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Meso-scale aeolian transport of beach sediment via dune blowout pathways within a linear foredune

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The evolution of coastal foredunes is largely controlled by sediment exchanges between the geomorphic sub-units of the nearshore, beach, foredune and dune field. Although blowouts are widely recognised as efficient sediment transport pathways, both event-scale and meso-scale quantification of their utility in transferring beach sediments landwards is limited. Foredunes characterised by multiple blowouts may be more susceptible to coastline retreat through the enhanced landwards transport of beach or foredune sediments. To date, a key constraint for investigations of such scenarios has been the absence of accurate blowout sediment transport records.
Here we use the Sefton coast in north-west England as a study area where an unprecedented temporal coverage of LIDAR data is available between 1999 and 2015. Additionally, an extensive set of aerial photography also exists, dating back to 1945 allowing comparison of blowout frequency and magnitude together with the alongshore limits of coastline retreat.
Digital terrain models are derived for each year that LIDAR data is available. Informed by LIDAR based topography and areas of bare sand (aerial photos) terrain models have been created containing individual blowouts. Differentials in 'z' values between each terrain model of each available year has identified topographic change and total levels of transport. Preliminary results have confirmed the importance of blowouts in transporting beach or foredune sediment landwards and thus potentially promoting coastline retreat. Repetition of processes across a larger number of blowout topographies will allow better identification of individual blowouts for 'event' scale field investigations to examine spatial and temporal variability of beach sediment transport via blowouts routes.