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Petrography and provenance study of gravel size clasts from Miocene glacio-marine sequences in the IODP_exp374 Ross Sea drillcores (Antarctica): preliminary study

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The International Ocean Discovery Program (IODP) Expedition 374 drilled five sites from the outer continental shelf to rise in the eastern Ross Sea (Antarctica) to investigate the West Antarctic Ice Sheet evolution during Neogene and Quaternary. Detailed petrographic investigation of gravel size clasts is a key to identify the rocks source of those sediments and consequently the paleo-ice flow shifts during time. Sites U1521 and U1522 are located in the outer continental shelf and present thick sequences of glacio-marine sediments. Results presented here show the clasts logging of 421m of cores, where more than 26.000 clasts (>2mm) were macroscopically identified and sub-divided in six major lithological groups: igneous rocks, quartz fragments, volcanic rocks, dolerite clasts, sedimentary/meta-sedimentary rocks and metamorphic rocks. Moreover, 220 clasts were sampled for detailed petrographic and minero-geochemical analysis. The number of clasts along the core shows a wide variability, with 0-10 clasts/m in the clast-poor diamictite intervals to 10-47 clasts/m in the clast-rich diamictite, indicating oscillations of the sediment supply at the ice front. In the westernmost site (U1521), located in the Pennel Basin, the Early(?) Miocene drilled sequence shows five major clasts assemblage variations, marked by the percentage variability of basalt and dolerite, while the two major populations, consisting of low-grade fine-grained meta-sedimentary rocks (40-55%) and felsic granitoids (25-45%) remain constant. Sedimentary rocks, such as quartz-arenite, were found; limestones, meta-limestones and limestone's conglomerates also occur and medium to high-grade metamorphic rocks, such as schists and gneisses, are not abundant. This lithological assemblage would be consistent with a source in the Transantarctic Mountains basement type; however, a local provenance from basement highs in the Ross Sea can not be excluded. In the easternmost studied site (U1522), located in the Glomar Challenger Basin, the Late Miocene drilled sequence, shows two major clasts assemblage variations, marked by the basalt abundance changes. The main lithological group is represented by low-grade fine-grained meta-sedimentary rocks (45-70%); secondary felsic to mafic granitoid rocks are present (20-40%). Dolerite clasts of the Ferrar Group are almost absent, instead basalts are common (1-5%) and medium- to high-grade metamorphic rocks (schist ang migmatitic gneiss) occur along cores. The Late Miocene sequence of the site U1522 shows a quite different clasts assemblage compared to the Early Miocene assemblage of the site U1521. Further detailed petrographic analysis are needed to better identify the source of clasts; moreover, geochronological analysis of heavy minerals of granitoid rocks could provide essential data to constrain provenance models in both sites.