Eastern Slade and Western Slade

Highlights

This site provides evidence, in the form of reworked glacial sediments, that this part of South Wales was glaciated by Irish Sea ice during a pre-Ipswichian glaciation. Its colluvial sediments and redeposited drift are proof that Devensian ice did not reach this part of Gower.

Introduction

Coastal exposures between Eastern Slade [SS 489 854] and Western Slade [SS 484 855] show evidence for the late Middle and Late Pleistocene history of south Gower. The locality is a reference site for redeposited pre-Devensian glacial sediments. It demonstrates that south Gower was free of glacier ice during the Late Devensian. The site was first described by Strahan (1907b) and later featured in studies by George (1932, 1933a, 1933b). The sequence was described and interpreted by Bowen (1966, 1969a, 1970a, 1971a, 1973b, 1974, 1977a, 1977b, 1984), and mentioned by Peake *et al.* (1973), Stephens and Shakesby (1982) and Bridges (1985).

Description

Between Oxwich Point and Horton, a fossil sea-cliff is buried by superficial deposits which were trimmed by the sea during the Holocene. At Western Slade, Eastern Slade and Horton, fault-guided dry valleys run inland to a plateau which is mantled with glacial deposits. These valleys are mulled with Late Pleistocene sediments that extend onto the coastal margin as an apron or terrace. The following sequence overlies a Carboniferous Limestone shore platform.

(Stratigraphic terminology of Henry (1984a, 1984b) in parenthesis) -

3 Blown sand and colluvium (Port-Eynon Silt)

2 Redeposited glacial drift (Western Slade

Diamicton) and limestone head (Hunts Breccia)

1 Colluvial silts (Pwll Du Red Beds)

This sequence is shown in (Figure 6). Raised beach sediments may occur towards the base of the sections (Strahan 1907b; George 1932; Bowen 1970a) but are not usually exposed.

The sections at Eastern Slade and Western Slade were first described by Strahan (1907b) who recorded a sequence of :

4 Loam (3.0m)

3 Till (6.0m)

2 Blown sand (0.10m)

1 Raised beach deposits

In some places, the loam was described as filling pipes in an earlier head deposit, and the glacial sediments (bed 3) were considered to have found their way to the coast via the small valleys at Eastern Slade and Western Slade.

Interpretation

George (1932, 1933a, 1933b), described the sections and observed that the deposits consisted very largely of glacial sand and gravel with head and loam, although *Patella* raised beach deposits occurred at the base of the sections near Eastern Slade. He noted that the glacial gravel contained a mixture of rocks from the South Wales Coalfield with a smaller number of Precambrian and igneous types which included examples from Ll■n, Anglesey, Skomer and Scotland. Ailsa Craig microgranite was also recorded by George. These far-travelled rock types were mixed randomly amongst the Upper Carboniferous pebbles, and George concluded that the deposits had resulted from "the outpourings of a tiny valley glacier" during the 'Older Drift' glaciation, when, he believed, Gower was affected by confluent Irish Sea and Welsh ice masses. Towards the base of the sections near Eastern Slade, he noted that the normally chaotic glacial gravels were replaced by 8 ft (2.4m) of stratified sands and gravels which he considered were of fluvioglacial origin. He noted that glacial sediments were replaced eastwards by limestone head and loam, regarding the limestone head as a solifluction deposit, and interpreting small lenses of finer-grained material within the head as seasonal meltwater deposits. The capping loam was derived from older superficial deposits by wind action. The entire sequence of deposits had been trimmed flat by the sea sometime after deposition of the 'Older Drift'. George (1932) termed the upper surface of the terrace the 'Post Older Drift Platform', and considered it to be equivalent in age and origin to similar features in Rhosili and Hunts Bays.

Bowen (1966, 1969a, 1970a, 1971a, 1973b, 1974, 1977a, 1977b, 1984) recorded the sequence given in the site description of this report. He noted that colluvial silts (bed 1) were exposed in the lee of a large limestone buttress at Western Slade, and that they showed bedding indicating derivation from the north-west — see (Figure 6). The unit was considered to post-date glaciation in the area because it contained derived erratics and was nowhere overlain by glacial deposits *in situ* (Bowen 1970a). The colluvial silts were overlain by slope deposits consisting of limestone head and redeposited glacial sediments (bed 2) or a mixture of both, with the proportion of head being greatest near limestone outcrops. Bowen (1970a, 1971a, 1984) noted that the redeposited till was confined to the middle of the bay at Western Slade and was replaced on its flanks by limestone head. This, together with the fabric of the sediment (Bowen 1969a, 1970a, 1971a, 1984), demonstrated that the deposit had been reworked down the Western Slade Valley from pre-existing inland glacial sediments. In addition to the mixture of South Wales and Irish Sea erratics recorded by George (1933a) from the redeposited glacial sediments, Bowen (1984) also noted that colluvial silts at the site contained staurolite, kyanite and zoisite, three minerals characteristic of an Irish Sea provenance (Griffiths 1939), in addition to possible Triassic components. The fluvioglacial sediments described by George (1933a) were reinterpreted by Bowen (1971a) as alluvially re-sorted and redeposited glacial sediments.

From the evidence in the coastal sections at this site and from elsewhere in Gower, Bowen (1971a) proposed the following sequence of events. 1) During an earlier pre-Devensian glaciation, sediments were deposited in Gower from sources in Wales and the Irish Sea Basin. 2) This glaciation was followed by a period of temperate interglacial conditions, probably during the Ipswichian Stage. The rock cliffs and platform at Eastern Slade and Western Slade were modified, and raised beach sediments accumulated at nearby Horton and elsewhere around the south Gower coast. 3) As conditions deteriorated with the onset of the Devensian Stage, sea-level fell and vegetation cover was reduced, promoting surface sheet-wash and the accumulation of bedded colluvial silts. 4) With a further deterioration of climate towards full periglacial conditions during the Late Devensian, limestone talus from local bedrock accumulated, and pre-Devensian glacial sediments were redeposited by solifluction and alluvial processes from inland, along the Slade and Horton Valleys. 5) Finally, towards the end of the Late Devensian, loess and colluvial sediments (bed 3) were deposited as a capping to the sequence (Bowen 1971a).

The sequence of sediments at Eastern Slade and Western Slade therefore provides an important record of environmental and geomorphological changes in Gower. The site shows particularly important evidence for the pre-Devensian glacial history of Gower, and is a reference site for redeposited glacial and other sediments of pre-Devensian age. During an 'early' glaciation, Gower was affected by ice, not only from the South Wales Coalfield, but also from the Irish Sea Basin. The sections also provide stratigraphic evidence to show that this part of south Gower lay outside the maximum limit of the Late Devensian ice-sheet.

Eastern Slade and Western Slade demonstrate the combined effects of topographic control and sedimentary processes on the accumulation and distribution of different sediment types. The site provides evidence with which to interpret coastal drift exposures elsewhere along the south Gower coast, and forms an integral part of a network of sites in Gower

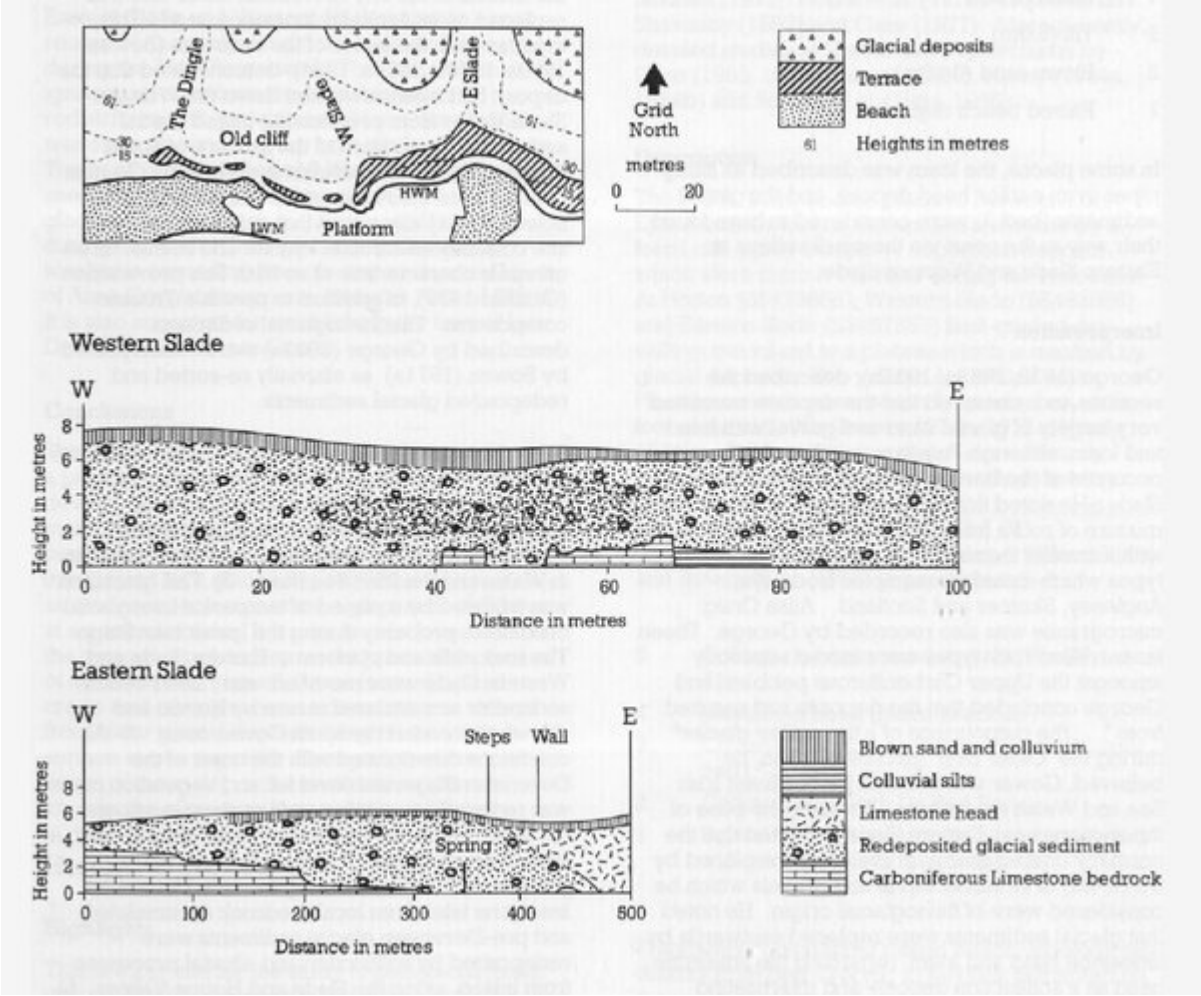
that constrain the position of the maximum limit of Late Devensian ice across the peninsula.

Eastern Slade and Western Slade provide a rock record of changing conditions in south Gower during the Late Pleistocene. The occurrence of igneous erratics from the Irish Sea Basin in redistributed till, provides evidence that Gower was once glaciated by ice from the Irish Sea Basin. The mixing of Irish Sea and Welsh rock types was used by T N George to show that Gower was glaciated by confluent Irish Sea and Welsh ice during the 'Older Drift' glaciation. The site is notable in recording the sole occurrence in Gower of Ailsa Craig microgranite from the Firth of Clyde. It is also important for establishing the limit of Late Devensian ice across Gower.

Conclusions

These localities are important as reference sites for a particular deposit which is nowhere else developed in such detail. This consists of a massive unsorted deposit (that is ranging from clay particles to large boulders) which was originally interpreted as a glacial deposit. That is, it was used as evidence to demonstrate a glaciation of Gower at a particular time. It is now known, however, that the deposit is not, in its present position, a product of an ice-sheet. Instead, it was formed by soil creep and other processes down the two valleys from older glacial deposits lying on the plateau surface above the cliffs. Recognition of the true origin of these deposits revolutionised the knowledge of ice age history in South Wales.

References



(Figure 6) Quaternary sequence at Eastern Slade and Western Slade (after Bowen and Henry 1984)