
Boscawen

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Highlights

Organic sediments found in the head sequence here provide unique evidence for environmental conditions in Cornwall during the Devensian Stage. Pollen and radiocarbon-dated evidence shows that the bulk of head deposits at Boscawen accumulated after *c.* 29 ka BP, during the Late Devensian.

Introduction

Boscawen GCR site comprises St Loy's and Paynter's coves, and is an important Pleistocene stratigraphic locality. Organic beds within the head sequence have yielded pollen and have also been radiocarbon dated. They provide a rare opportunity to subdivide and interpret head sequences in the region. The sections were first described by De la Beche (1839), and subsequently by Reid and Flett (1907), Rogers (1910) and Davison (1930). A contemporary assessment of the deposits is provided by Scourse (1985a, 1987, 1996c) and the site is also mentioned in the BGS memoir (Goode and Taylor, 1988).

Description

Good sections in Pleistocene sediments occur between Merthen Point in the west [SW 418 227], through St Loy's and Paynter's coves, almost to Boscawen Point in the east [SW 430 230]. The Pleistocene sequence is relatively straightforward with a rocky shore platform, cut entirely in granite, overlain by a sequence of raised beach and then solifluction deposits. The raised beach deposit overlies the shore platform at about 3.5 m OD, and reaches a maximum thickness of 1.8 m (Scourse, 1985a). For the most part, it consists of a matrix-supported deposit of granite pebbles and cobbles, although erratics are also common (including greenstone, hornfels, chalk flints, Greensand chert and purple sandstone): in places, more than half the pebbles are non-granitic (Reid and Flett, 1907).

The overlying beds (up to 12 m in thickness) consist mainly of a breccia made up of angular and subangular granite clasts (Figure 6.7). Considerable facies variations, however, occur both vertically and laterally, and sandy silt lenses can be seen particularly towards the top of the sections (Scourse, 1985a). In places, there are stratified sandy and gravelly bands, and throughout the sections slump and flow structures occur. Near the top of the sections, there is a coarse deposit of granite boulders. Towards Boscawen Point, the raised beach is underlain by a thin breccia made up of granite clasts.

At *c.* [SW 423 230], Scourse (1985a, 1996c) records the following sequence (maximum bed thicknesses in parentheses):

5. Breccia of granite fragments (0.5 m)
4. Sandy silt with scattered granite clasts (0.75 m)
3. Breccia of granite fragments (2.0 m)
2. Granular humic silt (0.5 m)
1. Breccia of granite fragments (0.5 m)

The silty humic sediments range from black through chocolate-brown to ochre in colour. They have yielded pollen, and have been radiocarbon dated to 29 120 + 1690/–1400 BP (Q–2414) (Scourse, 1985a, 1996c).

Interpretation

The raised beach deposits at Boscawen were noted by De la Beche (1839) but were first described in detail by Reid and Flett (1907). They recorded a Pleistocene marine-cut platform overlain by raised beach and head deposits. The erratic content of the raised beach deposit was used as evidence that it (like the overlying head) had accumulated under cold, glacial, conditions with the erratics having been derived from grounded ice-floes (Reid and Flett, 1907). This interpretation was also followed by Davison (1930).

Scourse (1985a, 1996c) recognized the same basic stratigraphy but interpreted the sequence in far greater detail. He correlated the raised beach deposit with that at Godrevy, classifying it lithostratigraphically as the Godrevy Formation. Despite this correlation, the age of the raised beach deposit is far from certain; Scourse (1985a, 1996c) has tentatively ascribed it to a pre-Oxygen Isotope Stage 5 event (see Godrevy and Porth Nanven). The overlying beds were interpreted as consisting mainly of solifluction deposits (Penwith Formation) (Scourse, 1985a, 1996c).

The organic sediments within the head sequence at Boscawen are fundamental to Scourse's (1985a, 1996c) interpretation of the beds and the cornerstone of his scheme for Pleistocene subdivision in Cornwall. The organic sediments are arranged in a number of beds, the upper ones apparently having been soliflucted. The pollen contained in the lower, *in situ*, beds, although not zoned in the conventional manner, does however indicate a tundra vegetation and an Arctic climate: the deposits appear to have accumulated in a small pool on the surface of a solifluction flow (Scourse, 1985a, 1996c). The fossil flora is dominated by grasses. The spectrum also indicates that sedges were present in wetter areas, and the herb pollen are those from species which would have colonized the poor, disturbed minerogenic soils of a periglacial landscape (Scourse, 1985a, 1996c).

A radiocarbon age determination of $29\,120 \pm 1690$ – 1400 BP (Q-2414) from these humic sediments, if reliable, provides a maximum, Middle to Late Devensian, age for the bulk of the Penwith Formation at the site. The *in situ* organic bed, regardless of its age, also shows that the breccia accumulated on at least two separate occasions, and although a Late Devensian (Oxygen Isotope Stage 2) age for the upper part of the sequence seems likely, there is no way at present of knowing the age of the underlying head, particularly in view of the lack of a reliable age estimate for the raised beach deposits beneath. Similarly, the duration of the climatically slightly less severe interlude in which the organic sediments accumulated is not known.

Discontinuous sand lenses in the upper part of the head sequence are interpreted by Scourse as periglacial wind-blown sand ('sandloess') and correlated with the Lizard Loess (Roberts, 1985). The latter has been dated on the Lizard Peninsula by the TL method to 15.9 ± 3.2 ka BP (QTL 1e) (Wintle, 1981).

Boscawen is primarily a reference site for the interpretation of solifluction deposits in South-West England. It also provides a valuable record, in the form of raised beach deposits, for fluctuations in relative sea level during the Pleistocene. At present, the age of the raised beach deposit here is unknown. The dated organic deposits from within the solifluction beds show clearly that most of the breccia, including the lenses of wind-blown material, is probably Late Devensian in age. They also show that head deposits, indistinguishable from those above them and classified, lithostratigraphically, as part of the Penwith Formation, formed at some stage prior to c. 29 ka BP (Scourse, 1985a, 1996c). An Ipswichian age for the raised beach deposit (equivalent to Oxygen Isotope Stage 5e) would confine this early period of head formation to Early or Middle Devensian times. Such an age, however, is far from certain, and if the raised beach deposit proves to be older (e.g. Stage 7), then this head could equally well date from a pre-Devensian cold stage (e.g. Stage 6). The precise character and duration of the period in which the organic sediments at Boscawen accumulated has yet to be determined. It is not clear, for example, if the surviving organic beds represent the early part of an interstadial phase of the Devensian, or simply a brief, even seasonal, respite from active solifluction.¹ Boscawen is therefore important for establishing that the head and solifluction deposits fringing the Cornish coast were not necessarily deposited in a single, synchronous, Late Devensian event or cycle.

Conclusion

Boscawen demonstrates important evidence for Pleistocene climatic and environmental conditions. Its raised beach and head deposits are in many ways typical of those along the south Cornish coast. However, organic sediments found within the head here have allowed a more detailed reconstruction of events than is usually possible. Solifluction appears to have been interrupted, c. 29 000 years ago, by a period of less harsh conditions when the land surface was colonized by tundra vegetation. A return to more extreme periglacial conditions and renewed solifluction is shown by thick head deposits which overlie the organic beds. Whereas the age of head deposits in most coastal sections can be determined only very broadly, the bulk of those at Boscawen can be shown to have accumulated after c. 29 ka BP, probably during the coldest part of the Devensian Stage (Late Devensian/Oxygen Isotope Stage 2). Head deposits below the organic sediments here must therefore be older, although like the raised beach deposits beneath them, their age is unknown.

References



(Figure 6.7) Boscawen GCR site (St Loy's Cove): solifluction deposits interbedded with organic sediments towards the base of the section. (Photo: J.D. Scourse.)