



Landslide detection through horizontal displacement by using multi temporal optical imagery

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Landslide is one of the major geologic hazards in mountainous areas. Detection and monitoring of which, is an important task for decision support systems and policy makers. However, accessibility to high mountainous regions is challenging for preparing landslide inventories. Furthermore the traditional techniques are labor intensive, time consuming and subjective, therefore impossible to be applied for regional scale. In this study an attempt has been made to develop a new technique for the semi-automatic identification of co-seismic landslides on regional scale by using ASTER imagery. In this technique images were projected onto the ground according to their viewing geometry. Then phase correlation method proposed by Leprince et al (2007) and Ayoub et al., (2009b) has followed for the calculation of relative offset between the two imageries. The correlation was performed in two levels; first it was executed on multi-pixel level in which the shift between the images from their correlation matrix was measured, while the second was executed on sub-pixel level when the measured shift was modified by approximating the slope difference of the images by Fourier transformation. By using this technique more than 80% of landslide has been detected in Himalayas region. The results showed a great improvement in term of increase in true positive rate and decrease of false positive rate. Application of this technique has proved that medium scale imagery like ASTER could be used in a rough topographic area like Himalayas to automatically detect above 80% of landslides. This method with some well-developed masks will further improve the automatic detection of landslides on regional scale in an economical way. This approach will also eliminate the need for extensive data analysis with huge rule-sets. Compared to other semi-automatic landslide detection techniques, this method is totally automatic and does not require experts to interpret the data on various stages of analysis.