

## ***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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1 **Shallow Geophysical Techniques to Investigate the Groundwater Table**  
2 **at the Giza Pyramids Area, Giza, Egypt**  
3  
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9 **ABSTRACT**  
10 The near surface groundwater aquifer that threatened the Great Giza Pyramids of Egypt,  
11 investigated using integrated geophysical surveys. Ten Electrical Resistivity Imaging, 26  
12 Shallow Seismic Refraction and 19 Ground Penetrating Radar surveys conducted in the Giza  
13 Pyramids Plateau. Acquired data of each method subjected to state-of-the-art processing and  
14 modeling techniques. A three-layer model depicts the subsurface layers and better delineates the  
15 groundwater aquifer and water table elevation. The aquifer layer resistivity ranges between 40-  
16 80 Ωm and seismic velocity of 1500-1800 m/s. The average water table elevation is about +15  
17 meters which is safe for Sphinx Statue, and still subjected to potential hazards from Nazlet  
18 Elsamman Suburban. Shallower water table in Valley Temple and Tomb of Queen Khentkawes  
19 detected to be between 14.5-15m represent a severe hazard. Perched ground water table detected  
20 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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24 **1. INTRODUCTION**  
25 In recent years, the 4500 years old Giza Great Pyramids (GGP) of Egypt; Cheops  
26 (Khufu), Chephren (Khafre), Menkaure and Sphinx statue; threatened from the rising  
27 groundwater table resulted from the water leakage of the suburban, irrigation canals and mass  
28 urbanization surrounding the GGP. This problem promoted the need to use non-destructive near  
29 surface geophysical techniques integrated with available borehole hydrogeological data to  
30 investigate and characterize the groundwater occurrences in the GGP. The GGP located in the  
31 southwestern part of the Greater Cairo Region (Fig. 1). Geologically, the Giza Pyramids Plateau  
32 composes mainly of white limestone, cream and yellow argillaceous limestone and dark grey  
33 dolomitic limestone of Middle-Upper Eocene age. The plateau rocks are commonly interbedded  
34 with thin marl layers in their upper part, which dips with about 5-10° to the SE direction. Steep  
35 escarpments border the plateau to the north and east directions as shown in Fig. 2 (Yehia, 1985;  
36 Mahmoud and Hamdan, 2002). Two regional groundwater aquifers underlie the sphinx (Fig. 3),  
37 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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