

Abstract

A Bayesian method of seismic tomography, Markov Chain Monte Carlo (MCMC), is used on ambient seismic noise acquired in the Cerdanya Basin (eastern Pyrenees) to investigate the range of possible S-wave velocity models, in an attempt to determine the depth of the sedimentary material in the basin. A profile along the basin used in a previous ambient noise tomography (ANT) study is also used in this study to compare results. While some effect from the basin can be detected by the MCMC, we find that this sedimentary layer is not clearly resolved given the lack of availability of high-frequency ambient seismic noise data for this study. However, a clear secondary velocity interface underneath the expected basin depth is detected, with an average depth of 1.36 ± 0.26 km.

We show that as a stand-alone method, MCMC proves to be a helpful tool in analyzing the 3D geometry of the basin. Beside this methodological aspect, our results help to improve the geological characterization of the Cerdanya Basin and could provide further constraints to refine the seismic risk maps of an area of relevant tourist and economic activity.