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SIGNIFICANCE OF SWALEY CROSS-STRATIFICATION IN THE CARSTONE FORMATION, HUNSTANTON, NORFOLK

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ABSTRACT

Cross-bedding in the Lower Cretaceous Carstone Formation at Hunstanton cliffs in Norfolk was first reported almost a hundred years ago, but details on the nature and significance of the cross-bedding have been largely ignored. To redress this we made detailed field observations and measurements. Fourteen cross-bedded sets were suitable for accurate measurements of set thicknesses, visible set length and foreset orientation. Eleven cross-bedded sets had NE trending foreset dip directions, while three sets had S trending foreset dip directions. Circular statistics on the directional data gave a significant NE mean dip direction of 55°. Cross-bedding geometry is broadly of 'trough-type' but specifically 'swaley', characterised by concave-upward shallow scours between 0.5-2.0 m wide and a few centimetres deep. Swaley cross-stratification is thought to form below fair-weather wave base, but above storm wave base; our calculations using published physical equations suggest the Carstone bedforms were generated on a storm dominated shoreface in 30 to 40 m water depth. Northward palaeocurrent directions are strikingly different to the predominantly southward palaeocurrents recorded in older Lower Greensand deposits of southern England. A storm surge relaxation current from the land deflected right by Coriolis forces could have resulted in an alongshore NE trending flow forming the Carstone cross-bedding. This interpretation allows for predominantly southward ocean currents interrupted by episodic storms surges and resulting relaxation currents.

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SPIT EXTENSION AND BARRIER ROLLOVER AT BLAKENEY POINT AND SALTHOUSE: HISTORIC MAPS AND FIELD OBSERVATIONS

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ABSTRACT

In the late 1990s, Brian Funnell used historic maps (1586 and 1797) and aerial photos (1952-1989) of the Blakeney area to calculate the mean extension rate of Blakeney Spit. He also charted landward rates of barrier movement (rollover) in the Salthouse area using a 1649 map. The mean centennial rate of extension of Blakeney Spit was $\sim 3.5 \text{ m a}^{-1}$ implying a likely age of the spit of 3000-4000 years. Change in barrier beach position between 1649 and the present day recorded a mean landward rollover rate of $\sim 0.85 \text{ m a}^{-1}$. These rates concur with earlier estimates and are supported by offshore data published since 2000. This hitherto unpublished work is augmented by more recent field observations from storm surges in 2007 and 2013 that record the episodic nature of barrier rollover and breaching. The most important observations are that shingle-entraining washover events at Salthouse are probably in part conditioned by local topography, favouring topographic lows. In 2013, shingle washover was accompanied by two breach channels. These temporary breach channels were cut principally by seaward drainage of floodwater trapped in the back barrier area following storm overtopping of the barrier. Moreover, the channels were sited on former creek and channel locations visible in the 1649 map. The inherited hydrological topography of the back barrier area thus continues to influence recent coastal geomorphic change.

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EARLY YEARS OF THE GEOLOGICAL SOCIETY OF NORFOLK: THE PARAMOUDRA BEHIND THE DOOR

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It was both a pleasure and a surprise to read Mike Leeder's account of the Paramoudra Club at City of Norwich School (CNS) which evolved into the Geological Society of Norfolk (Leeder 2019). The pleasure was in his reminiscences of the school and its teachers during the late 1960s: most of them were well known to me from my time at CNS some nine years behind Mike. The surprise was my rather belated discovery of the extraordinary significance to local geology of what had gone on at CNS in those years immediately preceding mine – it was history of which I had very little idea.

Mike described his contribution as the 'Upper Mesozoic' part of the story, in the hope of a 'Cenozoic' revival. If that is the case, I hope I can add a few details of geology at CNS during the very late 'Cretaceous', during that tumultuous time in the 1970s when the school was in transition from a boys-only grammar to a fully co-educational comprehensive.

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BOOK REVIEW

WORLD OF GEOLOGY: TRAVELS TO ROCKY PLACES

Tony Waltham, Whittles Publishing, Dunbeath 2019. 219pp. 110 illus. £18.99 Softcover

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Many people will envy Tony Waltham's experiences of travelling the world to see some of its most beautiful and amazing geological sites. In this book, he offers a collection of one hundred and ten stunning photographs to share "a taste of the visual delights within the world of geology". Each photograph is accompanied on the opposite page by a short explanatory and, sometimes, anecdotal text. Readers of the magazine *Geology Today* will be familiar with this format, as Tony's photographs are used regularly on its back cover.

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