

Geophysical techniques for hydrological investigations

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Geophysics in Greek means “physics of earth” (Scheidegger, 1976). Geophysics is the application of physical principles to investigate and study the interior of the earth, from land surface to the inner core, is known as solid earth geophysics (Reynolds, 1997 and Sheriff, 1982). This can be subdivided further into: global geophysics (pure geophysics) and applied geophysics (exploration geophysics or geophysical prospecting). Applied Geophysics is concerned with the investigation of the Earth’s crust and subsurface condition, usually with economic exploitation objectives, by making and interpreting measurements of physical properties of the earth. It covers a wide range of application, which includes sub-disciplines: engineering geophysics, environmental geophysics, archaeo-geophysics, hydro-geophysics, and hydrocarbon exploration. The application of geophysical surveys to evaluate the geological and hydrological conditions of underground water studies and prospecting is called hydro-geophysics. Hydro-geophysics utilizes different physical properties of earth materials to study subsurface structures. Major factors that have to be considered in the design of a geophysical survey for hydrogeological application (McCann & Green, 1996) are as follows: depth of penetration into the geological formation, vertical and lateral resolution required for the anticipated targets, and contrast in physical properties between the target and its surroundings. A preliminary stage of the investigation involves a desk study and reconnaissance survey; this is followed by the main stage of detailed field exploration and ground investigation; data review then continues during the groundwater extraction to expose more details of the groundwater quality and conditions. The significance of the research appears considerably in the exploration and studying geological units by mapping their subsurface features and characteristics using geophysical techniques for hydro geological applications for studying subsurface karstic limestone using geophysical techniques at Ipoh, Perak, Malaysia (Abu-Shariah *et al.*, 2000; Abu-Shariah, 2002). Therefore, different geophysical techniques were applied in many hydrogeological researches, and satisfactory results were obtained of multi-applications objectives. The geophysical techniques are useful in the assessment and delineation of subsurface structures and features, and provide cost-effective data for this target.

References

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