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A 3 Myr Mediterranean perspective on monsoon variability over the Sahara; implications for landscape and hominin evolution in tropical Africa

J.C. Larrasoaña (1), A.P. Roberts (2), E.J. Rohling (2), M. Winklhofer (3)

(1) Departamento de Ciencias de la Tierra, Universidad de Zaragoza, Spain, (2) National Oceanography Centre, Southampton, UK (3) Department of Earth and Environmental Sciences, University of Munich, Germany (jclarra@unizar.es / Phone: +34-976762127)

Since land-based records of tropical African climate are scarce and fragmentary, long-term reconstructions of African climate variability are based on proxy (largely dust supply) records from Indian and Atlantic Ocean sediments. However, interpretation of these records in terms of climate variability is not straightforward, because they might combine the response of different latitudinal and longitudinal portions of northern Africa to environmental variations driven by different climate processes. Here we recall a record of Saharan dust supply into the eastern Mediterranean Sea produced from ODP Site 967. We argue that this record provides a genuine view of the pace of tropical African climate, because it documents environmental variations in a specific location within Africa, the NE Sahara, taking into account the physiography of the region and its interaction with climatic processes. The Site 967 dust record documents variations in the supply of aeolian dust from the eastern Algerian, Libyan, and western Egyptian lowlands located north of the central Saharan watershed. We relate dust flux minima to penetration of the western African summer monsoon front to the north of the central Saharan watershed. This would have resulted in expansion of vegetation cover and in formation of freshwater lake and fluvial systems ("greening of the Sahara") in the dust source regions, thereby inhibiting formation of dust. Our results indicate that this northward monsoon penetration recurred, modulated by orbital precession, obliquity and eccentricity, during insolation maxima throughout at least the last 3 million years. The Site 967 dust record bears implications for better understanding the link between climate variability and evolution of hominins, because it documents the timing of climatically-driven expansion and retraction of wetland and

savannah ecosystems, where hominins lived and evolved, through much of northern Africa.