Balta Island, Shetland

[HP 660 075]

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Introduction

The small uninhabited island of Balta is 5 km long and lies in a north-south orientation at the mouth of the Balta Sound, off the west coast of Unst, the northernmost island of the Shetland archipelago (see (Figure 7.1) for general location and (Figure 7.30)). The island contains a continuous veneer of vegetated sand extending across Balta Island from a north-west facing bay at South Links through two low cols almost to the 45 m-high eastern sea-cliffs. The sand beach grades into a gravel storm ridge on the upper beach, with the coastal edge being marked by an erosional dune scarp. An extensive dune grassland plain lies behind and, although frontal dunes are absent, it is the most complete dune grassland system in Shetland (Mather and Smith, 1974; NCC, 1976). However, the complex is in an advanced stage of dissection due to a combination of rill dissection and severe wind deflation, probably due to overgrazing by the large rabbit population. In places the dune grassland has been deflated down to a base-level of aeolian calcarenite (Mather and Smith, 1974). This, together with the high rates of deflation, make this site important as a dynamic example of a beach–dune grassland–cliff continuum (MacTaggart, 1999).

Description

The morphology of Balta Island is markedly asymmetrical with the east coast characterized by 45 m-high cliffs, deeply indented with geos, contrasting with the low, more sheltered west-facing coast. The island is composed mainly of metagabbros (NCC, 1976) and the terrain generally consists of ice-scoured bedrock with a patchy till cover and many perched blocks. The only beach on Balta is a 200 m arc of sand at South Links on the west coast. This is backed by extensive windblown sand deposits of variable thickness that sweep across the island via two cols almost to the eastern sea cliffs. It is this extensive beach–dune grassland–cliff continuum that forms the GCR site of Balta Island (Figure 7.31).

Two intertidal rock platforms form the northern and southern limits of the beach at South Links. Fine-grained shell-sand dominates the lower beach and a gravel storm ridge, partly concealed by an apron of blown sand, forms the upper beach. Dunes are absent and the coastal edge backing the beach consists of eroded dune remnants separated by bare sand areas. These remnants, although indicative of severe erosion in the past, appear to be relatively stable and well-vegetated (Mather and Smith, 1974). The underlying gravel storm ridge affords partial protection to the dune grassland toe during storm wave action but the presence of erosional remnants suggests that this may not always be so.

Landwards, some 8 ha of dune grassland veneers a large shallow amphitheatre in the ice-scoured bedrock. Several bedrock knolls carrying perched blocks protrude through the plain from the irregular bedrock surface beneath and this is also reflected in the varying gradient and thickness of the blown sand deposits. The sand thickness decreases rapidly eastwards from depths of over 2 m on the lower parts of the system, thinning to 0.5 m towards the cols on the eastern side (Mather and Smith 1974). These slopes of climbing dune grassland are often in excess of 30° (Mather and Smith, 1974). In places, where the lower levels of the dune sands are close to the water table, they have undergone cementation processes into aeolian calcarenite that rests directly on top of the bedrock.

The grassland surface is heavily dissected by finger-like erosion scars and a rill drainage network. For example, approximately 100 m from the coastal edge, a 1–1.5 m-high active erosion scarp gradually extends inland along a cren-ulated front. The scarp is characterized by numerous erosion scars whose distal extension inundates the adjacent turf with re-deposited blown sand. The erosion of the surface is also initiated by the numerous small rills that form a radial pattern converging on the lower centre of the South Links amphitheatre. These small rills are ephemeral features, and appear as overland flow becomes concentrated on the lower surfaces after heavy rain. Higher up, subsurface drainage is facilitated by the numerous rabbit burrows that pit the dune surface. Inland of the crenulated erosion scarp, erosion scars

and deflation are less common and tend to be localized on the floors of depressions where subsurface drainage is concentrated (Mather and Smith, 1974). It is likely that heavy rabbit and sheep grazing and scraping has exacerbated the processes of wind erosion at South Links.

Interpretation

Balta Island contains the most complete dune grassland system in the Shetland Isles (Mather and Smith, 1974; NCC, 1976). The complex is at an advanced stage of natural dissection, as a combined result of wind deflation, rill activity and heavy grazing. The severity of the Shetland climate means that rates of change are likely to be more rapid than on equivalent mainland dune systems. As Balta Island is uninhabited, the beach-dune system has evolved naturally, with extremely limited direct human impact from ploughing and ditching. Indirect human influence via sheep grazing and scraping, together with a large rabbit population, has probably accelerated wind erosion processes. In spite of this, the predominantly natural and dynamic dune-erosion system at South Links is of geomorphological importance. In addition, the absence of dunes at the coastal edge is unusual and Balta represents an excellent example of a beach-dune grassland continuum. Aeolian calcarenite, the presence of which is unusual, provides a depth control on deflation and rill dissection (Mather and Smith, 1974).

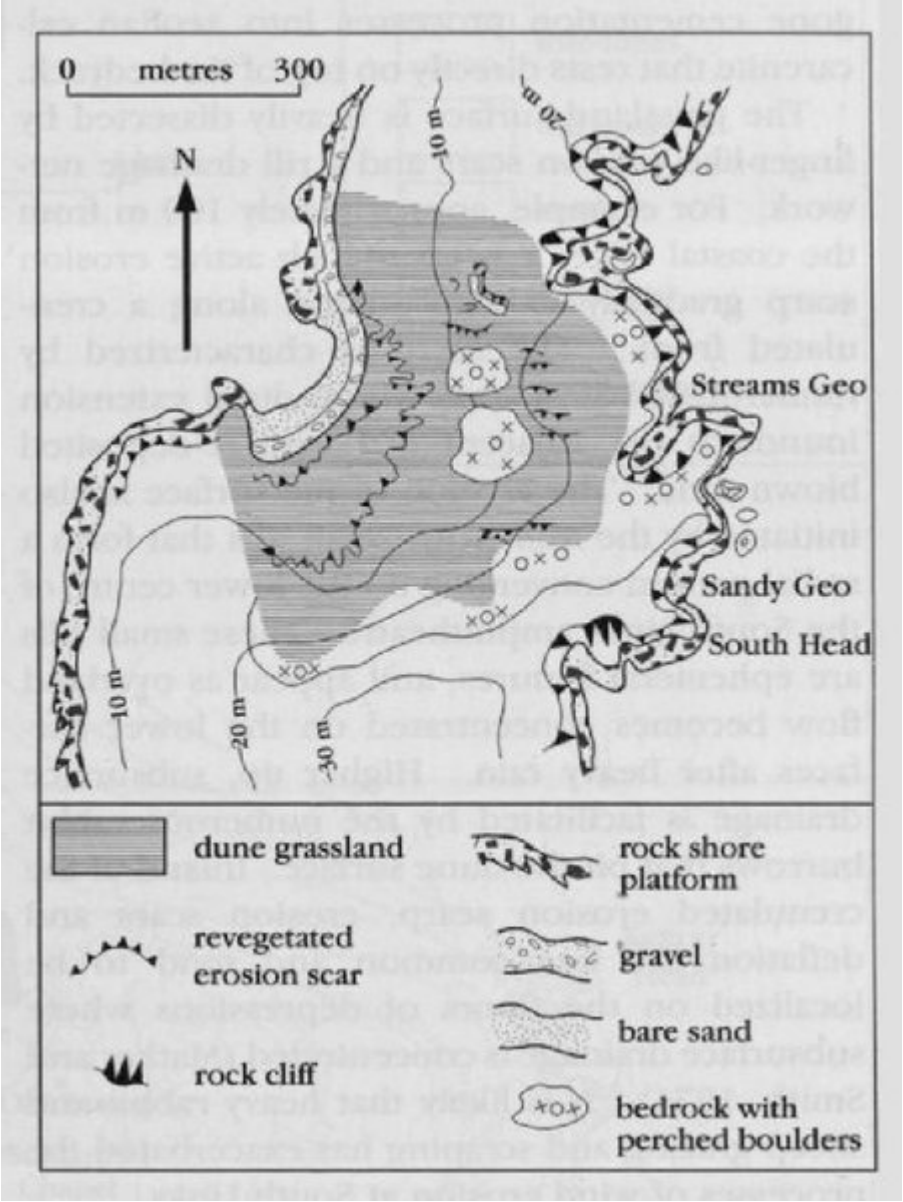
Balta Island is an important site for the study of the natural process of wind deflation and as such has great research potential. Some degree of management of the rabbit and sheep population could be implemented as part of a research strategy designed to achieve a better understanding of the processes involved in natural deflation. However, as yet Balta has failed to attract any detailed scientific research, although the outstanding geomorphological importance of the site has been recognized (Mather and Smith, 1974; NCC, 1976).

Conclusions

A continuous dune grassland veneer extends across the small uninhabited island of Balta from the north-west-facing sand beach through two low cols to the 45 m-high eastern sea cliffs. A combination of rill dissection, severe wind deflation and a high rabbit population has resulted in dissection of the dune surface. A crenulate erosional scarp with linear 'finger' erosion scars is gradually extending landwards into the dune grassland. In places the surface has been deflated to a base level where an unusual outcrop of aeolian calcarenite occurs (Mather and Smith, 1974). The high rates of natural deflation and dissection at a site where there has been limited human interference is of geomorphological importance and Balta Island provides an excellent research area to study the end results of such erosion.

(Figure 7.1) Great Britain sandy beaches and coastal dunes, also indicating the location of GCR machair–dune sites (see chapter 9) and other coastal geomorphology GCR sites that contain dunes in the assemblage.

(Figure 7.30) Balta Island, Unst, Shetland, is low in the west and high in the east. It is mainly rocky except where sand is blown up-slope from the beach at South Links. (After MacTaggart, 1999.)



(Figure 7.31) The geomorphology of Balta, Unst. There are no dunes but instead the site supports a wide expanse of climbing dune grassland some of which has been eroded into low escarpments. In places the dune surface has been eroded down to a base level of calcarenite by both wind deflation and rill erosion. (After MacTaggart, 1999.)