Gravity aspects from recent Earth gravity model EIGEN 6C4 for geoscience and archaeology in Sahara, Egypt

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A new method to detect paleolakes via their gravity signal is presented (here with implications for geoscience and archaeology). The gravity aspects or descriptors (gravity anomalies/disturbances, second radial derivatives, strike angles and virtual deformations) were computed from the global static combined gravity field model EIGEN 6C4 for an application in archaeology and geoscience in Egypt and surrounding countries. The model consists of the best now available satellite and terrestrial data, including gradiometry from the GOCE mission. EIGEN 6C4 has the ground resolution ~10 km. From archaeological literature we took the positions of archaeological sites of the Holocene occupations between 8500 and 5300 BC (8.5-5.3 ky BC) in the Eastern Sahara, Western Desert, Egypt. We correlated the features found from the gravity data with the locations; the correlation is good, assuming that the sites were mostly at paleolake boarders or at rivers. We suggest position, extent and shape of a paleolake. Then, we have estimated a possible location, extent and shape of the putative paleolake(s). We also reconsider the origin of Libyan Desert glass (LDG) in the Great Sand Sea (GSS) and support a hypothesis about an older impact structure created in GSS, repeatedly filled by water, which might be a part of some of the possible paleolake(s).