Geophysical Research Abstracts, Vol. 7, 10807, 2005
SRef-ID: 1607-7962/gra/EGU05-A-10807

Heterogeneity and Behavior of Saprolitic Slopes

A. Aydin

Department of Earth Sciences, The University of Hong Kong, Pokfulam Road, Hong Kong SAR, China (aaydin@hku.hk)

Heterogeneities in various forms and scales often control the mechanism and location of failure and deformation, and the factor of safety of slopes. Sources of heterogeneity in saprolitic profiles include: a) microfabric and mineralogical variations at the material scale; and b) macrostructural features such as relict joints, bands or pockets of relatively unweathered material or zones of contrasting weathering, infilled fractures, relict veins, secondary clay seams, differentially weathered dykes, corestones, and soil pipes at the field scale. There are two important engineering implications of such a large variability in type, abundance and scales of heterogeneities in saprolitic profiles: heterogeneities control the field behaviour and are difficult to be detected.

This paper presents a critical review of the field scale heterogeneities and the engineering behaviour of saprolitic profiles. The influence of corestones and relict joints are analysed with emphasis on characterization and possible instability modes. Roles of heterogeneities in slope instability are often interrelated with their roles in regulating groundwater regime, characterized by abnormal flow patterns and pore water pressure distributions. Potential pitfalls and effective strategies for ground investigation in heterogeneous profiles are elucidated. The remaining uncertainties, for example, in distribution or volumetric percentage corestones and in delineating zonal boundaries, require continuous upgrading of the engineering geological model during the construction stage of site investigations. It is suggested that such uncertainties can be reduced in a cost-effective manner by the use of accurate penetration rate records. A better understanding of the interactions among the heterogeneities, the matrix and the engineering geological environment as a whole should enable a consistent assessment of the significance of discrete features in stability, and hence a more rational design practice in saprolitic profiles.