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The Zealandia-SE China connection: Permian-Cretaceous intrusive rocks and mineralisation

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Zealandia is a 4.9 Mkm^2 continent in the SW Pacific Ocean. About 6% of Zealandia is above sea level, and forms the islands of New Zealand and New Caledonia. Before supercontinent breakup, Zealandia lay on the SE edge of Gondwana-Pangea, along strike from West Antarctica, NE Australia and New Guinea. Basement rocks of Zealandia record episodic Andean-style and scale batholith intrusion from c. 500-105 Ma, accompanied by terrane accretion. At c. 105 Ma subduction terminated and the c. 105-85 Ma geological record of Zealandia is one of A-type granites and pre-breakup syn-rift basins.

Like Zealandia, SE China once lay on the eastern edge of a supercontinent (Laurasia-Pangea), facing the paleo-Pacific Ocean basin. As might be expected, most of the geology of SE China is quite different from that of Zealandia. However, the Permian to Late Cretaceous (c. 270-85 Ma) geology of the two regions is remarkably similar, particularly in terms of the igneous record. Continental margin magmatism both in Zealandia and in SE China shows broad pulses at c. 240-210, 170-140, 130-115 and 100-80 Ma and broad lulls at c. 200, 135 and 105 Ma. Triassic and Jurassic pulses dominate in SE China, whereas Cretaceous dominates in Zealandia. Superimposed Late Cretaceous metamorphic core complexes and Cenozoic compressional tectonics means that, overall, the exhumation level of the igneous rocks in Zealandia is deeper than that seen in SE China and in NE Australia. Most New Zealand igneous suites are plutonic and were intruded into the mid- or deep-crust. Locally, deep crustal exposures of the Mesozoic arc root in Fiordland, New Zealand, expose eclogitic rocks formed at c. 60 km paleodepths. Zealandian volcanic rocks and shallow intrusions are common only in the intervals 145-140 and 100-80 Ma.

Mineralisation in New Zealand plutonic rocks includes occurrences of PGE (Permian-Triassic I-types), Mo (Jurassic A-types), Cu, Pb, Zn, Ag (Dana Shear Zone in Jurassic I-types), a diverse range of silicate, sulphide, phosphate, oxide and fluorine-rich Mo, Ag, Te, Bi, Au, As, Be, Cd, Co, Cu and Zn bearing minerals (Early Cretaceous A-types), Mo (Early Cretaceous adakitic granites). The Late Cretaceous A-type granites are regarded as having REE potential. These mineralised occurrences in New Zealand are yet to be mined, however a one million ounce gold resource hosted within inferred Cretaceous-age A-type graniteis currently at advanced exploration stage. The densely forested and mountainous nature of much of New Zealand means that many targets remain to be discovered. Despite the different structural levels, the relatively similar continental margin igneous records suggests there may be some useful comparisons of granite-hosted and related mineralisation between SE China and New Zealand.