Start Point to Prawle Point

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Highlights

This 6 km-section of coast provides some of the finest exposures of periglacial deposits in Britain. They demonstrate superbly the salient characteristics of coastal head deposits.

Introduction

The coast between Start Point [SX 830 370] and Prawle Point [SX 773 350] is extensively, mantled with Pleistocene, periglacial slope deposits. These deposits are especially well developed here because the schist bedrock is particularly prone to destruction by frost-action, and because most of this coast faces south or south-east and is thus protected from westerly and south-westerly waves. Alternatively, on the exposed sides of headlands, such as the section between Bolt Head [SX 725 359] and Hope Cove [SX 673 398], head deposits have been stripped by marine erosion (Mottershead, 1971). Authoritative descriptions of the coastal head deposits of South-West England were first made iby De la Beche (1839) who introduced the term 'head'. The sections between Prawle Point and Start Point received particular mention by Ussher (1904), Steers (1946), Masson-Phillips (1958) and Orme (1960b), but the most comprehensive sedimentological and morphological descriptions were given by Mottershead (1971). The quantitative characterization of the head deposits along this stretch of the coast is detailed by Mottershead (1972, 1976, 1982b). Estimates of current rates of bedrock weathering and erosion along the shoreline are provided by Mottershead (1981, 1982a, 1982c). Morawiecka (1993, 1994) described palaeokarstic features in 'sandrock' at Prawle Point.

Description

The sections range up to 33 m in height and are banked against a fossil cliffline up to 125 m high. The head rests on former wave-smoothed surfaces at the foot of the cliffs. The maximum thickness of the head is seen only at localities such as Mattiscombe Sands [SX 816 369] where subsequent erosion has cut deeply into the deposit (Figure 6.3). At other localities, such as Langerstone Point [SX 782 354], sections are as little as 2 m high: these exposures occur up to 270 m away from the fossil cliff. In contrast, the thickest sections occur only a short distance from the former cliffline. The head deposits fill the mouths of coastal valleys, as at Mattiscombe Sands and are of variable thickness where the bedrock floor is gullied or irregular. They are banked against the fossil cliff in a series of 'fans' or 'aprons', the surfaces of which form concave slopes of 10–15° near the bedrock slope, declining to 2–3° away from it (e.g. Langerstone Point) (Mottershead, 1971).

The head is poorly sorted and is composed of all particle sizes from boulders to clay (Mottershead, 1971). Sediments nearer to the ancient cliff are generally coarse, often containing boulder-sized material, whereas those away from it (and the source of sediment) are generally finer-grained, consisting largely of pebble- and granule-size material.

The lithology of clasts in the head reflects the nature of the bedrock found upslope, namely a combination of quartz-mica schist and green (chlo-rite/hornblende) schist. Mottershead (1971) noted a general increase in the ratio of quartz to schist in the sections farthest from the fossil cliffline, which he suggested was due to comminution of the more friable schist-types during transport, and perhaps even to the selective transport of smaller clasts. All particles, however, are angular or subangular, even those found farthest away from the old cliff. The clasts in the head show a strong unimodal orientation downslope, reflecting their direction of movement away from the cliffline and sediment source. The head sometimes shows crude stratification (e.g. at Rickham Sand; [SX 755 367]) with thin layers picked out in places by the different colours of the constituent mica and hornblende schists. Most of the head, however, is structureless.

Towards the base of many sections, the head also contains sand and rounded pebbles of marine origin. In places, possibly *in situ* raised beach deposits are covered by the head. At others, the former presence of a beach deposit is indicated by the occurrence of rolled stones within the head: some, such as those of flint, are clearly of non-local derivation.

Interpretation

Most deposits exposed in the coastal cliffs between Start Point and Prawle Point, are believed to have been derived by the action of frost on the ancient cliff which now lies upslope (Mottershead, 1971). They arrived on the ancient marine platform by mass movement processes, principally solifluction, under periglacial conditions. The morphology of the sediment bodies (Tans' or 'aprons' of head), and the sedimentological and lithological characteristics of the deposits are entirely consistent with such an origin. Alternating layers of different schist material within the head may indicate successive shallow solifluction 'flows', each derived principally from a particular bedrock lithology: other massively bedded and unstructured parts of the head sequence may denote the arrival of large thicknesses of saturated debris *en masse* (Mottershead, 1971). Whatever process variations the head may denote, there is general agreement that they indicate mass wasting under periglacial conditions, and are the products of degradation of the coastal bedrock slope (Mottershead, 1977a). These head sequences find close parallels elsewhere around the coast of South-West England (Mottershead, 1977b) although they are rarely, if ever, better developed.

Whereas their origin is not disputed, the age of the deposits is far from certain. Mottershead (1971) divided the sequences found along this coastline into a variety of facies: a Main Head (forming the bulk of the sequence); an Upper Head (distinguished by a silty texture, perhaps indicating the incorporation of loess); and a sporadic Lower Head (separated from the Main Head by raised marine sediments, for example, at Sharpers Cove, [SX 786 357]). Although Stephens (1966b, 1970a) had earlier effected a similar division of head deposits in north Devon, he had assigned them to the 'Wolstonian' (Lower/Main Head) and the Devensian (Upper Head) because the underlying raised beach deposits were believed to be of Hoxnian age. Bowen (1973b) regarded this differentiation as unrealistic and ascribed the different head facies to various stadial phases of the Devensian Stage. Mottershead (1971) instead followed the thinking of Masson-Phillips (1958) and Orme (1960b) and suggested that the raised beach deposits had accumulated during milder, interstadial, phases of the Devensian, with head accumulating during colder periglacial phases.

Modern work has shown that none of these schemes is universally applicable. Detailed regional geochronological studies (Keen, 1978; Lautridou, 1982; Davies and Keen, 1985; Bowen *et al.,* 1985; Mottershead *et al.,* 1987) have shown that the raised marine deposits of the western Channel date from at least two high sea-level stands in the Middle and Upper Pleistocene — probably equivalent to Oxygen Isotope Stages 7 and 5 of the deep-sea record. At sites where an Oxygen Isotope Stage 7 raised beach deposit lies beneath head, the possibility clearly exists for head facies to have accumulated during a number of Pleistocene cold stages (e.g. Oxygen Isotope Stages 6, 4 and 2). Where the head overlies an Oxygen Isotope Stage 5 marine deposit, on the other hand, a Devensian age (equivalent to either or both of Oxygen Isotope Stages 4 and 2) must be assumed. With the absence of datable materials, the ages of the head and raised marine sediments between Start Point and Prawle Point remain unknown.

Conclusion

Start Point to Prawle Point GCR site provides some of the finest sections through periglacial slope deposits (head) anywhere in Britain. Although their precise age is unknown, these deposits exhibit all the characteristic features of coastal head deposits, and are believed to have accumulated during a variety of cold stages in the Pleistocene when periglacial conditions prevailed. Alternating facies of head, comprising different clast lithologies, point to deposition by a variety of individual, shallow solifluction flows, with different bedrock layers in the old cliffline successively succumbing to the effects of frost-action. Elsewhere, massively bedded head deposits suggest downslope movement of substantial quantities of probably saturated debris *en masse.* In conservation terms, the sections from Start Point to Prawle Point provide a wide variety of slope deposits and related landforms of textbook quality, against which other, less well-developed examples, can be compared and interpreted.

References

(Figure 6.3) Coastal head deposits overlying a raised shore platform at Great Mattiscombe Sand [SX 816 369], 1.2 km west of Start Point. (Photo: D.H. Keen.)