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Ambient noise recorded at broadband stations in Portugal and Morocco: Characterization and Sources

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The first broadband (BB) seismic stations were deployed in Portugal in the 1990s, and ever since their number had steadily increased. Portugal is currently covered by a network of 35 broadband stations in mainland Portugal, which is complemented by stations in the islands of Madeira and Azores, as well as stations in Morocco. In the period 2010 – 2012, project WILAS – "West Iberia Lithosphere and Astenosphere Structure" (PTDC/CTE-GIX/097946/2008), deployed 30 additional temporary seismic BB stations in mainland Portugal. The WILAS stations, in addition to the permanent and TOPOIBERIA stations, provided a full and dense coverage of the Iberian Peninsula.

In this presentation we will characterize the ambient seismic noise recorded at BB stations deployed in Portugal (mainland, Azores and Madeira) and Morocco. We analyse all time periods of data available since the instruments were installed. The noise is characterized by means of probability density functions (PDFs) of power spectral density (PSDs) of continuous, overlapping, 1-hour segments of data. Time-series of noise levels at different frequencies and spectrograms are computed to visualize the variations of ambient noise over different time periods and frequency bands. We observe the expected diurnal periodicity at high frequencies and seasonal variation at long periods. There is a clear increase of the noise amplitude in the microseismic band during the Winter, when more storms occur in the adjacent Northern Atlantic. We correlate sea level, storm activity, and other atmospheric parameters with the variations in ambient noise level. The analysis performed gives clues concerning data quality (poor quality data is clearly identified), Earth structure (a correlation is visible between sedimentary basins and amplification of seismic noise), and sources of ambient noise at different frequency bands.