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Classification of landslide activity based on spaceborne interferometric SAR at the Moselle Valley, Germany

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Landslide activity is an important information for landslide hazard assessment. However, an information gap regarding up to date landslide activity is often present. Advanced differential interferometric SAR processing techniques (A-DInSAR), e.g. Persistent Scatterer Interferometry (PSI) and Small Baseline Subset (SBAS) are able to measure surface displacements with high precision, large spatial coverage and high spatial sampling density. Although the huge amount of measurement points is clearly an improvement, the practical usage is mainly based on visual interpretation. This is time-consuming, subjective and error prone due to e.g. outliers. The motivation of this work is to increase the automatization with respect to the information extraction regarding landslide activity.

This study focuses on the spatial density of multiple PSI/SBAS results and a post-processing workflow to semi-automatically detect active landslides. The proposed detection of active landslides is based on the detection of Active Deformation Areas (ADA) and a subsequent classification of the time series. The detection of ADA consists of a filtering of the A-DInSAR data, a velocity threshold and a spatial clustering algorithm (Barra et al., 2017). The classification of the A-DInSAR time series uses a conditional sequence of statistical tests to classify the time series into a-priori defined deformation patterns (Berti et al., 2013). Field investigations and thematic data verify the plausibility of the results. Subsequently the classification results are combined to provide a layer consisting of ADA including information regarding the deformation pattern through time.