



Identifying drought response of semi-arid aeolian systems using near-surface luminescence profiles and changepoint analysis, Nebraska Sandhills.

Catherine Buckland, Richard Bailey, and David Thomas
School of Geography and the Environment, University of Oxford, United Kingdom

Two billion people living in drylands are affected by land degradation. Sediment erosion by wind and water removes fertile soil and destabilises landscapes. Vegetation disturbance is a key driver of dryland erosion caused by both natural and human forcings: drought, fire, land use, grazing pressure. A quantified understanding of vegetation cover sensitivities and resultant surface change to forcing factors is needed if the vegetation and landscape response to future climate change and human pressure are to be better predicted.

Using quartz luminescence dating and statistical changepoint analysis (Killick & Eckley, 2014) this study demonstrates the ability to identify step-changes in depositional age of near-surface sediments. Lx/Tx luminescence profiles coupled with statistical analysis show the use of near-surface sediments in providing a high-resolution record of recent system response and aeolian system thresholds. This research determines how the environment has recorded and retained sedimentary evidence of drought response and land use disturbances over the last two hundred years across both individual landforms and the wider Nebraska Sandhills. Identifying surface deposition and comparing with records of climate, fire and land use changes allows us to assess the sensitivity and stability of the surface sediment to a range of forcing factors.

Killick, R and Eckley, IA. (2014) "changepoint: An R Package for Changepoint Analysis." *Journal of Statistical Software*, (58) 1-19.