Tiny organisms could change the face of coastal science

February 9 2015

New scientific research published in the journal *Nature Communications*, led by researchers at Bangor University in collaboration with scientists from the National Oceanography Centre Liverpool and the Universities of St. Andrews, Hull, Leeds and Plymouth, has discovered that 'sticky' sugars produced by micro-organisms have a remarkably large effect on the movement of sand and mud in aquatic environments.

"The effect of large amounts of extracellular polymeric substances (EPS), the sticky sugars secreted by micro-organisms in sand and mud found on the floor of rivers and seas, is well known in the scientific literature: EPS stabilises the bed by forming a 'biofilm' that is strong enough to resist erosion. However, our research has shown that even far more modest amounts of evenly distributed EPS are enough to dramatically slow down the growth of sediment ripples and other bedform types. Properly representing the occurrence and growth of sediment ripples is vital to the accurate prediction of the movement of sand and mud in rivers, estuaries and oceans in computer models. Our research implies that such models could do better in making predictions on a day-to-day basis. These model results are crucial to government agencies charged with mitigating the effects of coastal storms and river floods" explains lead author Dr. Jonathan Malarkey, oceanographer from Bangor University's School of Ocean Sciences.

Dr. Malarkey adds: "The effect of EPS is much stronger than the effect of clays on ripple development. We believe that this is down to the nature of the binding, since the EPS is far more effective at inhibiting

the sand grains from moving independently".

This research is part of the Natural Environment Research Council's million pound COHBED project, which involves experiments undertaken at hydraulics laboratories at the Universities of Bangor and Hull and fieldwork undertaken in the Dee Estuary. "One of the main reasons for setting up this research project is that our knowledge of bedform behaviour is limited almost entirely to pure sand, despite most aquatic environments being mixtures of sand, clay and EPS. In order to fill this gap in knowledge the project has required an innovative collaboration between biologists, oceanographers and sedimentologists", explains Dr. Jaco Baas, senior lecturer at the School of Ocean Sciences, principle investigator of the COHBED project, and recognised expert on bedform research.

More information: Malarkey, J., J.H. Baas, J.A. Hope, R.J. Aspden, D.R. Parsons, J. Peakall, D.M. Paterson, R.J. Schindler, L. Ye, I.D. Lichtman, S.J. Bass, A.G. Davies, A.J. Manning and P.D. Thorne, 2015. "The pervasive role of biological cohesion in bedform development." *Nature Communications*, 6:6257, DOI: 10.1038/ncomms7257.

Provided by Bangor University