
Northern Islay

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Highlights

Northern Islay is outstanding for its assemblage of fossil shoreline landforms, particularly shore platforms, and overlying glacial deposits. Most notable is the High Rock Platform, unparalleled elsewhere in its degree of development.

Introduction

This site, extending 7 km along the coastline of northern Islay between Rubha a'Mhail [NR 428 789] and Port Domhnuill Chruinn [NR 367 769], is one of the classic areas of raised shoreline landscape in the British Isles. Photographs of this coastline have been published in several major texts (for example, Johnson, 1919; Sissons, 1967a), and the Quaternary geomorphology of this area has been extensively discussed (Wright, 1911; McCann, 1961a, 1964, 1968; Synge and Stephens, 1966; Dawson, 1979a, 1982, 1983a, 1983b).

The coastal zone of northern Islay is dominated by a spectacular, high, coastal rock platform and cliff (the High Rock Platform). In addition, two other shore platforms are present, the Low Rock Platform and the Main Rock Platform. The High Rock Platform was first described by Wright (1911) and later by McCann (1961a, 1964, 1968) who provided detailed descriptions of the raised shoreline features and Quaternary stratigraphy of this area. McCann (1964) also described a large end moraine that rests upon the High Rock Platform at Coir' Odhar [NR 400 783]. This feature was reinterpreted by Synge and Stephens (1966). Subsequent investigations by Dawson (1979a, 1982) have demonstrated a complex history of Quaternary sea-level changes and glacial events for this area.

The High Rock Platform

Description

In northern Islay a high rock platform eroded in Dalradian quartzite is almost continuous between Lon na Cnuasachd [NR 405 787] and west of Mala Bholsa [NR 378 777] (Figure 11.9). East of Mala Bholsa the platform is spectacularly developed, having a maximum width of 650 m and backed by a cliff up to 60 m in height. (Figure 11.10). Along the entire length of the coastline, the cliff backing the platform is a degraded feature and is characterized by vegetated talus and slumped or soliflucted till, which blanket the rock face of the cliff and obscure the platform inner edge. The platform declines gently in altitude seaward at around 4° and its surface is free of stacks. Its front edge forms the backing cliff of a broad intertidal rock platform (the Low Rock Platform).

Between Aonan Port an-t-Sruthain [NR 385 781] and Aonan na Mala [NR 375 776] several exposures reveal accumulations of till that rest on the platform surface and which are, in turn, overlain by raised beach gravels. There, the distribution of the high raised beach gravels is limited to the seaward areas of the platform surface, generally below 27 m OD. Landward of these beach gravels the platform surface is overlain by till, and farther east along the coast the platform is overlain by the Coir' Odhar moraine (Figure 11.9).

Owing to the presence of drift deposits on the platform, its inner edge is only visible at six locations along stream channels and on the sides of geos. The altitudes (from 32.1 to 34.9 m OD) measured at these six locations indicate only minor variations in platform altitude and are similar to the values (32.1 m and 34.1 m OD) obtained for the west coast of Jura High Rock Platform. One slightly higher altitude (35.4 m OD) has also been measured for the surface of the platform elsewhere in northern Islay. The similar nature of the Islay and Jura platforms, and their close proximity to each other implies that they are part of the same shoreline (the High Rock Platform).

Interpretation

Wright (1911) first described the High Rock Platform of northern Islay and discussed its age and origin. He considered that the till-covered feature was 'preglacial' in age and that it had been affected by subsequent tectonic activity. A similar view was expressed by McCann (1968, p. 24) although he proposed that the feature was 'interglacial' since glacial erosion '...must surely have resulted in more than the trifling amount of surface modifications of the platform...'. McCann, however, considered that the 'till' described by Wright as overlying the platform was in fact soliflucted material.

The origin and age of the High Rock Platform, however, remain problematic, and depend largely on how the shoreline altitude data are interpreted (see also west coast of Jura). Sissons (1982b) suggested that the High Rock Platform in western Scotland represents a series of isostatically tilted shorelines produced during the last and previous glacials by frost action and wave action. However, the measured altitudes of the inner edge of the platform, as described above, appear to indicate that the platform is not glacio-isostatically tilted. Instead the pattern of measured altitudes indicates a generally horizontal platform surface that may be slightly warped.

Dawson (1983a) estimated that the widest High Rock Platform fragment in northern Islay would have required about 28,000 years of rapid periglacial shore erosion for its formation. The occurrence of such prolonged coastal erosion during a single period of cold climate is unlikely because of glacio-isostatic instability of the land surface and glacio-eustatic changes in sea level. It would therefore appear that the platform in northern Islay represents the product of several periods of shore erosion during the Pleistocene.

The Low and Main Rock Platforms

Description

On the foreshore beneath Rhuvaal lighthouse [NR 426 792], two distinct rock platforms have been reported (Dawson, 1979a, 1980a). Both platforms occur in the intertidal zone but are markedly different not only in width, but also in morphology. The lower is the more conspicuous and forms an almost continuous feature along the northern Islay coastline. This platform is generally 100 m wide and in the Coir' Odhar embayment reaches a maximum width of almost 300 m. With the exception of the area near Rhuvaal lighthouse this platform is terminated landwards by quartzite cliffs, generally 30–35 m in elevation. In addition, its smooth ice-moulded surface and its considerable width strongly suggest that it forms part of the similar feature described in south-west Jura.

At Rhuvaal, however, the inner edge of the lower platform is separated from the main cliff by a second shore platform, which is 20–25 m wide. Between the two platforms is a 1–2 m high cliff. Unlike the lower platform, the surface of the higher platform (the Main Rock Platform) is characterized by protruding angular and inclined quartzite ridges. This platform can be traced intermittently for a considerable distance along the northern Islay coastline.

Interpretation

The fact that the lower set of platform fragments has been ice-moulded demonstrates that they were produced prior to the last glaciation. This platform, first noted by Wright (1911) as a '...preglacial plain of marine denudation...' has been termed the Low Rock Platform by Dawson (1979a, 1980a). He noted that its presence as an ice-moulded intertidal feature, along many parts of the Scottish coastline, implied that it is interglacial in origin and unaffected by glacio-isostatic tilting. An alternative explanation was proposed by Sissons (1981a) who argued that the glaciated intertidal features represented a set of platform fragments of different ages that have been subject to glacio-isostatic deformation and which has been exhumed in the intertidal zone as a result of present marine activity. According to this hypothesis, these rock platform features were initially produced by cold-climate shore erosion processes. The higher platform fragments are considered part of the glacio-isostatically tilted Main Rock Platform (see Isle of Lismore), regarded as having been produced during the cold climate of the Loch Lomond Stadial (Dawson, 1979a, 1980b) (but see Isle of Lismore). This shoreline, owing to its glacio-isostatic deformation, is generally considered to pass below sea level west of Mala Bholsa (Dawson, 1980b).

The Coir' Odhar Moraine

Description

The Coir' Odhar moraine forms two distinct north-west-facing arcuate ridges which are separated by a small embayment 200 m wide (Figure 11.9). On both sides of the embayment the ridges rest on the High Rock Platform.

Exposures in the eastern ridge (at [NR 400 785]) reveal angular quartzite blocks embedded in a matrix of stiff, orange clay. The deposits, together with the morphology of the feature, indicate clearly that it is a moraine. Rounded raised beach cobbles mantle the outer edge of the ridge and demonstrate that McCann's (1964) view that these gravels are incorporated within the moraine is invalid.

On both sides of the embayment the outer margin of the moraine is cuffed and the cliff forms the inner edge of a distinct raised shoreline at 26–27 m OD. This shoreline forms the marine limit in the area and is a clear feature along considerable stretches of the northern Islay coastline.

Inland of the moraine, the backing cliffs at the head of the embayment are composed of stratified sands and gravels which have been deeply incised by several streams. The surface of the stratified deposits descends seaward from over 42 m to 26–27 m OD, with an average gradient of 40 m km^{-1} ; they have been interpreted as out-wash deposits formed as the ice retreated from the moraine (Dawson, 1979a).

Interpretation

McCann (1964) first described a terminal moraine in northern Islay resting on the High Rock Platform and concluded that it represented the outer margin of a valley glacier that flowed seaward from a corrie located farther inland (McCann, 1964, p. 5). He considered that, since raised beach deposits were apparently incorporated within the moraine, a readvance of ice had occurred in northern Islay that was contemporaneous with the Highland (Loch Lomond) Readvance identified by Charlesworth (1956). McCann (1964, p. 5) stated that '... the outer face of the morainic ridge at 77 ft (23.5 m) above high water mark is unmodified by marine erosion showing that the sea must have fallen below this level before the onset of the readvance of the ice'.

In direct contrast, Synge and Stephens (1966, p. 107–8) concluded that the moraine was '...one of a series of drift ridges deposited by the general glaciation on this coast... the seaward edge of this 'moraine' is the erosion scarp, or cliff, of the Lateglacial marine limit. An accumulation of rounded beach gravels occurs at the foot of this small cliff at 90–99 ft (29.3–30.2 m) (the) marine limit along this stretch of coast is uniform in height, and uninterrupted by any later glacial phase'.

Dawson (1979a) agreed with Synge and Stephens and established that the outwash deposits, formed as ice retreated from the moraine, were graded to the raised shoreline at an altitude of 26–27 m OD. The Coir' Odhar moraine was therefore formed during the retreat of the main Late Devensian ice-sheet and was not of Loch Lomond Readvance age as proposed by McCann (1964). The raised shoreline at c. 26–27 m OD at Coir' Odhar was considered by Dawson (1982) to be contemporaneous with the Central Islay moraine: no other moraine systems have been correlated with the Coir' Odhar moraine.

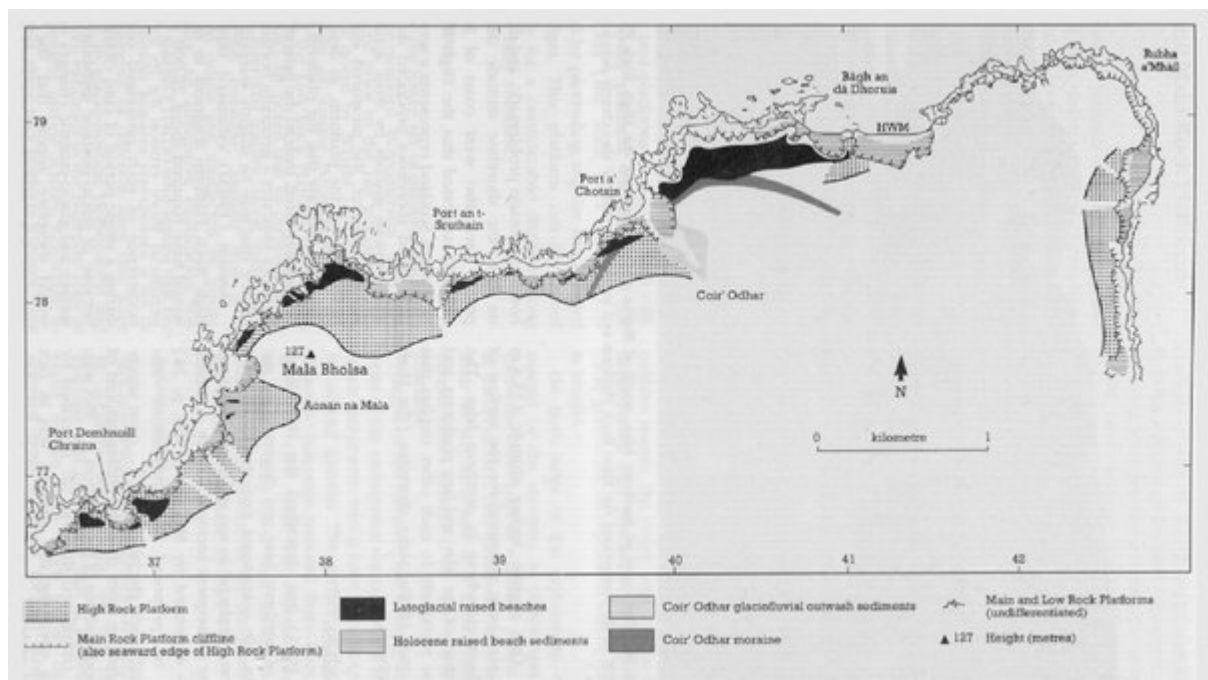
Following the first account of the High Rock Platform of northern Islay by Wright (1911), Johnson's (1919) description of the feature in his standard textbook, *Shore Processes and Shoreline Development*, focused international attention on this coastal zone as a superb example of a raised shoreline landscape (cf. Dawson, 1991). Stratigraphic studies and accurate levelling have since demonstrated the complexity of Late Quaternary sea-level changes (including glacio-isostatic shoreline deformation) and glaciation history in this area (Dawson, 1979a, 1982), and although a considerable amount of detailed information is now available, the origins and ages of certain geomorphological features still remain controversial. Thus the origin and age of the High Rock Platform are the subject of considerable disagreement (see Sissons, 1982b; Dawson, 1983a, 1984). Moreover, Sissons (1981a) and Dawson (1980a) maintain opposing views on the nature of the Low Rock Platform. Finally, the Coir' Odhar moraine, although now firmly established as having been produced during deglaciation of the last ice-sheet, appears to be related to a glacial episode for which there is only limited evidence in western Scotland. To a large extent, the detailed discussions of these features have arisen from their superb

development in the Northern Islay landscape. The area is thus of outstanding scientific interest both for the classic development of shore platforms and for the associated geomorphological and stratigraphic evidence, which together provide an important record of Late Quaternary sea-level changes and glacier fluctuations in western Scotland.

Conclusion

Northern Islay is outstanding for Quaternary coastal geomorphology, displaying some of the finest examples of isostatically uplifted raised shoreline features in Europe. These have been raised to their present levels above the sea by the uplift that followed the depression of the Earth's crust by the weight of ice-sheets during the ice ages. It is a classic locality for raised shore platforms, most notably the High Rock Platform of western Scotland. The superb development of raised coastal terraces, together with the presence of a moraine formed by the last ice-sheet (approximately 15,000 years ago), makes the area quite unique in Scotland.

References



(Figure 11.9) Geomorphology of northern Islay between Rubha a'Mhail and Port Domhnuill Chruinn.



(Figure 11.10) The coast of northern Islay, south of Rubha a'Mhail, showing the High Rock Platform and its backing cliff. In the foreground the Main Rock Platform and its backing cliff are also clearly developed. (Photo: J E. Gordon.)