

Applicability of Ground Penetrating Radar for investigation of vadose zone in arid land

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We evaluate the applicability of Ground Penetrating Radar(GPR) for characterization of subsurface structure and groundwater in arid land, which control the transport phenomena of water and solute transport in vadose zone.

We conducted the field test in the fields of Arid Land Research Center, Tottori university, using the GPR system with shielded antennas of dominant frequencies, 100,200,400,500,900,1.5GHz. Soil type in the field is almost uniform sand, and water content of soil is around or lower than 5%. Then soil is considered to be lossless media in electric magnetic sense. Penetration depth of each antenna is deeper than values usually reported. For example penetration depth of the system with 100MHz antennas is considered to be in the range from 20 to 30m.

We visualize 3D subsurface structure using the 100 MHz antenna. The obtained image shows the distribution of ground water table and layer which seems volcanic ash seam in sand and will control water recharge process in vadose zone.

Keywords: Ground Penetrating Radar (GPR), Vadose zone, Subsurface structure, Arid land