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Major and trace (including REEs) element stratigraphy in the first 90 m (around 1 Myr) of ANDRILL AND-1B drillcore.

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An integrated system Inductively Coupled Plasma - Sector Field Mass Spectrometry (ICP-SFMS) and Inductively Coupled Plasma – Atomic Emission Spectrophotometry (ICP – AES) has been applied to quantify 39 major and trace elements (including Rare Earths Elements -REE) in Antarctic glaciomarine sediments collected in the framework of ANDRILL. This project aims to study the role of the Antarctic Continent within the global climatic system, by the recovery and analysis of two deep sediment cores (AND-1B, MIS and AND-2A, SMS), drilled close to the margin of the Ross Ice Shelf. The main goals of ANDRILL were to obtain a stratigraphic record that documents key steps in Antarctica's Cenozoic climatic and glacial history, and in the tectonic evolution of the Transantarctic Mountains and the West Antarctic rift System. In particular, the study of the geochemical composition of sediments along the two ANDRILL cores can provide information about the possible source of terrigenous material deposited over the drilling site (Harwood et al., 2006).
Preliminary results with a spatial resolution of about 1 m for the geochemical composition of the interval 24.66-85.24 m of depth of marine sediments from AND-1B core covering about the last 1 Ma, are here shown. The concentration ratio of each measured element with respect to Al concentration, used as terrigenous reference, was calculated in order to remove the possible effect on elemental concentrations of differences in average sediment grain-size along the core and possible dilution effects and point out specified metal enrichments. The presented data and depth profiles (e.g. Fe/Al, Mn/Al, Co/Al, Cr/Al, Eu/Al and Europium anomaly) relative to sediments deposited during the last Ma at the MIS site, show an evident discontinuity from samples collected above and below 58.4 m of depth, corresponding to about 0.45 Ma BP, following the latest AND-1B dating model (85.24 m of depth corresponding to about 0.988 Ma; the chronological datum of the sediments is developed from 40Ar/39Ar ages volcanic deposits, Naish et al. 2009). This difference of geochemical composition suggests different rock sources for the material deposited before and after about 0.45 Ma BP. In particular the geochemical composition of the upper sediments is similar to the one of McMurdo Volcanic Group (MVG) whereas the lower sediments are close to the compositions of samples collected in the Transantarctic Mountain (TAM). Such a different composition could be linked to the climatic discontinuity known as Mid-Brunhes Event (MBE), dated 430 Kyr BP, which marks the boundary between two different global climatic conditions, with the youngest part characterized by a larger temperature gap between short and warm interglacials and long and cold glacials, with respect to the oldest part.

Bibliography:

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