Geophysical Research Abstracts
Vol. 19, EGU2017-18265, 2017
EGU General Assembly 2017

Tomographic reconstruction of structures using a novel GPR system

Alessandro Fedeli (1), Jana Ježová (2), Sébastien Lambot (2), Matteo Pastorino (1), Andrea Randazzo (1), and Lara Pajewski (3)

(1) Department of Electrical, Electronic, Telecommunications Engineering, and Naval Architecture, University of Genoa, Genoa, Italy, (2) Earth and Life Institute, GERU, Université Catholique de Louvain, Louvain-la-Neuve, Belgium, (3) Department of Information Engineering, Electronics and Telecommunications, Sapienza University of Rome, Rome, Italy

The ever growing range of applications of ground penetrating radar (GPR) motivates the need of developing efficient measurement systems combined with effective data processing methods. On the one hand, advanced GPR measurement systems require to accurately model the physical effects occurring between the antenna structure and the medium. On the other hand, the GPR device should provide a reliable reconstruction of the properties of the targets under an inspection to a common user. In this work, a novel GPR system was tested for the imaging of buried structures. First of all, the acquired experimental data were pre-processed with a proper calibration technique for removing antenna effects. After that, a reconstruction of a hidden structure was obtained by means of both qualitative and quantitative electromagnetic inverse scattering methods. In particular, while the qualitative techniques aim at reconstructing only specific features of the targets (e.g., location, shape), the proposed quantitative method has the challenging goal of the complete electromagnetic characterization of the buried structures. The performance of the new system was evaluated in different operating conditions with promising results.

Acknowledgment

This work benefited from the networking activities within the EU funded COST Action TU1208, “Civil Engineering Applications of Ground Penetrating Radar”. Part of this work was carried out during the Short-Term Scientific Mission STSM-TU1208-34990 “Testing of a new lightweight radar system for tomographical reconstruction of circular structures” (Alessandro Fedeli, Italy, visiting Prof. Sébastien Lambot, Belgium).