Geophysical Research Abstracts, Vol. 8, 05331, 2006
SRef-ID: 1607-7962/gra/EGU06-A-05331

Concept for the use of multitemporal optical satellite data and digital elevation models for the mapping of landslides and regional landslide hazard zonation

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The presented concept shall demonstrate how multitemporal optical satellite data and multitemporal digital elevation models (DEM) can be used for landslide mapping and a landslide hazard zonation on a regional scale. Beside the remote sensing images and their derivatives, filed work shall be used as a source for information; mainly for the collecting of ground control points, sample and validation data.

So far, optical remote sensing data served only as a partial source for information in landslide hazard zonations, i.e. to map landslides which was done mainly visually or to assist in analysing the relationship between landslides and causative factors by extracting information related to geomorphology, topography, geology, landuse and hydrology. This is the more remarkable as remote sensing data proved to be of value in the single domains, although, a systematic analysis about the use of satellite imagery is sometimes missing; this is especially valid for the mapping of landslides.

Therefore, one emphasise is put on the evaluation of different remote sensing change detection techniques, i.e. Change Vector Analysis, Principal Component Analysis and Image Segmentation, for their suitability to map landslides. The goal is to find an objective and fast method which should be transferable to similar areas. Besides the landslide inventory maps also additional information related to landslides shall be extracted from the remote sensing data, viz. geomorphology, topography, geology, land use and hydrology. As the mapping of landslides and also most of the related spatial data requires information from digital elevation models only pre- and post-event remote sensing data offering stereo capabilities shall be used. The DEMs shall be generated with precise ground control points measured by a differential GPS in the field. Due to the high spectral resolution and the medium to high spatial resolution ASTER

data will be a good choice. But also data from other sensors like SPOT, IKONOS or even ALOS could be included and tested for their potential in landslide mapping and hazard zonation. The actual choice of the data also depends on their availability for the study region. Recent planning envisages an area in Nepal in Makawanpur district as a first study region where several landslides occurred in 2003 and 2004. For this region pre- and post-event ASTER and SPOT data is available in very good quality.

The gathered information, i.e. the landslide inventory maps of the different years, the DEMs for the different years and the derived spatial data can then be used for a combined analysis leading to a hazard zonation showing spatial and temporal probabilities.

By the predominant use of remote sensing data different benefits can be expected. Here, the independency of (outdated) maps and the possibility for regular updates of landslide zonation maps on a regional scale can be highlighted.