

Mapping water basins in the eastern Sahara by SRTM data

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The eastern Sahara of North Africa includes some of the driest regions on Earth. However, its landforms kept a record of moist climates in the past. Its omnipresent sand was born of water during wet episodes and shaped by wind during dry climates (El-Baz, 1998). The sand cover has inhibited revealing surface features. Radar waves from space penetrate the sand cover to unveil underlying topography.

This contribution discusses two lake-like depressions and two major drainage basins in northwestern Sudan: (1) Salima depression, which straddles the border between Egypt and Sudan; (2) Darfur mega-lake that occupies the northernmost part Darfur; (3) Kermah basin drainage lines, which terminate at the Nile near Kermah; and (4) Howar basin, an extensive east-west drainage that joins the Nile south of Dungulah.

The rocky surface of the Salima basin is covered by the Great Salima Sand Sheet. Acquisition of the first radar image from space by the SIR-A mission (Elachi et al., 1982) revealed major dry valleys beneath Saharan sands. This increased interest in the potential of groundwater resources (El-Baz, 1998). Groundwater wells in the East Oweinat region presently produce wheat, chickpeas and other crops. This increases interest in neighboring regions of northwestern Sudan.

In Northern Darfur, both radar images and SRTM data allowed mapping the boundaries of an ancient mega lake (Ghoneim and El-Baz, 2007). Radarsat images depicted segments of horizontal rows of lake-terrace remnants at 573 meters above sea level. Both the Government of Sudan and the United Nations are planning groundwater wells to alleviate the military conflict and the humanitarian crisis.

A distinct drainage pattern occurs to the west of the Third Cataract and west of Kermah along the Nile River. SRTM data were used to delineate eastward trending dry wadi tributaries in a 23,646 Km² area. Wadi Arbain, with numerous Neolithic cultural remains, forms the northernmost drainage line leading directly to the Nile. Four other drainage lines start from the Abyad Plateau and lead to an irregular depression southwest of Kermah. This basin, whose tributaries cover 62,742 Km², was proposed as a segment of the "Proto Nile" (Pachur and Kropelin, 1987).

Wadi Hawar basin emanates from Ennedi Mountains of Chad and trends eastward. Its watershed is 184,820 Km² and its length exceeds 1,435 km. Thus, it represents the longest western tributary of the Nile. Its lower reaches south of Dungulah are known as El-Ghabah, Arabic word for forest. This connotes that the area used to host vegetation supplied by water from Wadi Howar.

These major features indicate the prevalence of water that would have seeped, by primary or secondary porosity to be stored as groundwater (El-Baz, 2000). Thus, they represent regions that should be explored for groundwater to ease existing problems and assure a better future.

References:

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