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Seismic noise correlations and monitoring of the Utiku (New-Zealand) landslide

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The Utiku landslide (New-Zealand) has been monitored over the last 40 years by the Geological National Survey because its movements impair the Highway 1 integrity as well as the unique railways of the Northern Island. Six seismic recorders were added to the survey over the 11/2008 – 01/2010 period. We continuously recorded the ground motion created by microtremors, trains, and over a thousand earthquakes (M 1-7.8) that occurred in the complex tectonic setting of New-Zealand. The hourly cross correlation of the seismic records is an efficient tool to monitor the landslide activity. Preliminary results show an overall seasonal variation of the arrival time, probably linked to environmental parameters such as pressure or water level. A detailed analysis reveals a strong variation of a few percent of the relative velocity between some pairs of seismic stations. This apparent decrease of velocity is linked to two major effects: one is the relative displacement of the seismic recorders within the landslide; the second is the disturbance in the structure of the rock situated above the slipping interface. A comparison with GPS time series allows us to quantify these two effects.