



## **High-resolution seismic characterization in an urban area: a subway tunnel test site (Barcelona, Spain)**

D. Martí (1), R. Carbonell (1), I. Flecha (1), I. Palomeras (1), E. Vázquez-Suñé (2), J. Font-Capó (2), A. Pérez-Estaún (1).

(1) Institute of Earth Sciences “Jaume Almera” – CSIC, Barcelona, Spain, (2) Universidad Politécnica de Catalunya, Barcelona, Spain

A detailed characterization of the physical properties, as well as the reconstruction of the fracture network (faults and dykes) was obtained in a subway construction project, by means of seismic methodologies. The acquisition experiment was designed using different 2D and 3D geometries with the aim of imaging the shallow surface around the tunnel course, having the constraint of the town planning. A Vibroseis truck was used as a source to provide a good S/N ratio, taking into account the expected environmental noise present in an urban site. The extremely heterogeneous surface layer (weathered granite and antropogenic effects) make difficult to obtain a good seismic reflection image, at least at the exploration depth. The first-arrival seismic tomography revealed as a key tool to clearly differentiate the different rock volumes characterized by different physical properties. Low velocity values (1000 – 1300 m/s) characterize the upper part of the study area providing the geometry of the thick surface weathered layer. In a few meters, a high velocity gradient indicates the contact with a granite more cohesive and less fractured. High velocity anomalies (up to 5500 m/s) surrounded by low velocity zones show a serie of porphyric dykes or unfractured granites cut by different fault systems. The tomographic velocity models also provide a new image of an important Miocene fault, quite different to the previous geological section derived from the core interpretation.