

Urban Seismic Refraction in a Granitic Environment (Porto, Portugal)

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Northern Portugal possesses a temperate Atlantic climatic influence. In this environment the weathering of granite is characterised by an irregular and shallow profile with the occurrence of some isolated blocks. Other factors such as relict and structural shearing also control the weathering profile. The weathering is therefore distinct from the tropical and cold environments. Episodes of human occupation, also add complexity to the overburden cover in the urban environment in which sustained development of two underground car-park projects of Porto town were performed using geophysical methods.

This environment can restrict the application of the different methods. Electromagnetic urban noise is prejudicial to EM, Magnetic and to some extent GPR. Therefore, we show that the seismic refraction method is more robust if the interpretation takes into account the spatial velocity distribution.

Traditional seismic refraction interpretation dates back to the fifties. Mota (1954), introduced one of the first improvements in refraction data inversion by dealing with the multi-layer and multi-dip model. But granitic weathering rarely results in this geometry. Palmer (1980), introduced improvements to the Delay Time method that permitted to deal conveniently with irregular interfaces of the refractors. But in granitic weathering we seldom observe homogenous velocities. Weathering is more of a gradual transition. Recently, a new technique based in traveltimes tomography inversion method resulting in detection of lateral and vertical velocity heterogeneity that was useful to supply the engineer and the archaeologist with a 3D block of the granitic velocity distribution to support development of the projects.