



Greening of the Sahara - a paleo perspective on the history of water in the Middle East and North Africa

M. Bar-Matthews

Geological Survey, Geochemistry, Jerusalem, Israel (matthews@gsi.gov.il)

The Middle-East, mostly at its southern edge together with North Africa, the northern edge of the Sahara Desert, are located at the boundary between high- to-mid latitude and tropical-subtropical climate systems. The geographical duality of desert adjacent to Mediterranean-type climate regions played and still plays a major role on the water availability. Thanks to the number of important paleoclimate studies that been made on accurate dating of cave speleothems in Southern Arabia and Oman (Fleitmann et al., 2011) and in the northeast Sahara, the Negev Desert Israel (Vaks et al., 2010) and the study of sapropels in Eastern and central Mediterranean (Almogi-Labin et al., 2009; Osborne et al, 2008), it is clear that the region was graced with water during peak interglacials when the African monsoon and westerly storm/rainfall systems intensified. Northward penetration of the Inter Tropical Convergence Zone over the Arabian and African continents resulted in increased discharge of the Nile River and rivers that emerged from central Sahara into the Eastern Mediterranean Sea. Correspondingly, enhanced westerly wind activity led to an increase in rainfall from Atlantic-Mediterranean sources over the entire Mediterranean basin, which even penetrated south into the north-east corner of the Sahara Desert. The Saharo-Arabian Desert became narrower and climatic “windows” opened for the dispersal of hominids and animals out of the African continent at 250-239, 210-193, 138-120, 108-98, 87-84 and 10-6.5 ka BP, with severe dry conditions in between. Greening of the Sahara Desert at these intervals is supported also by various marine and terrestrial records, such as corals, lakes, tufa deposits and archeological findings. Dry conditions prevailed in the Sahara desert during glacials. This is in contrast to the climatic conditions in the Eastern Mediterranean coastal region and the Jordan Rift Valley (Bar-Matthews et al., 2003; Lisker et al., 2010), where water was available for humans and animals who enjoyed a variety of ecological niches for living (Frumkin et al., 2011).

Almogi-Labin, A. et al (2009) *Quat. Sci. Rev.* 28, 2882-2896.

Bar-Matthews, M. et al (2003) *Geochim. Cosmochim. Acta* 67, 3181-99.

Fleitmann, D. et al. (2011). *Quat. Sci. Rev.* 30, 783-787.

Frumkin, et al. A. (2011). *Jour. Human Evol.* 60, 437-451

Lisker et al, (2010). *Quat. Sci. Rev* 29, 1201–1211.

Osborne A.H. et al. (2008). *Proc. Nat. Acad. Sci.* 105, 16444-16447

Vaks et al. (2010). *Quat. Sci. Rev.* 29, 2647-2662.