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The combined time-depth conversion as a method for a better imaging of complex scenarios

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In this contribution we will propose a resume regarding the technique of the combined time depth conversion, which is relevant to particular cases in the framework of the GPR prospecting, that are of interest when layered scenarios are met, or in cases when electrically large cavities are likely found [1]. These cases are particularly relevant for the urban geophysics, because of the intrinsic layered structure of many engineering works and for the risk of subsidence due to unknown buried cavities.

In these cases, the problem is often computationally too cumbersome to be afforded in its entire complexity [2]. On the other hand, a common GPR processing [3] might not provide a correct imaging of the buried scenario, because in layered media the first (shallower) layer would result spuriously compressed or spuriously dilatated with respect to the other ones, whereas a buried cavity would (and does) appear all the times incorrectly compressed.

These well-known problems are due to the different propagation velocity of the electromagnetic waves within the different media.

However, if one of these cases is recognizable from the data, it can be possible to operate a suitable localized expansion of the compressed parts of the image, that can be -let say- ironed up to its correct vertical size [4].

This makes it possible to represent the different buried targets in more realistic reciprocal positions and proportions, so making clearer the image. In particular when a slicing is applied or (in some cases) a pseudo 3D perspective imaging, the combined time-depth conversion can meaningfully improve the interpretation of the buried scenario.

At the conference, both simulated and experimental results in controlled condition will backup these reasoning.

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