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Integrated Near-Surface Geophysical Techniques for Geological Evaluation for Installing Water Plant on Sidi Abdel-Rahaman's Area, Northwest Mediterranean Coast of Egypt

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Integrated induction electromagnetic, electrical and ground penetrating radar surveys were carried out in highly intruded site by sea water at the northwest coast of Mediterranean Sea, Egypt, to assess the shallow subsurface stratification, cracks, faulting, or any unexpected subsurface criterion that can affect the sustainability of the construction of a new water plant. The applied geoelectrical resistivity sounding (ER), which can be utilized for investigating the vertical and lateral variation of resistivities of subsurface geological sequence, supported with the additional information gathered from GPR and VLF-EM techniques and correlated and validated with the referenced subsurface geological sequence and the drilling boreholes.

Applying VLF-EM and ER techniques reveals the geology of the subsurface up to 120 meters from the ground surface in the form of four-distinctive-layers model of: surficial moderately-resistive alluvial deposits with a thickness varies between 5 – 8 m; second layer of highly-resistive calcareous sandy mud deposits with a thickness ranged between 10 – 22 m, third layer represented by highly saline saturated oolitic limestone with a thickness ranged between 60 – 72 m and the imaged succession was ended with highly-resistive marly limestone with clay intercalations. Whereas, ground penetrating radar supported the near-surface subsurface sequence.

The integration of the VLF-EM, ER and GPR results generated well-established and trustable subsurface geological model and There is no indication for the presence of subsurface abnormalities in the investigated site, that can affect the stability and sustainability of the proposed new water plant, taking into account the extreme degree of saline saturation due to the closeness of the site to the Mediterranean Sea

Biography:

Essam Abdel Halim Morsy is an associate Professor in Environmental and Applied Geophysics Department, Faculty of Science, Cairo University where he has been a faculty member since 1996. He completed his undergraduate studies, M.Sc and Ph.D degrees at Cairo University. His research interests lie in the area of application of near-surface geophysical techniques in solving the environmental and engineering problems, ranging from theory to design to implementation. He has collaborated actively with researchers in several other disciplines of environmental science, particularly air quality and solid waste management.