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The GPR dataset of the IFSTTAR Geophysical Test Site

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This contribution aims to present a collection of ground penetrating radar (GPR) profiles, acquired over the Nantes Geophysical Test Site of the French institute of science and technology for transport, spatial planning, development and networks (IFSTTAR). The dataset is part of the Open Database of Radargrams of COST (European Cooperation in Science and Technology) Action TU1208 "Civil engineering applications of Ground Penetrating Radar" and includes 41 radargrams. Such radargrams were recorded by using two GPR systems equipped with various antennas working on different frequency ranges.

The idea beyond the TU1208 Open Database of Radargrams is to make available for the scientific community a selection of GPR responses from natural and manmade structures. All data, along with descriptions of the investigated structures, are being uploaded on the Action website (www.GPRadar.eu). To the best of our knowledge, this is the first open database of GPR responses: similar initiatives were never undertaken in the past, in the GPR field.

By employing inversion and imaging techniques, scientists can try and reconstruct the geometrical and physical properties of the inspected subsurface or structures, from the experimental measurements. Methods for the solution of forward-scattering problems can be used to reproduce the measured data by modelling the scenarios at hand. Processing algorithms and procedures can be tested over the database radargrams. Overall, this initiative will foster and facilitate a reliable comparison of different approaches. Let us mention that the aim of comparing different approaches is obviously not to define the "best methods," but more properly to understand the range of reliability of each technique in terms of accuracy, potential, advantages, and drawbacks.

The IFSTTAR Geophysical Test Site consists of a pit, 30 m long and 5 m wide, with sloping sides. The useful region of the pit has a variable depth, ranging from 3.30 m to 4.70 m. The pit is divided into eleven sections, filled with different materials and separated by vertical interfaces. There are two sections filled with silt, a multilayered section, two sections of calcareous sand, two sections filled with low-density gravel gneiss, and four sections filled with high-density gravel gneiss. The filling materials are chosen to be representative of common scenarios in urban sites. Several targets are embedded in the test site. They are representative of objects that can be commonly found in trenchless works – such as pipes, cables, stones of various size, and masonry. The positions of the obstacles were accurately identified in a local reference system during the construction of the test site. Precautions were taken to prevent water inflows, including bottom and side drains and coverage by an armed single layer of geotextile. The radargrams were gathered by using two pulsed systems manufactured by GSSI and MALA. The GSSI GPR was used with 200-, 400-, 500- and 900-MHz antennas; the MALA GPR was used with 250-, 500-, and 800-MHz antennas.

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