Geophysical Research Abstracts
Vol. 19, EGU2017-2101, 2017
EGU General Assembly 2017

TDR measurements looking for complex dielectric permittivity and complex magnetic permeability in lossy materials

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TDR probes can be exploited for the measure of the electromagnetic characteristics of the soil, or of any penetrable material. They are commonly exploited as instruments for the measure of the propagation velocity of the electromagnetic waves in the probed medium [1], in its turn useful for the proper focusing of GPR data [2-5]. However, a more refined hardware and processing can allow to extrapolate from these probes also the discrimination between dielectric and magnetic characteristics of the material under test, which can be relevant for a better interpretation of the buried scenario or in order to infer physical-chemical characteristics of the material at hand. This requires a TDR probe that can work in frequency domain, and in particular that allows to retrieve the reflection coefficient at the air soil interface. It has been already shown [6] that in lossless cases this can be promising. In the present contribution, it will be shown at the EGU conference that it is possible to look for both the relative complex permittivity and the relative magnetic permeability of the probed material, on condition that the datum has an acceptable SNR and that some diversity of information is guaranteed, either by multifrequency data or by a TDR that can prolong its arms in the soil.

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