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Spatial variation of Lg-wave attenuation in the Iberian Peninsula

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Within a global context, the Iberian Peninsula is a region where low to moderate ($M_w < 5.5$) earthquakes occur, most of them at shallow depths ($h < 40$ km). Seismicity concentrates mainly around the Pyrenean Range, the northwestern part of the peninsula, and the southern deformation zone that includes the Betics, the Alborán Sea and the Gulf of Cádiz. In recent years, considerable improvements in seismic data quality and geographic coverage have been made by the deployment of new permanent and portable broadband seismic stations in the Iberian Peninsula. The dense accumulation of seismic data has allowed us to investigate lateral variation of crustal seismic attenuation to develop the first regional 2D *Lg*-wave attenuation model for the entire Iberian Peninsula and its frequency dependence.

Seismic data used consist of 71 events with magnitudes $3 \leq m_{bLg} \leq 5.4$ focal depths less than 30 km and epicentral distances from 100 to 1000 km which were recorded by 343 seismic stations between January 2008 and October 2013. To avoid confusion with fundamental-mode Love-wave energy on the transverse components, we only analyzed vertical component recordings.

Among all the methods proposed to measure *Lg* attenuation, we considered the reliable Two-Station Method that allows removing the common source term by taking the ratio of *Lg* amplitudes recorded at two different stations along the same great-circle path from the same event. It requires, however, strict source-station configuration and dense event and station coverage. The spectral ratios collected over high-quality interstation paths were used to determine 1 Hz *Lg* Q (Q_0) and its frequency dependence η. Then, the lateral variations of the attenuation parameters were mapped using inversion.

Lg-wave propagation was found to be inefficient or blocked for most of the paths crossing the Mediterranean Sea, the western Alborán Sea and the Strait of Gibraltar. Our results reflect large variations in Q_0 values across the Iberian Peninsula which is in accordance with the different geotectonic characteristics present in the region. Low *Lg* Q_0 values (high attenuation) were found in the Pyrenean Range and in the southern area whereas the most stable western part of Iberia showed high *Lg* Q_0. The obtained *Lg* η spatial variation map show that intermediate η values characterize most of the analyzed region.