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Imaging the lithospheric structure of the Central Iberian Zone

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In this work, we present lithospheric-scale model of a profile imaging part of the Iberian Massif in western Iberia. The image comprises the Spanish Central System and the Cenozoic Duero and Tajo basins which bound this mountain range to the N and S. The Central System represents part of the Variscan Central Iberian Zone (southern margin of the Paleozoic Gondwana) which was reactivated and uplifted during the Alpine Orogeny. This feature and its foreland basins to the N and S represent the most relevant topographic attribute of central Iberia.
We have used the data recoded within the CIMDEF experiment which is an almost 300-km long profile trending in NW-SE direction. The dataset consists of two months of continuous recording by an almost-linear array of 69 short-period seismic stations. We have applied seismic interferometry through two technics to construct two independent images of the lithosphere. The first technique is the so-called Global-Phase Seismic Interferometry. We have used global-earthquakes (> 120^0 epicentral distance) recordings from the continuous data to extract global phases (PKP, PKiKP, and PKIKP) and its reverberations in the lithosphere. The selected phases are autocorrelated and stacked to construct a high-resolution pseudo zero-offset reflection image. The second technique relies on the application of seismic interferometry to the continuous ambient seismic-noise recordings through autocorrelation. The autocorrelation provides an approximation of the zero-offset reflection response of a single station. Both methods are complementary as they rely on different energy sources but are applied to the same positions of the receivers.
Results reveal features that can be correlated in both reflection images. The crust-mantle boundary is mapped as a relative flat interface at approximately 10 s two-way traveltime. However, in the Central System, this feature shows an imbrication and deepening towards the NW. Crustal interfaces are found at 5 s and 7-8 s two-way traveltime. Both techniques reveal upper-mantle features between 12-18 s.
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