

## DEFORMATION CHARACTERISTICS OF SCALY CLAY SUBJECT TO TROPICAL WEATHERING

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### **Abstract**

Scaly clay is an argillaceous sediment, with a pervasive fabric of lenticular, highly polished, curved, slickensided surfaces and is commonly associated with *mélange* formations. In regions subject to tropical weathering regimes outcrops of scaly clay erode rapidly, giving rise to extensive badlands topography. Islands such as Barbados lose considerable areas of land to badlands evolution each year and associated landslides disrupt settlements and communications.

The effects and implications of tropical weathering on scaly clay sediments have been examined. A programme of laboratory studies has been completed to characterise the physical, mineralogical and mechanical properties of undisturbed samples of the materials. The samples, collected from different depths within weathering profiles, between ground surface and fresh, unweathered materials at depth were each subject to similar experiments. The results provide a picture of how mechanical properties and physical characteristics vary with depth into the weathering profile.

Two materials were selected: the Joe's River Formation from Barbados, a scaly clay of Upper Eocene age; and the Lichi *mélange* of Taiwan, a Pliocene-Pleistocene scaly clay. The outcrops of these two materials experience similar climate and weathering regimes and are both characterised by frequent landslides, badlands development and loss of agricultural land.

Physical parameters, clay mineralogy and chemical composition were determined and a series of triaxial deformation experiments were conducted to gain a better understanding of how the mechanical behaviour of the sediments changes with depth into the weathering horizon. The data illustrate important changes during weathering, including destruction of the original sedimentary structure, a large increase in pore volume and variations in geotechnical characteristics. The experimental results demonstrate that mechanical changes caused by tropical weathering are an important factor in the development of the badlands which are common to scaly clay terrains.