



Analysis of clast lithologies from CRP cores - Implications for Transantarctic Mountains erosion and ice-flow directions in the McMurdo Sound during Cenozoic time

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From 1997 to 1999, three overlapping drill holes (the CRP holes) cumulatively recovered a 1472-m record of glacial-marine succession recording the sedimentation history in the Victoria Land Basin, Western Ross Sea (Antarctica) from late Eocene to early Miocene. This work deals with the gravel-fraction analysis of the sediments recovered by these cores, and we discuss the clast distribution patterns and synthesize the petrographical data for the most representative basement lithologies occurring as granule- to boulder-size clasts.

Gabbros/dolerites and granitoids represent the dominant components. Within the granitoids, monzogranites, porphyries and granodiorites are the most common varieties, with very minor tonalites and syenites. Sedimentary rocks are a major lithology only in the lowest part of the CRP-3 core, becoming then a minor occurrence and almost disappearing in the uppermost recovered sedimentary CRP succession. Basalt clasts related to the McMurdo Volcanic Group are present only above ca. 300 mbsf in CRP-2A, being usually a minor component excepted within the tephra layers recovered in CRP-2A and within the CRP-1 core. Metamorphic rocks represent a very minor occurrence scattered throughout the cores and consist of gneisses, Ca-silicate rocks, schists, quartzites, low-grade metasediments and minor amphibolites and marbles.

The analysis of clast distribution throughout the cores allows a subdivision of the sedimentary succession into five main zones:

Zone 1 (bottom CRP-3 – ca. 300 mbsf CRP-2A) is characterised by a clast assemblage dominated by cover-derived rocks, mostly represented by Ferrar Group gabbros/dolerites and, subordinately, by Beacon Supergroup sedimentary rocks. Foliated low-grade metasediments are only present within this zone;

Zone 2 (ca. 300 – ca. 120 mbsf CRP-2A) source rocks consist of subequal proportions of gabbros/dolerites and granitoids belonging to the Granite Harbour Intrusive Complex. Basalts of the McMurdo Volcanic Group first appear;

Zone 3 (114 – 109 mbsf CRP-2A) consists of the tephra layers present within the lithological unit 7.2;

Zone 4 (109 mbsf CRP-2A – ca. 40 mbsf CRP-1) is dominated by granitoids;

Zone 5 (above ca. 40 mbsf CRP-1) is characterised by a clast assemblage mainly represented by basalts, with occurrences of sedimentary rocks, granitoid and gabbros/dolerites in subequal proportions.

All clast assemblages are consistent with a provenance mainly from the onshore region facing the Granite Harbour and with a progressive unroofing of the Transantarctic Mountains. Nevertheless, the presence of the Skelton Group derived metasediments within Zone 1 could also indicate a provenance from the Skelton Glacier area.