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Denudation rates of southwestern Madagascar over the past 900 ka and their relation to climate changes.

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Denudation is the sum of chemical weathering and physical erosion. It is a key parameter controlling the evolution of the Earth's surface, the production of soils, the stability of relief or the evolution of climate through silicate alteration. It also controls sedimentary fluxes that regulate the burial of organic carbon and hence influences the CO_2 cycle. Through these controls, denudation influences large scale biogeochemical cycles. In turn, climate influences denudation through a number of processes such as precipitation or vegetation distribution. In order to comprehend the past evolution of the Earth's surface and to better predict future changes that will affect our habitat, it is crucial to constrain links that exist between climate and denudation especially during the Quaternary. This requires precise quantification of past denudation rates. We propose here to pursue this goal using cosmogenic radionuclides, a method which has already proven its efficiency for this particular kind of study. We apply this method to a sedimentary archive from the Mozambique Canal, offshore southwestern Madagascar. The choice of the study area is motivated not only by data availability, but also by the absence of intense tectonic activity or glaciations over the quaternary, limiting changes in denudation rates over time to climatic forcings, and hence simplifying the system we wish to study. We measure cosmogenic ^{10}Be in quartz grains of 17 turbiditic layers from a marine sedimentary core that has been dated between 50 and 900 ka, and that was drilled on a terrace of the underwater Tsiribihina valley, in the Mozambique Canal. This core has been shown by a preliminary study to record MIS 1 to 22 with a hiatus between MIS 11 and 15. A source study using εNd and heavy minerals also enables to constrain the origin of the sediments to major rivers draining southwestern Madagascar. The ^{10}Be analysis of this core will provide paleo-denudation rates with high time resolution (approximately 30 ka) integrated over a large drainage basin through several climatic cycles during the Quaternary.