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# Fluvial response to rapid climate change during the Devensian (Weichselian) Lateglacial in the River Great Ouse, southern England, UK

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**Abstract**

Few Lateglacial (15,200–11,500 Cal BP) fluvial deposits are known from southern England, UK. This paper outlines a sedimentological investigation of a Lateglacial site near the village of Roxton in the middle reach of the River Great Ouse. Below the Holocene argillaceous alluvium, several large gravelly lithofacies units representing long-term fluvial processes are recognised based on their lower bounding surfaces and sedimentary features. In line with palaeontological evidence and radiocarbon dating, detailed facies analysis indicates that the river changed from a braided to a wandering/meandering regime in response to the warming-induced reduction in nival peak discharge and increase in vegetation cover consisting of birch woodland and grassland during the Lateglacial Interstadial (15,200–12,700 Cal BP). This was followed by a change back to a braided river in response to climatic deterioration during the Younger Dryas Chronozone (12,700–11,500 Cal BP). The interstadial floodplain consisted of both overbank fines and channel lateral or point-bar sands and gravels. The two suites of contemporaneous sediments in the geological succession may be easily mis-interpreted as independent climato-stratigraphical units due to their cross-cutting relationship and marked difference in facies assemblage. Lateral channel movement in such a system also implied that the floodplain underwent constant erosion, resulting in underdeveloped overbank sequences, insufficient to withstand post-depositional removal by erosion. This probably accounts for the rare preservation of fine-textured overbank deposits of the Lateglacial Interstadial in southern England.


*Keywords:* Facies models; Wandering/meandering river; Climate change; Lateglacial; Great Ouse; Southern England

## 1. Introduction

The Lateglacial climate (ca. 15,200 to 11,500 Cal year BP, Table 1) underwent drastic change over the North Atlantic region, imposing strong impacts on continental sedimentation and geomorphological processes (Bond et al., 1993; Dansgaard et al., 1993; Lowe et al., 1999). In response to climatic oscillations and associated environmental changes, many lowland rivers in the northwestern and central European mainland experienced changes in behaviour and style (Vandenberghe et al., 1994; Starkel, 1995; Mol et al., 2000). In contrast, few Lateglacial fluvial deposits containing similar evidence are known from the British Isles (Rose

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Table 1
British Late Devensian stratigraphy based on Rose (1989), Björck et al. (1998) and Lowe et al. (1999)

| Marine Isotope Stage | Climatostratigraphy, British Isles | | | | | Greenland Ice Core |
|---|---|---|---|---|---|---|
| | Stage/Substage | | Stadial/Interstadial | Age | | |
| | | | | 14C BP | Cal BP | |
| | Holocene | | | 10,000 | 11,500 | |
| 1 | Late Devensian Substage | Lateglacial | Loch Lomond Stadial (Younger Dyras) | | | GS-1 |
| | | | | 11,000 | 12,700 | |
| | | | Windermere Interstadial | | | GI-1 |
| 2 | | | | 13,000 | 15,200 | |
| | | | Dimlington Stadial | | | Multiple GS and GI events |
| | | | | 26,000 | | |
| 3 | Middle Devensian Substage | | | | | |

et al., 1980; Collins et al., 1996; Lewis et al., 2001). This paucity has been attributed to a high process threshold for the rivers to cross or the removal of the deposits by erosion (Van Huissteden et al., 2001).

British lowland rivers characteristically emplaced gravelly deposits in a braided regime in non-glaciated southern England during the last glacial Devensian (Weichselian) Stage (Fig. 1), whereas Holocene

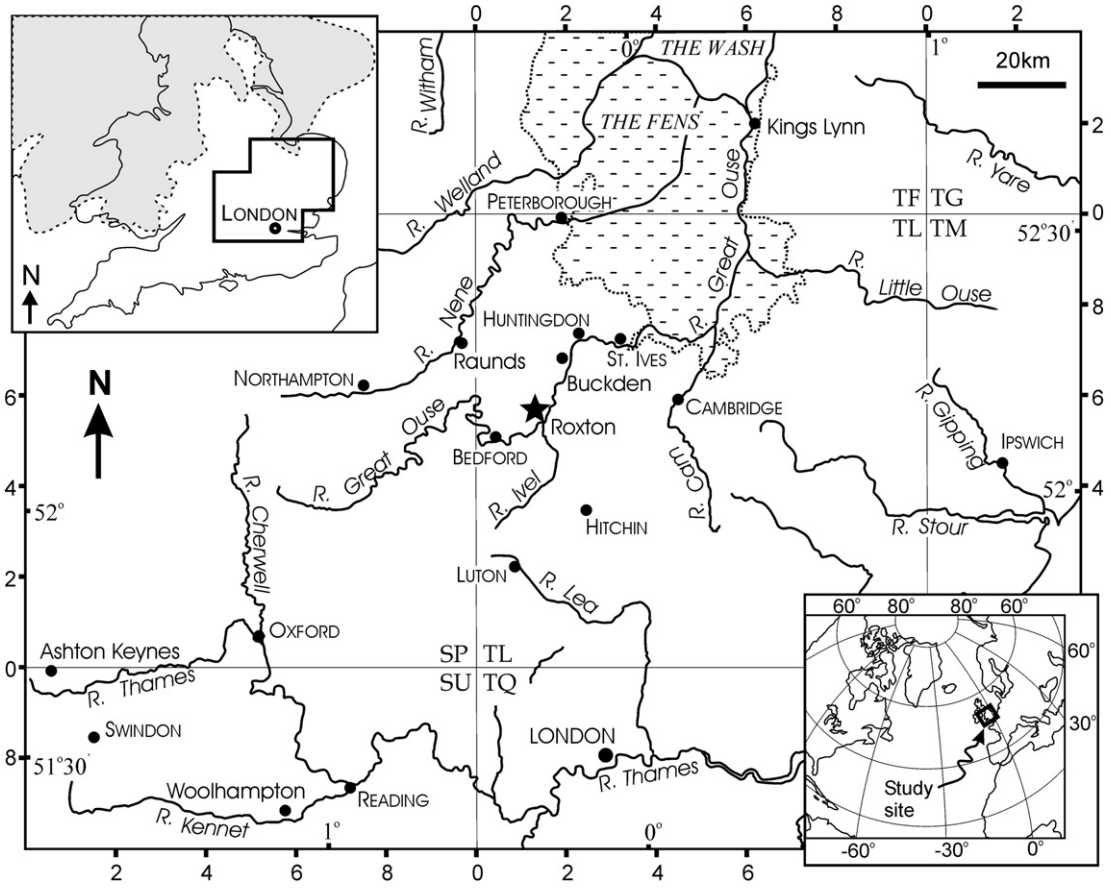


Fig. 1. Location map of the study area. Star indicates the study site shown in Fig. 2. The two capital letters such as TL, TM and SU are British Ordinance Survey grid references. The grey area in the upper left inset map indicates the Late Devensian ice advance (Bowen et al., 1986).