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Geophysical methods as effective tools in geo-environmental investigation and monitoring

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Subsurface geology is especially near to the surface which is one of the prime important in any environmental management. Among these are groundwater logging and monitoring, slope stability in areas of landslides, voids and karstic features, soil contamination, geotechnical characterization of foundation beds, buried archeological remains or building, tombs, etc. Surface and borehole geophysical methods such as Earth Resistivity Tomography (ERT), shallow Seismic Refraction Tomography (SRT), Crosshole Seismic (CHT), Ground Penetrating Radar (GPR), ground magnetic and ground gravity have wide applications in detecting and evaluating of the mentioned environmental features. These techniques are characterized by different penetration and resolution capabilities from few centimeters to hundred meters based on the method used and site conditions. For example, ERT was applied on the coastal area of the Mediterranean Sea opposite Egypt from which the interfaces between fresh, brackish and saline water were identified. Also it applied on the extension areas around Prophet Mohamed Mosque to differentiate between different types of basaltic flow and locate the saturated and unsaturated zones. Moreover, it applied on the proposed site of Sohag University, Egypt to locate shallow fractures and clayey beds. SRT was applied to determine the excavation tools and methods in pathway of underground tunnel at El-Madina city, KSA. Also CHT was applied to determine the geotechnical parameters in the foundation beds in new settlement site. Ground magnetic was used in locating buried tombs in Hibis Temple archeological site, El-Kharga area, Egypt. GPR survey was carried out to detect buried utilities and seepage inside tunnel in different areas. Finally geophysics has a wide applications and act as effective tolls in geo-environmental investigation and monitoring.

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