



Mapping the basement of Ebro Basin in Spain using ambient noise auto correlations

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It has been proved that seismic ambient noise may provide valuable information about the Earth's subsurface. Earlier studies successfully applied single-station autocorrelations of the recorded ambient noise to retrieve body wave reflections from the Moho. In this work, we extend this approach to higher frequency noise to map the basement of the sedimentary Ebro Basin in Spain.

The Cenozoic Ebro basin had a complex evolution which generated a non-uniform basement structure. A basement high (Monegros High) divides the basin in two depocenters: the eastern depocenter has up to 3600 meter sedimentary thickness while the western one has up to 5000 meters.

We tested two autocorrelation methods to retrieve the reflection response at 42 seismic stations (vertical component) located along the basin. The classical approach provided poor results, possibly due to background seismicity (mainly from the Pyrenees) and other signals which overprint the low-amplitude P-wave reflections from the basement. However, the second approach, the Phase Cross-Correlation, proved to be efficient to retrieve the reflection component of the Green's Function. It was possible to measure confidently the two-way time (TWT) of the P-wave basement reflections for 36 stations (85% of total). The results are compared with synthetic data and lithological profiles from wells. Using a constant velocity model, the TWTs were converted to depth to present a more detailed basement map of the basin.

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