Geophysical Research Abstracts,
Vol. 11, EGU2009-12513-1, 2009
EGU General Assembly 2009

Application of GIS and Remote Sensing to slope instability assessment in loess terrain as a means of documentation, analysis and forecasting

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Loess is wind-lain dust that accumulates to great thickness, especially in the northern continents, giving rise to distinctive terrain and hydrology. Frequent failures on loess slopes are a major cause of the loss of human lives, and also act as a severe constraint on development of some regional economies in some of the poorer countries of the world. The detailed products of recent research into periodic instability of loess in the eastern region of China's Gansu province has led to a pioneering approach to the application of GIS to landslide documentation, analysis and temporal forecasting. Lithology, land-use, sinkhole distribution and slope gradient are analysed as fundamental factors controlling slope instability. The Spatial Analysis function of the GIS software is used to generate slope instability maps. Comparison of the GIS results with slope failures recorded during field mapping, and known to have occurred in the past demonstrates the fidelity of the modelled outcome. It is shown that the quality of the results of this small regional study is higher than those obtained using traditional slope assessment methods based upon comparative criteria. This methodology is suitable for application to other landslide-susceptible terrains of several types including those on loess in central and eastern Asia. The method also has the potential to contribute to improved underpinning of local and regional land management and planning.