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Evidence and implications for a grounded ice sheet in the Central North Sea in the early Pleistocene

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The rich archive of industry 2D and 3D seismic dataprovide a major opportunity to enlighten us about the Quaternary glacial history of the British and Scandinavian Ice Sheets. Early Quaternary terrestrial records of glaciation are at best highly fragmentary and at worst non-existent and dominated for the most part, by the last deglaciation. The depo-centre along the Central Graben and Viking Graben contains a rich sedimentary archive approaching, in places, 1000 m thick. Evidence is reviewed, from existing and new work, including mapping from 3D seismic of diagnostic ice proximal and subglacial landforms, wireline log and core data. These data indicate that, not only was there grounded ice present on the periphery of the North Sea but, an ice sheet extended far into the Central North Sea. The timing of this is not fully constrained but is it significantly earlier than previously thought, and certainly occurs in the early Quaternary. The possible source areas for this ice sheet and mechanisms by which it could be so extensive early in the Quaternary are explored. These findings are contextualised in terms of other evidence for NW European ice masses from IRD, and evidence for extensive ice sheets in other parts of the world in the early Quaternary e.g. the Laurentide Ice Sheet. The implications for the regolith hypothesis, a mechanism by which orbital forcing is modulated by changing ice sheet dynamics, and landscape evolution are discussed.