Monitoring magnitude and direction of movement in landslides with optical remote sensing.

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Landslides are a widespread natural hazard. Remote sensing is these days used to detect landslide locations, by visual interpretation or semi-automated analysis of multi-temporal images. Instead of only being able to sense the status quo, a continuous monitoring of movement would greatly add to knowledge on landslides and help risk assessment in landslide prone areas.

In this paper, we aim to not only detect landslides, but also monitor its movement over time. We first assess the capabilities of the adopted methodology to detect motion and provide an overview of what level of detail can be detected, and what imagery (high spatial resolution or high temporal resolution) is needed to do so.

For the application we focused on landslides in Kashmir (Pakistan) and on the Koyulhisar landslides in the North Anatolian Fault Zone (Turkey). We used sub-pixel correlation of optical ASTER and Quickbird imagery to detect spatial shift of pixels. These observations were linked with elevation data to evaluate the sense of direction obtained by remote sensing. Observations from the field (Pakistan) as well as GPS data were in addition used to validate magnitude and direction of movement.