Investigations of subsurface characterization using ground magnetic resonance

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The use of the geophysical technique for groundwater mapping has been increased due to the rapid advances in computer and numerical modeling. The new technique of ground magnetic resonance (GMR) is used in geophysical applications for determining aquifer properties such as porosity, permeability and water content. The technique of GMR measurements are based on nuclear magnetic resonance (NMR) which is used in the laboratory and in the boreholes. The technique of NMR provides the subsurface information from the surface based measurements. As such, the NMR is the only geophysical exploration method providing direct and non-destructive information on hydraulic subsurface aquifer properties.The main aim of present study is to know the distribution of water with depth, location of the basement rock, thickness of weathered zone, structural and stratigraphic conditions relevant to the groundwater conditions near Roorkee region of Uttarathand, India. During experiments, both small diameter of 10 m and large diameter of 20 m loops were used in the field. The results obtained from GMR equipment were compared with borehole test of the aquifer characterization up to 30 m to 40 m below the surface. The results show the good agreement with existing data of the site selected in the field. The technique of GMR provides direct measurement of total water content and estimates the relative pore-size distribution and hydraulic conductivity. It also directly measures the mobile and immobile water content below the surface of the soil. Thus, GMR provides the valuable information for groundwater investigations.