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Recent seismic activity and ambient seismic noise tomography of the Ventaniella Fault (NW Spain)

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The use of ambient seismic noise for surface wave tomography has experimented an important development over the last decade, due to the common presence of noise sources and the possibility of applying this approach at multiple scales. Moreover, ambient seismic noise cross-correlation between station pairs allows us to reconstruct the empirical Green's function of the propagating medium. In this study, we have analysed 19 months of data recorded by a small array of 10 short period seismic stations, deployed in order to investigate the southeastern section of the Ventaniella Fault (Cantabrian Chain, NW Iberian Peninsula), an important structure that shows seismic activity in this sector.

Firstly, we have accurately located 43 microseisms with ML ranging 0.2 and 1.9, geographically distributed in two main clusters. This seismicity is mostly located at depths between 9 and 20 km. Secondly, by daily cross-correlating and stacking of the vertical component ambient seismic noise, we have calculated 45 empirical Green's functions. These signals are dominated by Rayleigh waves, which clearly emerge from the background noise. We have also determined the individual dispersion curves of Rayleigh waves for each station pair, and we have calculated their group velocities in the period range from 1 to 16 s. These data have been used to invert 2D Rayleigh wave group velocity maps at different periods that may provide new insights on the origin of the seismicity and the structural role of the Ventaniella Fault in the context of the Cantabrian Chain.