

## REVISED MIDDLE TO LATE PALAEOZOIC TECTONIC EVOLUTION OF THE NORTHERN NEW ENGLAND FOLD BELT, QUEENSLAND

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The tectonic evolution of the New England Fold Belt (NEFB) during the Middle to Late Palaeozoic has previously been viewed as having persistent supra-subduction zone arc magmatism, such that the location of these magmatic arc belts have been an important reference frame for tectonic reconstructions. Our research, however, finds no evidence for arc magmatism within the northern NEFB except at the end of this period. In contrast, we recognise three main episodes of extension-related magmatism and accompanying sedimentation: 1) ~380-365 Ma; 2) ~360-340 Ma; and 3) ~320-280 Ma. Magmatism and sedimentation occurred in a broad 'back-arc' region, with any arc magmatism located further east, and at least during the Late Carboniferous-Early Permian, east of the present Queensland coastline.

In our model, Middle Devonian silicic-dominated magmatism preceded back-arc basin development along the continental margin. Magmatism varied from low-K+Al trondhjemite/rhyolite in the east (e.g., Mount Morgan), to medium- to high-K, I-type granitoids ~350 km to the west (Retreat Batholith). Mafic, effusive and hydroclastic volcanism then developed within the Yarrol Basin in eastern Queensland, previously regarded as a fore-arc basin. Mafic rocks range from basalt to basaltic andesite and vary in composition from N-MORB to crust-contaminated, 'arc-like' low-K tholeiites, being most similar to basalts associated with intra-continental rifting and back-arc basins. Dyke orientations and palaeocurrent data suggest that rift basins (Yarrol & Campwyn) developed along the plate margin were northeast-trending.

Renewed, silicic, to weakly bimodal magmatism ~360 Ma was related to the opening of the Drummond Basin, and was more voluminous and widespread, extending >400 km inboard of the present coastline. Extrusive volumes were >100,000 km<sup>3</sup>. Rhyolite to high-silica rhyolite ignimbrites/intrusions are volumetrically-dominant, with subordinate low-Ti basaltic and andesitic lavas/intrusions occurring along the northern and eastern margins of the Drummond Basin. The rhyolites are transitional in composition between destructive plate margin and within-plate magmas, similar to trends observed in other rift-related silicic igneous provinces (e.g., Whitsunday & Chon Aike provinces).

A voluminous, silicic-dominated magmatic and thermal event during the Permo-Carboniferous preceded the opening of the Bowen-Sydney Basin system. Silicic igneous rocks define a belt >1900 km long and 300 km wide, with extrusive volumes 500,000 km<sup>3</sup>. Volcanic rocks are dominated by dacite to high-silica rhyolite ignimbrite related to a major continental caldera system. An extensive granitic batholith belt is preserved in central and northern Queensland, and dyke swarms developed over a distance of 1000 km along the margin. Igneous compositions become bimodal up-sequence with Early Permian mafic lavas including basalts with intraplate signatures.

Extension terminated with the Permo-Triassic Hunter Bowen Orogeny, which was accompanied by the first evidence for supra-subduction zone magmatism.

**Abstracts & Programme, GSNZ Annual Conference "Northland 2002". *Geological Society of NZ Miscellaneous Publication 112A*, p. 9.**