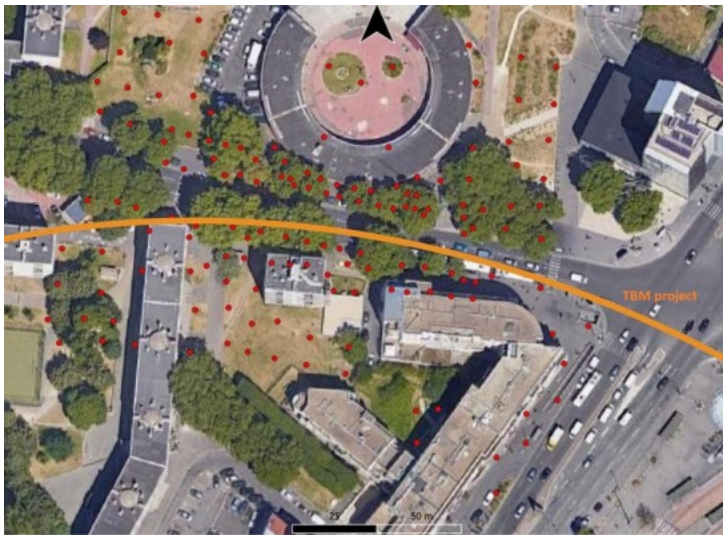
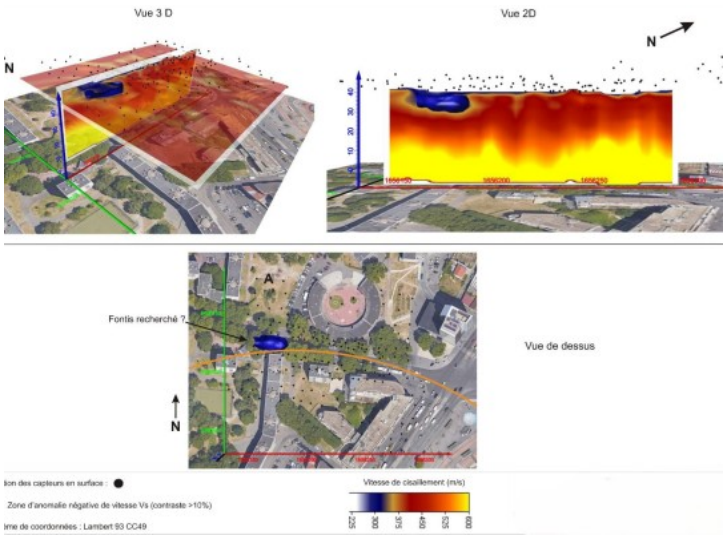
Grand Paris Express Line 15 North-East

Characterization of a Formerly Backfilled Sinkhole Using 3D Ambient Noise Tomography – SISSTERRA

Aubervilliers - FRANCE



Seismic network of geophones (red dots) and projection of the TBM alignment.



SISSTERRA results. Zoom on the major velocity anomaly (2D sections and projection of the anomaly localisation on the map).

2025 - 2025

IRIS L15 nord est

LINE 15, A 75 KM RING ROAD AROUND PARIS

The North-East section of Line 15, 23 km long, will pass through 13 municipalities and directly benefit 675,000 residents. It will complete the South and West sections of Line 15 to form a large 75 km ring around the capital, with a planned service launch in 2031. The excavation of the project faces geological challenges, requiring the implementation of innovative technologies.

CONTEXT FOR SISSTERRA APPLICATION

Along the future path of the Line 15 tunnel boring machine (TBM), studies have been conducted to better understand the subsurface conditions. For example, a study in Aubervilliers (France) applied the SISSTERRA solution for non-invasive subsurface imaging at a site affected by a sinkhole in the 1960s, where backfilling may have been poorly executed. The objective was to confirm the presence and extent of this former sinkhole. Using a dense array of 160 autonomous seismic sensors and advanced ambient noise processing, a 3D shear-wave velocity (Vs) model was reconstructed down to 50 meters.

3D TOMOGRAPHY RESULTS AND VALIDATION

The 3D ambient noise tomography revealed a low-velocity anomaly. Further ground investigation logs at the center of the anomaly confirmed the presence of backfilled materials of allochthonous origin, whose geotechnical properties appear to be of low quality, supporting the validity of SISSTERRA results in this complex urban context.