Geophysical Research Abstracts
Vol. 19, EGU2017-14800, 2017
EGU General Assembly 2017
© Author(s) 2017. CC Attribution 3.0 License.

Healing of the landscape after Gorkha earthquake, insights from seismic interferometry

Luc Illien (1), Christoph Sens-Schönfelder (2), Niels Hovius (2), Christoff Andermann (2), and Jens Martin Turowski (2)

(1) Ecole Normale Supérieure, Paris, (2) GFZ German Research Centre for Geosciences

It has been shown that earthquakes trigger transient effects in the landscape that can last from several days (enhanced river discharge) to several years (enhanced landslides rates) or even decades (e.g. river bedload). These observations are geomorphic expressions of physical changes in shallow subsurface that are yet poorly understood. To gain insights in the underlying physical processes, we appeal to exploratory geophysical methods that allow us to monitor the variation of rock strength over time. Thanks to a seismic dense array deployed in the Bhote Koshi catchment following the April 2015 7.8 Mw Gorkha (Nepal) earthquake we can apply noise correlation monitoring the evolution of the seismic wave velocities at a high spatial resolution in the landscape. Our results show that the observed velocity changes are spatially heterogeneous after ground shaking events. We attribute these velocity changes to coseismic damage that is followed by a recovery in rock strength in the sampled medium. We suggest that these results directly reflect the state of the most fractured layer in the landscape, in the shallow sub-surface. These findings allow us to discuss where erosion patterns such as landslide-prone areas cluster but also mechanisms responsible for hillslope healing after large earthquakes. Finally, this study highlights the value of seismometers for the investigation of near-surface processes in the context of natural hazards.