

Interactive comment on “Shallow Geophysical Techniques to Investigate the Groundwater Table at the Giza Pyramids Area, Giza, Egypt” by Sharafeldin M. Sharafeldin et al.

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Please also note the supplement to this comment:

<https://www.geosci-instrum-method-data-syst-discuss.net/gi-2017-48/gi-2017-48-AC2-supplement.pdf>

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Shallow Geophysical Techniques to Investigate the Groundwater Table at the Giza Pyramids Area, Giza, Egypt

9 **ABSTRACT** The near surface groundwater aquifer that threatens the Great Giza Pyramids of Egypt
10 investigated using integrated geophysical surveys. Ten Electrical Resistivity Imaging, 26
11 Shallow Seismic Refraction and 19 Ground Penetrating Radar surveys conducted in the Giza
12 Pyramids Plateau. Acquired data of each method subjected to state-of-the art processing and
13 modeling techniques. A three-layer model depicts the subsurface layers and better delineates the
14 groundwater aquifer and water table elevation. The aquifer layer resistivity ranges between 40
15 80 Ωm and seismic velocity of 1500-1800 m/s . The average water table elevation is about +15
16 meters which is safe for Sphinx Statue, and still subjected to potential hazards from Nazlet
17 El-Samman Suburban. Shallower water table in Valley Temple and Tomb of Queen Khenepepu
18 detected to be between 14.5-15m represent a sever hazards. Perched ground water table detected
19 in elevated topography to the west and southwest might be due to runoff and capillary seepage.
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22 *Keywords: Groundwater, Electrical Resistivity, Seismic refraction, GPR*

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In recent years, the 4500 years old Giza Great Pyramids (GGP) of Egypt; Cheops (Khufu), Chephren (Khafre), Menkaure and Sphinx statue; threatened from the rising groundwater table resulted from the water leakage of the suburban, irrigation canals and mass urbanization surrounding the GGP. This problem promoted the need to use non-destructive near-surface geophysical techniques integrated with available borehole hydrogeological data to investigate and characterize the groundwater occurrences in the GGP. The GGP located in the southwestern part of the Greater Cairo Region (Fig. 1). Geologically, the Giza Pyramids Plateau composed mainly of white limestone, cream and yellow argillaceous limestone and dark grey dolomitic limestone of Middle-Upper Eocene age. The plateau rocks are commonly interbedded with thin marl layers in their upper part, which dips with about 5-10° to the SE direction. Steep escarpments border the plateau to the north and east directions as shown in Fig. 2 (Yehia, 1985; Mahmoud and Hamdan, 2002). Two regional groundwater aquifers underlie the sphinx (Fig. 3). The Quaternary aquifer of the Nile alluvium consists of graded sand and gravel with

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Fig. 1. final revised version include figures and replies

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