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The Quaternary Geology of the North Sea

A tectonostratigraphic scheme for glacial deposits in northern East Anglia, UK

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East Anglia possesses a spectacular archive of lowland glaciation that spans the Middle and Late Pleistocene and links the region to ice masses that repeatedly glaciated central and eastern Britain and the North Sea region. Attempts to develop a stratigraphic framework for this archive have typically utilised conventional lithostratigraphic approaches and a range of different nomenclatures and schemes have been presented over the years. However, these lithostratigraphic approaches contain a number of inherent flaws that limit their applicability. Firstly, the process of glaciation is driven largely by 'tectonic' rather than 'sedimentary' mechanisms such that glacigenic sequences do not always obey the Law of Superposition. Secondly, glacigenic units do not always possess distinct and spatially-extensive lithostratigraphic characteristics because glaciers can flow-over, erode and entrain a wide range of substrate lithologies. Thirdly, ice advances do not always result in the deposition of a till but can simply override and glacitectonically-deform an underlying sediment-pile. In East Anglia, all of these issues manifest themselves to varying degrees, such that published lithostratigraphic schemes typically underestimate the number of ice advances and ice-marginal oscillations within the geological record. Within this paper, we present a hybrid tectonostratigraphic classification for the glacial succession of northern East Anglia, encompassing where appropriate, lithostratigraphic and morphostratigraphic elements. This approach identifies seven major tectonostratigraphic sub-divisions relating to individual ice-advances and a progressive shift in tectonic regime reflecting the long-term evolution of substrate and deforming-bed processes across the region during glaciation.