Geophysical Research Abstracts
Vol. 16, EGU2014-10390, 2014
EGU General Assembly 2014

Thermal buffering of concrete by seaweeds during a prolonged summer heatwave

Larissa Naylor (1) and Martin Coombes (2)

(1) University of Glasgow, School of Geographical and Earth Sciences, United Kingdom (larissa.naylor@glasgow.ac.uk), (2) University of Oxford, Oxford University Centre for the Environment, Oxford.

Hard coastal infrastructure is subject to aggressive environmental conditions, including a suite of weathering processes in the intertidal zone. These processes, along with waves, lead to costly deterioration of coastal structures. Existing methods (e.g. coatings, less porous concrete) to reduce the risk of concrete deterioration rapidly lose their effectiveness in the intertidal zone. Additionally, a changing climate will lead to increased frequency of storms, higher sea level and higher extreme temperatures – and therefore, pose an increased risk of deterioration. Might there be a biogenic solution? New research (Coombes et al. 2013) has shown that fucoid seaweeds reduce microclimatic extremes and variability under normal summer conditions. The results presented here supplement these findings in two ways. First, they demonstrate that fucoid seaweeds act as a thermal buffer during a prolonged summer heatwave in Britain (July 2013). Over 36 days of continuous monitoring at two sites in Cornwall, UK, 19 of which were during the official heatwave, there were statistically significant differences ($p = 0.000$) in the maximum temperatures between thick seaweed (7.5 – 9.5 cm thickness) and thin seaweed (2 – 2.5 cm thickness) plots. Maximum temperatures reached 22˚C and 33˚C, for thick seaweed and thin seaweed plots, respectively. Variations in maximum temperatures between the two sites appear to be related to aspect. Second, the significantly different maximum temperature results between plots also demonstrate that seaweed thickness is an important factor influencing thermal buffering capacity. These data clearly demonstrate that fucoid seaweeds buffer concrete seawalls against extreme temperature fluxes during a heatwave, probably limiting the efficiency of deteriorative processes such as thermal expansion and contraction and salt crystallisation.