Early Paleozoic I- and S-type granitic magmatism at the Pacific margin of the Transantarctic Mountains (TAM): dominantly a crustal recycling process?

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CA magmatism at the early Paleozoic Gondwana margin was active between about 520-495 Ma and resulted in abundant granitoid intrusions and related basic igneous rocks (GHI; Granite Habour Intrusives). In Northern Victoria Land at the Pacific margin of the TAM, the GHI are dominated by granitic rocks of I-type tonalitic to S-type evolved granitic composition. They mostly intruded low- to high-grade clastic metasediments whose zircons record U-Pb ages and ε(Hf) values indicative of a provenance from distal and isotopically very heterogenous sources of Cambrian to Archean age. Two of the investigated GHI (I-type) show a largely bimodal U-Pb zircon age distribution with maxima at about 515 Ma and 495 Ma. The ε(Hf) values of these zircons are homogeneous at c. +8 - +6 and -3 - -6 for the two samples, respectively. Their is only very minor evidence of zircon inheritance indicating that AFC processs involving country rock type crustal materials were not dominant in these GHI.

The majority of GHI samples (n=4) including an I-type tonalite from an outboard position of the former active continental margin, however, contain very heterogenous zircon populations without distinct evidence of a GHI-type magmatic component. The zircons are indicative of isotopically very heterogeneous late Precambrian to early Paleozoic sources (c. 800-500 Ma; ε(Hf) +12 - -48), juvenile arc(s) and evolved sources of Grenville-age (ε(Hf) +14 - -21), and cratonic sources with ages up to 3.3 Ga and ε(Hf) close to 0. In their age and ε(Hf) value, zircons in these GHI very closely match those of the metasedimenry country rocks indicating that formation of these granitoids is dominated by crustal recycling.