

Orinoco discharge variability during the last interglacial based on detrital Sr-Nd isotopic composition and grain size distribution of Tobago Basin sediments

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The Tobago Basin receives large amounts of terrigenous inputs from the Orinoco River and, therefore, sedimentary records from this region capture past changes in erosion and rainfall in northern South America. However, interpretation of such records in terms of hydroclimatic changes is complicated due to a large number of other potential terrigenous sources (e.g., the Amazon River, local volcanic arc, aeolian dust), and their variable contributions over time. Here, we analyzed sediments from the Tobago Basin for detrital radiogenic Sr and Nd isotope compositions, major element ratios (e.g., Si/Al) and grain size distributions to reconstruct changes in sediment provenance and continental weathering intensity during the penultimate glacial-interglacial cycle (135-115 thousand years ago, ka). During the last interglacial, ϵ_{Nd} signatures (ranging between -12.5 and -11.3) suggest continuous deposition of material from the Orinoco and Amazon Rivers, likely combined with additions of Saharan dust and periodic minor contributions from the nearby volcanic arc. Significantly less radiogenic ϵ_{Nd} signatures of the penultimate glacial sediments (ranging between -13.5 and -13.2) indicate reduced Amazon sediment influx and Orinoco-dominated sedimentation during the sea level low stand. In addition, we find three peaks with low Sr isotopic ratios, at ~127, 119 and 116 ka, that can be explained by minor shifts in sediment provenance and/or grain size effects (i.e., sediment coarsening). We argue that the inferred changes in sediment properties reflect millennial-scale reductions in Orinoco discharge, which is supported by proxy records of surface water productivity. Our results extend the knowledge of the last interglacial climate instability to the tropical realm and confirm the link between precipitation variability in northern South America and sea surface conditions in the North Atlantic.