

DUNBAR

J.E. Gordon

OS Grid Reference: NT661788

Highlights

The coastal landforms at Dunbar are notable for a series of shore platforms, including features which pre-date the Late Devensian. These landforms are representative of erosional coastal features found along the east coast of Scotland and are important for interpreting former sea-level changes and processes of rock coast development.

Introduction

This site (NT 661788) is a 1.9 km long stretch of coast in the immediate vicinity of Dunbar. Within its limits are preserved four distinct shore platforms which range in altitude from 25 m above, to 11 m below present sea level (Rhind, 1965; Sissons, 1967a, 1976b; Hall, 1989a).

Description

The highest (A) of the four shore platforms known to be present at Dunbar is one of a number of fragments which occur at 18 m to 25 m O.D. between North Berwick and Berwick in south-east Scotland (Rhind, 1965). That this platform pre-dates the last ice sheet may be inferred from the preservation of the drift tail of a crag and tail on its surface at Dunbar (see Sissons, 1967a, figure 83). A second platform (B) occurs in the intertidal zone, and for about 1 km west of the Castle ruins it is backed by a 20 m high cliff cut in volcanic tuffs and sandstones (Clough *et al.*, 1910; Francis, 1975). Several stacks protrude above the platform surface, including the Dove Rock, a relatively more resistant volcanic plug, and shallow caves are cut into the backing cliffs. Present-day beach deposits, mainly shingle and some coarser debris, occur at the heads of embayments in the cliffline. The platform attains its greatest width, about 350 m, west of Long Craigs, where it clearly truncates the underlying sediments and agglomerates (Clough *et al.*, 1910; Francis, 1975) (Figure 17.11).



Figure 17.11: Intertidal shore platform at Dunbar, which has been planed across a series of Devonian–Carboniferous and Carboniferous sediments and agglomerates. (Photo: J. E. Gordon.)

To the west, the backing cliff of the intertidal platform is degraded and is fronted by Holocene raised beach deposits resting on a third platform (C) at an intermediate level and separated from the lower intertidal one by a rock step 1 m to 2 m high. These relationships are best seen in section at NT 66337899. A further platform (D) occurs offshore at about -11 m O.D.

Interpretation

The highest platform (A) clearly pre-dates the Late Devensian glaciation, although its age is unknown. Similarly the age or ages of the next two lower platforms (B and C) are unknown, although from evidence elsewhere on this part of the coast they pre-date the last ice sheet (Hall, 1989a). Sissons (1976b) suggested the possibility that they were originally a single feature, the step between them having been cut by recent marine erosion since the sea attained its present level. Hall (1989a), however, has argued that the presence of till at the rear of the intertidal platform (B) at two sites nearby precludes significant erosion and retreat of the backing cliff during the Holocene. According to Hall (1989a) the two platforms (B and C) existed as separate features prior to the Late Devensian, and Holocene marine erosion has been confined to stripping a till cover. These platforms may form part of the intertidal platform that is developed extensively elsewhere in eastern Scotland (see Milton Ness and Kincaig Point). Dawson (1980a) has correlated this platform with the Low Rock Platform of western Scotland (see Northern Islay and West Coast of Jura).

The offshore platform (D) has been correlated with a buried gravel layer and platform in the Firth of Forth and a submerged platform near Burnmouth to define the Main Lateglacial Shoreline in south-east Scotland (Sissons, 1976a, 1976b). Sissons (1974d) also correlated the Main Rock Platform of western Scotland (see Isle of Lismore) with this shoreline, suggesting that they were formed during the severe climatic conditions of the Loch Lomond Stadial.

Dunbar is important for demonstrating the geomorphology of shore platforms formed during the Pleistocene. Such platforms occur at a variety of altitudes along the east coast of Scotland (Walton, 1959; Sissons, 1967a; Rhind, 1965; Crofts, 1975; Browne and Jarvis, 1983; Stoker and Graham, 1985; Hall, 1989a) (see also Kincaig Point and Milton Ness) but are particularly well-preserved in the vicinity of Dunbar. Here also, the relationship of the uppermost platform (A) to glaciation is indicated by the superimposition of a drift tail on the platform, and two lower platforms (B and C) are also inferred to pre-date the last glaciation. The site emphasises the importance of inherited features in the coastal geomorphology of eastern Scotland (*cf.* Walton, 1959; Sissons, 1967a; Hall, 1989a).

Conclusions

Dunbar forms part of the site network demonstrating Quaternary coastal geomorphology and sea-level change. In particular, it is notable for an excellent series of rock platforms of different ages, including examples that pre-date the last ice age (i.e. formed before 26,000 years ago). Dunbar is one of the best sites in eastern Scotland illustrating the development of multiple shore platforms and it also highlights the contribution of older elements to the form of the present coastal landscape.

Reference list

- Browne, M.A.E. and Jarvis, J. (1983) Late-Devensian marine erosion in St Andrews Bay, east-central Scotland. *Quaternary Newsletter*, **41**, 11–7.
- Clough, C.T., Barrow, G., Crampton, C.B., Maufe, H.R., Bailey, E.B. and Anderson, E.M. (1910) The geology of East Lothian, including parts of the counties of Edinburgh and Berwick. (Explanation of Sheet 33, with parts of 34 and 31). 2nd ed. *Memoirs of the Geological Survey of Scotland*. Edinburgh, HMSO, 226pp.
- Crofts, R.S. (1975) Sea bed topography off north-east Scotland. *Scottish Geographical Magazine*, **91**, 52–64.
- Dawson, A.G. (1980a) The Low Rock Platform in western Scotland. *Proceedings of the Geologists' Association*, **91**, 339–44.
- Francis, E.H. (1975) Dunbar. In *The Geology of the Lothians and South East Scotland An Excursion Guide* (eds G.Y. Graig and P. McL. D. Duff). Edinburgh, Scottish Academic Press,

93–106.

Hall, A.M. (1989a) Pre-Late Devensian coastal rock platforms around Dunbar. *Scottish Journal of Geology*, **25**, 361–5.

Rhind, D.W. (1965) Evidence of sea level changes along the coast north of Berwick.

Proceedings of the Berwickshire Naturalists' Club, **37**, 10–5.

Sissons, J.B. (1967a) *The Evolution of Scotland's Scenery*. Edinburgh, Oliver and Boyd, 259pp.

Sissons, J.B. (1974d) Lateglacial marine erosion in Scotland. *Boreas*, **3**, 41–8.

Sissons, J.B. (1976a) Lateglacial marine erosion in south east Scotland. *Scottish Geographical Magazine*, **92**, 17–29.

Sissons, J.B. (1976b) *The Geomorphology of the British Isles Scotland*. London, Methuen, 150pp.

Stoker, M.S. and Graham, C. (1985) Pre-Late Weichselian submerged rock platforms off Stonehaven. *Scottish Journal of Geology*, **21**, 205–8.

Walton, K.W. (1959) Ancient elements in the coastline of north-east Scotland. In *Geographical Essays in Honour of Alan G. Ogilvie* (eds R. Miller and J.W. Watson). London, Nelson and Sons, 93–109.