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## Testing the applicability of ambient noise methods in zones with different degree of anthropogenic sources.

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The general objectives of the “Seismic Ambient Noise Imaging and Monitoring of Shallow Structures” (SANIMS) project, funded by the Spanish Ministry of Science, Research and Innovation (Ref.: RTI2018-095594-B-I00), are focused into the application and development of methods based on ambient noise seismic data recorded by dense networks to image and monitor natural and human-altered environments. To achieve this objective, temporal seismic networks have been installed since late 2019 in two very different settings; the Cerdanya Basin, a sedimentary basin located in the eastern Pyrenees and the city of Barcelona.

Regarding the Cerdanya Basin, a relatively unaltered setting, a network of up to 25 broad-band stations has been installed for a period of one year. Additionally, a high resolution grid of seismic nodes will be deployed for 2 months in the central part of the basin, with interstation distances of 1.5 km. In order to constraint the uppermost crustal structure using ambient noise, vertical component recordings will be processed using the phase cross-correlation and time-frequency domain phase-weighted stacking to extract fundamental mode Rayleigh waves. The surface waves will then be used to measure inter-station group and phase velocity dispersion curves that will be inverted using the Fast Marching Surface Tomography method. Depending on data quality, we will also process the horizontal components to extract Love waves for joint inversions with Rayleigh waves to constrain radial anisotropy and/or the application of new strategies to perform attenuation tomography.

Regarding areas strongly altered by human activity, we have deployed a network of 15 short-period stations within the city of Barcelona, in most of the cases installed in the basement of secondary schools, for a duration of 9-12 months. The objective of this deployment is twofold; acquire new valuable scientific data and introduce the students in an Earth Science research project. Although the Barcelona area has been investigated using MHVSR methods by different authors, the new data acquired by the SANIMS project will expand the available data and will allow to analyze the time variability of the measurements. This new dataset will also be used to analyze the applicability of the methods based on Rayleigh wave ellipticity inversion of ambient noise and earthquake data to provide S-velocity depth profiles. Under the assumption of an isotropic horizontally layered medium, the ellipticity inversion is not affected by the directivity of the diffusive noise wave field and seems therefore to be a good option to determine local S-velocity depth profiles in areas with little lateral inhomogeneities and uneven distribution of noise sources.

We expect that the use of ambient noise methods will allow to map the basement and to obtain new higher resolution ambient noise tomographic images of the upper crust in the Cerdanya Basin and to better constrain the subsoil properties of Barcelona, hence improving the existing seismic hazard maps. Besides, comparing the results in both areas will allow to compare the performance of the different methods based on ambient noise in quiet and noisy areas.