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Sedimentary provenance of Trinity Peninsula Group, Antarctic Peninsula: petrography, geochemistry and SHRIMP U-Pb zircon age constraints.

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The Trinity Peninsula Group (TPG) crops out in northern Graham Land and consists of a mostly non-fossiliferous metasedimentary succession of Permo-Triassic(?) age, which was accreted prior to the initiation of the Gondwana breakup. This succession has been sub-divided, from north to south, into five formations, namely: Hope Bay (HBF), View Point (VPF), Legoupil (LgF), Charlotte Bay (ChBF) and Paradise Harbour (PHF) formations. However, there are still large areas with unknown stratigraphic allocation, age and extension.

Twenty TPG samples (12 sandstones and 8 mudstones) were collected from four localities in the Antarctic Peninsula, including Hope Bay; Paradise Harbour, Cape Legoupil and Charlotte Bay. Twelve sandstones were selected for modal analysis and 15 samples (7 sandstones and 8 mudstones) for whole rock chemical analysis. The geochemical data of the TPG samples was compared with the geochemical data of other sedimentary successions of different provenance and tectonic setting, by using unsupervised artificial neural networks.

The modal composition of the sandstones is dominated by quartz and, in similar but smaller proportions by feldspar, and according to the discrimination scheme of Dickinson et al. (1983) is consistent with the product of erosion of the plutonic roots of a magmatic arc. The chemical data suggest a relatively evolved source, with a composition similar to a typical granodioritic continental magmatic arc. The deposition of the detritus is most likely to have occurred within an active continental margin.

Three sandstone samples from the HBF, LgF and PHF were selected for U-Pb dating of detrital zircons by SHRIMP. For the HBF and PHF samples, the major age component is Permian (270-280 Ma). Only the sample from LgF has two important peaks at $\tilde{2}70$ and $\tilde{4}70$ Ma. In all cases, the youngest dated zircon is Permian ($\tilde{2}57$ Ma).

These results show that there are strong chemical and chronological similarities between the TPG, the Duque de York Complex (DYC, Patagonia), the Rakaia Terrane (New Zealand) and the LeMay Group (Alexander Island, Antarctic Peninsula). These similarities suggest that these successions derive from the same active continental margin. Into this context, the subtle petrographical differences between TPG and DYC could possibly indicate that both units correspond to different petrofacies of a common source, as has been proposed for the Rakaia Terrane in New Zealand.