GLACIAL/INTERGLACIAL VARIABILITY IN TRANSPORT AND ORIGIN OF DETRITAL SEDIMENTS OF THE RIO GRANDE RISE (SOUTHWEST ATLANTIC OCEAN)

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The reconstruction of the origin of sedimentary material and its transport in the ocean gives key information to understand ocean circulation and the weathering regime of the past. The deep Atlantic Ocean, especially its southwestern part, at present, is a data-sparse region. To know more about changes in material input and supply areas in this part of the Atlantic in this research project radiogenic Nd and Sr isotope ratios are used, which have been shown to be a good material tracer in many previous oceanographic studies.

In this work, the variability of detrital εNd and 87Sr/86Sr values for Site 516 A on Rio Grande Rise was used to reveal the heterogeneity in the detrital material associated with the alternation of glacial-interglacial stages over the past 600 kyr. Using the already known εNd and 87Sr/86Sr values for other places as geochemical markers, potential sources of the material were identified using the database of marine and terrestrial radiogenic Nd and Sr isotopes for tracing earth-surface processes (Blanchet 2019). Also, interpretation of Nd and Sr isotope ratios in samples and potential sources helps to determine the transport ways of material (by currents, dust, etc.).

A total of 50 samples from the core 516A from Rio Grande Rise were prepared, and the elements Sr and Nd were extracted and purified from samples, then they were analyzed using MC-ICP-MS. The observed variability in εNd is clearly measurable and it varies depending on the alternation of glacial/interglacial stages: from -6.2 during glacials and up to -7.9 in a peak of interglacial (on average it ranges between -6.8 and - 7.31 respectively). 87Sr/86Sr variability does not follow εNd and changes in Sr isotopic composition related to glacial/interglacial alternation don't have clear patterns, probably because of mixing material from different sources and different material sorting, which can also affect to 87Sr/86Sr values. Nd and Sr isotopic ratios, observed as a result of the analysis, are typical for the South Atlantic. Changes in material isotopic composition (mainly Nd) can be explained by the variability of the material supply from Patagonia and also additional factors given that current strength changed. During the glacial stages, there was increased input of material with more positive εNd values from Patagonia and the Argentina Basin. Also, during this time, the significance of aeolian transport grew. Climate conditions of glacial stages were drier, and because of sea level decline, large shelf areas are exposed and eroded. Thus, the arid areas were expanded, which are sources of dust carried by the winds, which increased during glacial as well. During interglacial stages, there was more input of old weathered rocks with more negative εNd values from northern sources (Barbados Basin, northern and central part of South America). During these periods the transfer of material by currents prevailed.

The research in this area reveals some local patterns of material input changes, at the same time, it will be one of the missing puzzles to better understand past global ocean material transport and paleocirculation.