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The Quaternary Geology of the North Sea

Dynamic landscape change during the late Early to early Middle Pleistocene: evidence from East Anglia, UK

Jonathan R. Lee[1], James Rose [2,1] and Ian Candy 3

[1] British Geological Survey, Keyworth, Nottingham, NG12 5GG (jrlee@bgs.ac.uk)

[2] Department of Geography, Royal Holloway University of London, Egham, TW20 0EX

The late Early to early Middle Pleistocene (0.9-0.48 Ma) is one of the most dynamic periods of Quaternary-time, coinciding with the transition from obliquity- to eccentricity-forced climate. East Anglia possesses Britain's most complete (albeit highly-fragmented) onshore record of environmental change during this time-interval and was situated within the western margins of the North Sea Basin of the time. The geological record from the region offers an important insight into the complex patterns of climatic and palaeogeographic variability that occurred. However, attempts to apply a robust chronostratigraphic framework to this part of the Quaternary sequence have proven challenging and in some instances controversial. Difficulties have arisen due to contrasting chronological interpretations based upon different types of utilised geological evidence (e.g. river terrace chronologies, biostratigraphy and amino acid chronologies) and the tendency to attempt to correlate assemblages directly with marine isotope stages. A significant problem with these approaches is that they can underestimate the temporal responses of physical systems to change. Within this presentation, we attempt to go back-to-basics by examining the late Early to early Middle Pleistocene record of environmental change in East Anglia from the perspective of the main sedimentary building-blocks. In particular we focus upon the large-scale geometry of units and more discrete evidence (soils, first appearance lithologies, sedimentary facies variability) for palaeogeographic change and attempt to demonstrate the speed of landscape change relative to modern and other geological analogues. The findings of this approach suggest that East Anglia and the North Sea Basin were highly-sensitive to climate-forcing that acted to drive major changes in palaeogeography and geological processes that occurred at sub-Milankovitch time-scales.