A review of methodologies for monitoring active landslides with ambient seismic noise

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Ambient seismic noise is now widely used to image the Earth, from global scales to local subsurface applications, and to monitor tiny mechanical changes [1]. The basic idea behind all applications is that the ambient noise cross-correlations between two passive sensors represents the impulse response between them as if one was a source. Reproducibility turns this method into a robust technique for time-lapse probing the properties of the soil [2]. In this review, we will present two outputs than can be derived from daily or hourly ambient noise cross correlations.

1) We use Coda Wave Interferometry to estimate tiny relative velocity changes (dV/V) that can be as small as 10^{-4} to 10^{-5}. Seismic velocity changes are associated to evolutions of rigidity of the material and/or changes of density. In the first case, dV/V can be used as a precursor signal for soil destabilization [3]. Changes of density are in general smaller than rigidity changes priori to destabilization.

2) We use Coda Wave Decorrelation as an indicator of structural changes [4]. These changes can originate from fluid injections, geometrical deformation, and crack developments. . .

We will also overview practical applications of landslide monitoring in non-seismic and seismic regions.

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