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Looking for changes in the upper crust associated with large magnitude earthquakes in central Italia using seismic noise autocorrelations

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In this work, we use seismic noise autocorrelations to monitor the temporal evolution of the upper crust in Central Italia in order to look for changes that could have occurred before the 2009 Mw6.3 L'Aquila and the 2016 Mw 6.2 Amatrice earthquake.

To that end, we use the Coherence of Correlated Waveforms [CCW] method, that consists in measuring changes in the waveform of autocorrelations with a temporal resolution of 5 days.

Our measurements of the CCW show that the L'Aquila Earthquake is preceded by a 150-days oscillation whose amplitude and frequency progressively increases until the rupture. Analysing 17 years of data, we found that this signal occurred only before the L'Aquila and the Amatrice earthquake. This suggests the existence of a unique nucleation process.

Finally, we compare the results obtained using the CCW method with the temporal evolution of the seismic waves velocity (dv/v) obtained by analysing the coda of seismic noise autocorrelations.