



Attribute analysis and deconvolution on GPR data

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GPR has been extensively used both in civil engineering problems and in delineating archaeological buried targets due to its high resolution imaging. One of the problems encountered is to distinguish the recent civil underground structures and utilities from archaeological remains.

The underground utilities, usually buried approximately at 0m-2m depth, are causing multiples to the GPR data and along with the closely spaced inhabitation phases produce complex GPR sections. Thus, increased resolution is needed. Time varying wavelet deconvolution efficiently increases the temporal resolution and also obtains the correct polarity of the reflectivity series. This method utilizes a known wavelet which can be acquired experimentally. Attribute analysis is a powerful tool for the interpretation of GPR data. There are two main categories of attributes: The first is Instantaneous attributes which are related to the variations of the physical properties of the subsurface and the buried objects. They are calculated sample by sample via Hilbert transform and the most common are instantaneous envelope and phase. The second category includes the geometrical attributes which are related to the spatiotemporal variations in the data and are affected by morphological variations. They are calculated in a user defined time and space window and the most common are semblance and coherency.

We utilize processing tools such as deconvolution, to suppress multiples from the data and increase the temporal resolution as well as attribute analysis to better image the subsurface. Here, we demonstrate the potential of attribute analysis on deconvolved GPR data in delineating recent buried structures and utilities at sites where buried antiquities also exist.