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Seismic velocity changes in the region affected by the Mw 7.8 Pedernales (Ecuador) earthquake from cross-correlation of ambient seismic noise

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In the last decade, correlation of ambient seismic noise has opened a window to new possibilities for the study of structural properties of the Earth. One such possibility is the monitoring of transient changes in the mechanical properties of the surrounding crustal material following an earthquake. These changes, expressed as variations in seismic velocities, are usually associated to fracture damage and release of fluids due to the earthquakes shaking, but could also be related to deformation associated with afterslip. On April 16, 2016, a Mw 7.8 earthquake struck the coast of Ecuador, rupturing a ~100 km-long segment of the megathrust interface previously identified as highly coupled. Shortly after the mainshock, we deployed a temporary seismic network to monitor the post-seismic phase, in addition to the already in-place permanent Ecuadorian network. Here we present results from cross-correlation of continuous ambient seismic noise during a ~12-months period following the mainshock. Taking advantage of the dense and extensive station network, we investigate the spatial extension of the postseimic seismic velocity increase. Our preliminary results show a sustained increase in seismic velocities after the earthquake, with a decay in the rate of the increase during the last few months. We interpret these variations in seismic velocities (steady increase) as the crust's response to the healing process that takes place during the post-seismic phase. This healing process could involve the decrease of fluid-related pore pressures and the healing of fractures generated during the mainshock, both at the interface and on the overriding plate.