

Absolute Chronology of Wet Climate Periods in the Present Arid Parts of Northern and Southern Africa

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The present absolute chronology of humid periods in the present arid parts of northern and southern Africa before Marine Isotope Stages 5 (MIS 5) is based on few radiometric ²³⁰Th/U ages. However, only precise absolute ages of samples showing lithostratigraphic, biostratigraphic or geomorphologic indications of climatic changes can provide evidence about whether regional and global climatic signals in the northern and southern hemispheres can be correlated. Thermal ionization mass spectrometry (TIMS) is a more precise method for determining the ²³⁰Th/U ratio than the radiometric method. Samples of lacustrine limestone from a mega paleo-lake in the Murzuq Basin in Libya and from a stalagmite from the Roessing Cave in Namibia were analyzed. On the basis of morphological indications of the Murzuq Basin in Libya, Thiedig (Thiedig et al., in press) identified three extensive lacustrine limestone beds at different elevations, and therefore postulated at least three extremely wet phases in the area of the mega paleo-lake during the Quaternary. The size of the "Fezzan" paleo-lake appears to have varied between 2000 and 120,000 km². The geomorphological evidence for three levels of the paleo-lake in Libya is supported by ²³⁰Th/U ages, which indicate pluvial phases around 360 ka (MIS 11), 240 ka (MIS 7) and 129 ka (MIS 5), confirming the proposed stratigraphic sequence of the deposits. A stalagmite of

the Roessing Cave in the Namib Desert has been dated, yielding ¹⁴C ages younger than 30 ka, which are inconsistent with the corresponding radiometric ²³⁰Th/U ages, which are larger than 300 ka. The new TIMS ²³⁰Th/U ages of cores from the stalagmite provide evidence for continuous growth from around 500 ka to 370 ka, corresponding to a growth rate of 1.4 mm/ka. Samples of speleothem deposits at the foot of the huge stalagmite yielded "isochron"-corrected ²³⁰Th/U ages of about 400 ka, 200 ka and 118 ka, indicating wet phases in the Namib Desert, corresponding to MIS 11, 7, and 5. The sea-level highstands in Libya appear to correlate with the pluvial phases of the Namib Desert when the absolute ²³⁰Th/U ages of the limestone samples from the northern hemisphere are compared with the speleothem samples from the southern hemisphere. The precipitation histories of the two hemispheres seem to be linked with each other. The pluvial phases occurred during MIS 11, 7 and 5, supporting the correlation of wet climate periods in Africa during the Early Pleistocene with interglacial phases in the temperate climate zones.

Thiedig F, Oezen D, El Chair M & Geyh MA, *Geology of Murzuq Basin, Elsevier Amsterdam, (in press)*.