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QUANTITATIVE PROVENANCE ANALYSES OF CRP CORES: IMPLICATIONS FOR EROSION/UPLIFT MODELS OF THE TRANSANTARCTIC MOUNTAINS IN SOUTHERN VICTORIA LAND

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The three Cape Roberts Project (CRP) drill holes represent a cumulative recovery of a c. 1.5 km thick succession, documenting the evolution of the western Victoria Land Basin (Southern Victoria Land, SVL) from latest Eocene (c. 34 Ma) through to late Early Miocene (c. 17 Ma), and in Plio-Pleistocene time.

The analysis of clast distribution patterns allows a subdivision into four main petrofacies: P1 (bottom CRP-3 – ca. 300 mbsf CRP-2A), dominated by cover-derived rocks, mostly Ferrar Supergroup (FS) gabbros/dolerites and basalts and, subordinately, Beacon Supergroup (BS) sedimentary rocks; low-grade metasediments are only present within this petrofacies; P2 (ca. 300 – ca. 120 mbsf CRP-2A), consisting of subequal proportions of FS gabbros/dolerites and granitoids sourced in the Granite Harbour Intrusive Complex (GHIC); clasts of McMurdo Volcanic Group (MVG) basalts first appear and MVG tephra-rich layers occur at 114 – 109 mbsf in CRP-2A; P3 (109 mbsf CRP-2A – ca. 40 mbsf CRP-1) dominated by GHIC granitoids; P4 (above ca. 40 mbsf –Plio-Pelistocene section, CRP-1) mainly represented by MVG basalts, with occurrences of BS clasts, GHIC granitoids and FS gabbros/dolerites in subequal proportions.

All clast assemblages are consistent with a local provenance and the major petrological variations suggest a discontinuous stile of erosion/uplift during the unroofing of the adjacent Dry Valley block in SVL. Moreover: a) the presence within P1 of low grade metasediments most likely sourced in the Skelton Group and indicative of a southern provenance in Early Oligocene time; b) the occurrence of mixed sedimentary clasts sourced from different stratigraphic levels in the BS, and c) their coexistence - even in the lowermost CRP-3 section - with granitic clasts derived from the underlying pre-Devonian basement provide additional constrains for Cenozoic erosion/uplift models for the Transantarctic Mountains in SVL which should consider a complex interaction between possible changes of ice-flow directions and tilted fault blocks with partly independent uplift /erosion histories.