Geophysical Research Abstracts
Vol. 12, EGU2010-5271, 2010
EGU General Assembly 2010

The British Geological Survey's 'Slope Dynamics' Project

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The aim of the British Geological Survey (BGS)'s 'Slope Dynamics' project is to provide observational data to slope stability modelling and zoning based on factors of safety obtained from a combination of geotechnical, geomorphological and oceanographic models. The project has been monitoring since 2001 the progress of terrestrial and coastal landslides within 'soft rock' formations in the UK. Recently, field observatories have been set up to allow a variety of methods, some traditional and others novel, to be applied to actively unstable natural slopes in order to achieve a thorough understanding of the substrata, the mass movement processes within them and their relationship to the environment and environmental change. Monitoring has been carried out at six or twelve monthly intervals at test sites on the east coast of England (Holderness and Norfolk) and at Hollin Hill in North Yorkshire. A key part of the project makes use of innovative terrestrial LiDAR methods to produce repeated accurate 3-D models of the ground surface, which then enable 'change models' of landslide movements to be determined. This work was started in 2001 and is continuing.

The BGS currently has two Riegl terrestrial laser scanners: the long-range LPM-i800HA and the very-long-range LPM-2K; the former being equipped with a digital camera. The multiple scans are positioned in the national grid co-ordinate system using high resolution dGPS. Together, these allow accurate observations to be made in remote and exposed locations without the need for potentially dangerous direct access to the steeper more unstable slopes. The coastal test sites, which have exhibited recession rates of between 2m and 9m per year, allow rapid changes to be monitored. Inland active landslides are less common but more suited to instrumentation and long-term monitoring. Results to date have revealed the relationships between landslide style and geology, and also the patterns and time scales of characteristic cycles of mass movement at coastal sites.