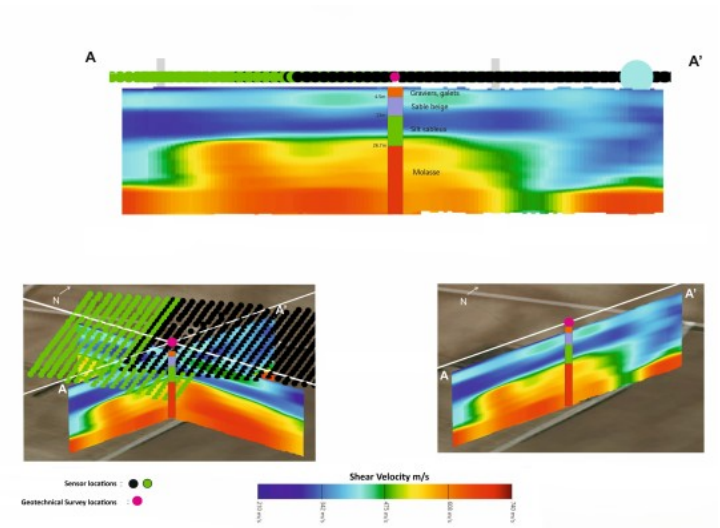
Rhonergia Hydropower Dam project

Preliminary Site Investigation Studies for the development of the Geological model - SISSTERRA application

Saint-Romain-de-Jalionas - FRANCE

Rhonergia dam scenario. Credit: Agence 2BR – CNR



Comparison of Vs values obtained by SISSTERRA at the intersection of a borehole. The dots represent location of surface sensors.

2023 - 2024

Compagnie Nationale du Rhône

CONTEXT AND OBJECTIVES

The Rhônergia project of the Compagnie Nationale du Rhône (CNR) aims to build a new dam with a hydrœlectric power station on the Rhône River between Lyon and the Upper Rhône. Within this framework, CNR commissioned SIXENSE to conduct a geophysical survey using the Sissterra® method based on 3D Ambient Noise Tomography.

The survey, conducted in Saint-Romain-de-Jalionas (France), aimed to characterize the subsurface by mapping the depth and geometry of the alluvial layers and the underlying bedrock. Its objectives were to detect depressions or mechanically weak zones, evaluate lateral heterogeneities, and identify preferential groundwater-flow pathways within the sediments or at the alluvium–bedrock interface.

SISSTERRA MEASUREMENTS

Over 1,100 sensors were deployed across 3 sites of the study area. The recording period ranged from 168 to 192 hours per site. Underwater sensors in the Rhône were strategically placed to ensure data continuity across the river. The resulting dataset included more than 300,000 cross-correlation measurements.

The final 3D models provide a continuous representation of shear velocity within the first 60 meters, both along the banks and beneath the riverbed. These models offer key insights into the subsurface structure, including lithological transitions, the weathering state of molassic materials, and paleo-channels at the rockhead.

In terms of seismic risk, a comprehensive Vs30 map was produced.

RESULTS AND CONCLUSION

This project has demonstrated the added value of SISSTERRA for geological and geothermal exploration in complex environments. The deployment strategy, including a set of seismic nodes placed directly in the Rhône River, showcased the method's adaptability in mixed land - water settings. This ensured continuous lateral coverage. The resulting high-resolution Vs models helped identify sedimentary facies transitions, areas of low material cohesion, and potential preferential water pathways, essential information for both geothermal resource targeting and geotechnical risk assessment.