Results of landslide detection based on SAR Interferometry processing

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Abstract

The use of differential Synthetic Aperture Radar Interferometry (dInSAR) for the detection and monitoring of earth surface processes is meanwhile an established method. However, this approach has only success if the observed area fulfills specific requests, like sufficient backscattering, flat slope gradients or very slow growth of vegetation.

In the European Union funded project OASYS – integrated optimization of landslide alert systems the early identification of endangered areas plays the main important role (www.vce.at/oasys). For the recognition of surface movements one has decided to investigate the capability of dInSAR. Within the framework of this EU-project several test sites i.e. in Greece, Germany, Hungary, Rumania and China were investigated. Our InSAR investigations were especially focused on the Baota landslide in China and the Prinotopa landslides in Greece (ESA proposal 1498).

The processing levels were based on the differential interferometry approach using two or more coherent ERS 1 and 2 radar scenes for the final interferogram calculation. The different steps, like coregistration, filtering procedures, unwrapping, etc. were accompanied by taking manual corrective actions, because the existence of two vegetation periods in Baota and the steepness of the terrain in these areas were not the best boundary conditions for InSAR processing.

The displacements on the Baota landslide of up to 14mm in six months from the InSAR processing were in extremely good coincidence with the geodetic derived movement rates. This proved that there is a strong potential for the detection of landslides and possible earth surface movements with SAR Interferometry in the Changjiang (Yangtze river) region.

We used for the Prinotopa test site in Greece a 3pass–Interferometry approach, and finally we got several identical clusters of pixels that gave us an indication for earth surface changes in relation to their vicinity. We could prove these results with GPS displacement vectors, too.