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An Investigation of Landslide Mechanisms in a Coastal Glacial Till

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This project aims to discuss the techniques employed in investigating the complex relationship between pore pressure variation and the movement rate and style in landslide systems. The complex landslide of Upgang beach in Whitby, UK, 500 m in length, is considered in order to understand how the landslide movement starts and stops in glacial till with precise data from displacement and piezometer data. More specifically, terrestrial laser scanning (TLS) has been used monthly to characterize the dynamics of landsliding, with data captured at 5 cm resolution. Additionally, in situ monitoring, using extensometers, piezometers and rain gauges, is carried out to explore the dynamic relationship between displacement and pore water pressure. Firstly, displacements are observed by the lateral extensometers. Furthermore, groundwater is monitored in six stand-pipe boreholes, which are installed in different layers within the till in order to monitor pore water pressure at various representative locations on the cliff slope. In an attempt to understand the mechanisms that control landslides in response to pore pressure changes, direct shear box and back pressured shear box are used to examine the whole evolution of failure responding to variations in stress and strain. This allows for an understanding of the role of material behavior in controlling landslide movement patterns. In particular, the shear strength of five layers of tills are analysed using the direct shear box. This, together with the groundwater data are then analysed using the back pressured shear box to simulate the field condition of landslides during the development of failure. It is hoped that a combination of fieldwork methods and laboratory testing utilised in this project can generate critical discussions and ultimately lead to a more nuanced understanding of landslide mechanisms.