Geophysical Research Abstracts
Vol. 12, EGU2010-5393-1, 2010
EGU General Assembly 2010

Downwearing rates and patterns on a cohesive shore platform, Isle of Sheppey, UK.

Cherith Moses (1), Richard Charman (2), and Rendel Williams (1)

(1) University of Sussex, School of Global Studies, Geography, Brighton, United Kingdom (c.moses@sussex.ac.uk), (2) Environment Agency, Worthing, East Sussex, United Kingdom

Cohesive coastlines are possibly the most dynamic subset of rocky coasts and are characterised in many places by actively eroding cliffs and shore platforms. To date research efforts have focussed on understanding and measuring their rates of cliff retreat rather than the downwearing of the platforms. Beach renourishment is often undertaken to maintain adequate beach heights to protect the cliffs or existing sea defences from wave attack. It is argued that platform downwearing may be the prime cause of beach lowering in such situations, e.g. on the Lincolnshire coast, UK. Despite this argument, few direct measurements of clay platform downwearing exist and current understanding of the mechanisms that cause erosion of cohesive shore platforms is limited.

This study, which is ongoing, has measured downwearing rates over a four year period across a shore platform developed in London Clay at Warden Point on the Isle of Sheppey, Kent, UK. Measurements have been recorded using the Traversing Erosion Beam, designed specifically to measure micro- to meso-scale downwearing on cohesive shore platforms (Charman et al. 2007). The platform is 300 m wide with a gradient of 0.5 degrees and is backed by 48 m high cliffs. A thin mixed-sediment beach, approximately 8 – 20 m wide and 0.1 m deep, covers the landward edge of the platform. The mean annual rate of downwearing, for six measurement sites on the upper to lower mid-shore, during the sample period 2005 – 2009, is 15.7 $\pm$ 10.5 mm/yr.

Significant variations have been observed in the annual and seasonal rates of downwearing across the platform. The maximum annual downwearing rate of 60.9 $\pm$ 9.4 mm was recorded on the upper middle platform between July 2005 and July 2006. Over the full recording period 2005 – 2009, the maximum downwearing rate recorded was 29.0 $\pm$ 3.3 mm/yr on the upper platform. The location of the maximum downwearing has varied between measurement periods and is not consistently on one part of the platform. Data collected over shorter time periods of 3 to 5 months indicate that downwearing is greatest during the winter period and lower during the summer. Extensive areas of fluid mud, which may temporarily protect the platform from erosion, were noted on the surface during the summer measurement periods. The data also indicate that downwearing is greater on slightly raised areas of the platform surface rather than in shallow depressions.

Given that so little is known about rates and patterns of cohesive shore platform erosion, these baseline data provide a valuable insight into their dynamics. The mean annual downwearing rate recorded in this study is just over four times as fast as that of soft Cretaceous chalk platforms of the Eastern English Channel coasts (3.65 mm/yr; Foote et al. 2006). In the context of rock coasts, cohesive materials are amongst the most sensitive and potentially the most vulnerable to predicted climate change. Further field measurements of cohesive shore platform downwearing are needed in order to establish clearer linkages with cliff and beach behaviour and to inform models that predict their response to changing in wave energies and sea level rise.

Charman R., T. Cane, C. Moses and R. Williams (2007) A device for measuring downwearing rates on cohesive shore platforms. Earth Surface Processes and Landforms, 32, 2212 – 2221
Foote Y., E. Plessis, D.A. Robinson, A. Hénaff and S. Costa (2006) Rates and patterns of downwearing on chalk shore platforms of the Channel coasts. Z. Geomorph. Suppl. 144, 93 – 115