspect orocline in the northern Tasmanides (the North Queensland Orogen) may record collision between a ribbon continent and Gondwana; palaeomagnetic data from within this suspect orocline show a large change in declination between the Silurian and Devonian. Late Cambrian oroclinal bending in the western Tasmanides is responsible for the rigid kink-bending of the originally linear Mount Wright volcanic chain. While this feature has also only been recognised through its aeromagnetic expression, the displacement that produced its flexure was also responsible for the growth of the Nackara Arc, a fold-thrust system in the Adelaide Fold Belt representing the retro-thrust part of the same orogeny. A re-examination of existing palaeomagnetic data from the Adelaide Fold Belt supports the view that the Nackara Arc is rotational. Taken together, the set of previously unrecognised oroclinal rotations in the Tasmanides reduce a series of apparent complexities in the Palaeozoic Gondwanan apparent polar to local vertical-axis rotations.