Geophysical Research Abstracts,
Vol. 10, EGU2008-A-12056, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-12056
EGU General Assembly 2008

Climate change and slope instability - networking in the UK

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Building and civil engineering infrastructure in the UK covers extensive areas where marginally stable soils are found. Appropriate engineering design can significantly reduce the risk of a slope instability hazard in these regions. However, the risks cannot be completely eliminated as is evident from events where, e.g following excessive rainfall, slope instability causes disruption to road and rail networks or destruction of property. Planning for these occurrences and long term management of the assets is traditionally based on static information comprising relatively simple algorithms to enable an assessment of landslide risk. The parameters used are often derived from small sets of soil data, pore pressure evaluations and a dose of expert judgement. Climate information is often only used in an indirect manner and, when applied, is nearly always based on historical information. This is a risky approach, particularly at a time when changes in major climatic parameters, precipitation and evapotranspiration, are taking place at unprecedented rates. Part of the problem to address this issue is the uncertainty associated with the models. Whereas on a detailed site scale the processes leading to movement and relevant soil properties may be established in sufficient detail to enable derivation of critical thresholds and perhaps even a probabilistic analysis of slope instability, extrapolation of this information to a larger regions is fraught with difficulties. There is insufficient data on the geotechnical variability of even major soil strata where slope instability frequently occurs (such as the London, Oxford and Lias Clays) to enable a probabilistic assessment as a basis for the evaluation of slope stability. Even if such datasets were delivered, there is still a lack of information on how long-term changes in conditions (e.g. precipitation-driven pore pressures) could affect the manifestation of movement in slopes. Present-day forecasts of how slope stability

may change over the next 50 to 80 years, for example, therefore remains relatively speculative. Thus far the case has not been made convincingly enough either way (greater or lesser slope stability) to convince asset managers to change their design, operation and management strategies. Planning for the future needs better information and the best science thus far has not been good enough. There is now an urgent need to improve our capabilities. Delay in incorporation of new design codes reflecting conditions in 2050 or 2080 may prove to be costly if the result of climate change is more widespread and more frequent instability. On the other hand, were a consensus developed that the resultant of changes in climate is a lesser degree of instability, UK Plc is wasting money in designing to factors of safety that are greater than required. Considering the large financial resources taken up by earthworks in building and civil engineering in the UK, either case deserves further integration of old data, new research and more intensive collaboration activities in the UK to deliver an appropriate forecasting capability relevant to both natural and constructed slopes. Networking and more intensive collaboration is therefore key to achieve this. The UK-wide CLIFFS network is providing a suitable platform that is fostering this development.