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Ambient seismic noise monitoring: an online application for decision makers – example of various applications for different slopes configurations.

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Monitoring landslides is essential to understand their dynamics and to reduce the risk of human losses by detecting precursors before failures. In general, surface observations need to be complemented by observation at depth, in the bulk of the material. A decade ago, the ambient seismic noise interferometry method was proposed to monitor changes in the seismic surface wave velocity. As seismic wave velocities are directly related to the rigidity of the material, any reduction of seismic velocity can be associated to a loss of rigidity with high probability (a route toward soil liquefaction or to high fracturation). This technique led to detect a velocity decrease several days before the failure of a clayey landslide [1], paving the way to a novel precursor signal that could serve for alert or early warning systems. Here we report at least five different landslides that have been monitored, over several years [2]. In this paper, we detail the standard experimental configuration, the basic signal processing procedure, the sensitivity and resolution of the method, together with its advantages and possible limitations. Environmental effects on the relative seismic velocity change are discussed.

In order to make the technology operational for decision makers, we built an online application with web portal displaying daily evolution of seismic velocity variation. This portal also integrates other available observations like environmental parameters (weather, precipitations) or surface observation (photogrammetry, gps, extensometers...).

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