



## **A Survey of active Landslide Movement in Iceland from SAR Interferometry**

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Landslides in Iceland have caused both fatalities and considerable economic loss during the past centuries. Recent discovery of creeping landslides near towns in eastern and northern Iceland led to the initiation of our study that has the following two primary objectives: To assess the monitoring capabilities of SAR Interferometry (InSAR) on these known Icelandic landslides and to survey large areas in eastern and central-north Iceland to search for other creeping landslides that may exist. We chose to focus on conventional InSAR, rather than persistent scatterer interferometry, as vegetation cover in Iceland is limited and because man-made structures are usually below the landslides, instead of being on top of them.

We analyzed both ERS data from 1993-2000 and requested new Envisat acquisitions during summers in 2004-5 from both ascending and descending tracks. In northern Iceland we clearly detect movements and can map the boundaries of the only landslide that was known to be active in that region. More importantly, we have discovered over ten new landslides in northern Iceland that are both variable in their displacement activity and aerial extent.

Two landslides were known to be active in eastern Iceland; near the towns of Seyðisfjörður and Neskaupstaður. Repeated GPS measurements from 2001-2 showed that these landslides were moving at rates of up to 40 cm/year. We analyzed a number of ERS/Envisat interferograms covering this area and detected limited or no movement on these landslides. The InSAR data cover a different time-period, primarily 1997-9 and 2004-5, and therefore indicate highly episodic landslide movements. We also surveyed eastern Iceland in search for other landslides, and similar to northern Iceland, we discovered here over ten locations of active landslide creep.

In conclusion: (1) we find that conventional InSAR is a highly effective technique to survey large areas for possible active landslide motion, at least where surface conditions are similar to those in Iceland, (2) we have discovered over 20 locations of active landslide creep in eastern and central-north Iceland from the InSAR measurements in 1993-2000 and 2004-2005, and (3) we find landslide motion in Iceland to be highly episodic, which may limit the usability of other techniques, such as permanent scatterer analysis, for landslide monitoring.