Student fieldwork opportunities in macrotidal estuaries: Quaternary geoscience examples from the Severn Estuary, UK

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Macrotidal estuaries are distinctive coastal environments that offer excellent fieldwork opportunities for undergraduate and postgraduate students in Higher Education. As a learning resource in geoscience disciplines, macrotidal estuaries and their associated coastal wetlands provide sometimes unique access to geological strata and geomorphological features. This is often due to a number of inherent characteristics of many macrotidal estuaries. As with all estuaries and, indeed, coastal environments, they are temporary landforms only, being determined by climate and sea-level change. Sea-level high-stand events transgress over previous landsurfaces, which become drowned by rising sea-level, and buried and preserved by tidal deposition. Therefore, opportunities to investigate precursor landscapes exist that underlie the later estuarine deposits. The accommodation space for tidal sediments is often large in macrotidal estuaries due to the high tidal range, which may lead to the accumulation of thick sequences of estuarine sediments and, if exposed, provide a window into the palaeoenvironmental and palaeogeomorphological development of the estuary. Finally, estuary surfaces also provide opportunities for study. These characteristics are applicable to both modern estuaries and to palaeoestuarine sequences.

This paper provides examples of how student fieldwork has been developed to fully utilize the learning resources provided by the modern Severn Estuary, in southwest United Kingdom, in Quaternary geoscience education. The Severn Estuary has a tidal range of c. 14.5 m with a Palaeozoic and Mesozoic basement. The environment is characterized by both tidal deposition and local coastal erosion, so that exposures of Pleistocene and Holocene sediment sequences are present within the intertidal zone, and accessible using coring equipment in coastal wetlands. Examples of student fieldwork include exercises that examine the late Pleistocene succession, the Holocene sequences with their palaeoenvironmental and archaeological constituents, the environment and geomorphology of the modern estuarine intertidal surface, and the hydrodynamics of the estuarine waters and tidal prism. The logistics of undertaking student field work in these environments is also discussed, such as issues around health and safety. These student fieldwork examples, developed in the Severn Estuary, could be applied to other macrotidal estuaries, such as the Bay of Fundy in Atlantic Canada.

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