Landslides and coastal erosion at Aldbrough, East Riding of Yorkshire

Aldbrough is located approximately 10 km south-east of Hornsea. The cliffs here are rapidly eroding so that Seaside Road now terminates at the cliff edge (Figure 1). Several buildings have been lost to the sea since 1885 including the Spa Inn, the Talbot Hotel and the Royal Hotel.

As part of the continued programme of work monitoring coastal erosion and landsliding at several sites around the coast of Great Britain, BGS is studying, monitoring and laser-scanning the cliffs at Aldbrough in Yorkshire.

Video of the data collected in 2006 at Aldbrough.

Figure 1 Seaside Road in 2003 cut off by the cliff.

Cliffs

The steep cliffs at Aldbrough face north-east and have a regular height of about 20 m (Figure 2). The cliffs are actively receding and the cliff profile is stepped due to the contrasting erosion resistances of the tills and the different landslide processes in the upper and lower parts of the cliff. At high tides the lower, and in some case middle, sections of the cliff are subject to considerable erosion by wave action.

Figure 2 The cliffs at Aldbrough.

Geology

The glacial tills at Holderness are mostly Late Devensian (18 000 to 13 000 years old) and probably represent the products of more than one glacial regime and till-forming process. The two major Late Devensian till formations on the Holderness coast are the 'Skipsea Till' and the overlying 'Withernsea Till'.

Cliff retreat

Historical annual recession rates for the caravan site at Aldbrough are reported as being 1.16 m for the period 1852 to 1951 using historical maps (Valentin, 1971) and 2.16 m for the period 1951 to 2004 using cliff surveys (East Riding Council). The coastal erosion and sediment yield of the Holderness coast have been estimated (Balson et al., 1998) using a digital terrain model for 50 km of coastline. They calculated that, using data going back to 1786, up to 2 million m^3/year were removed from the cliff and up to 4 million m^3/year from the cliff and shore face combined. Figure 3 shows the coastal erosion of the lower part of the cliff.

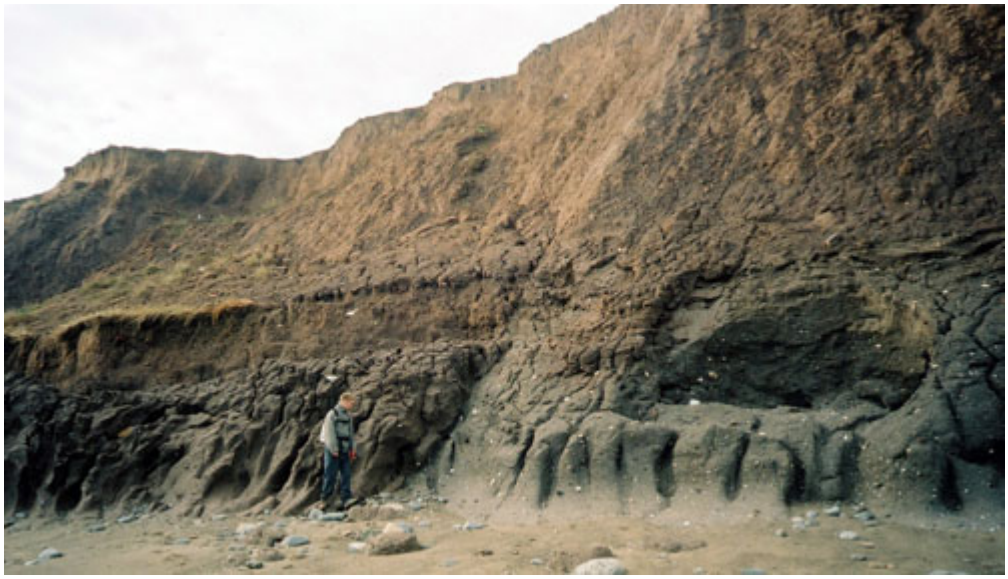

Figure 3 Coastal erosion of the lower part of the cliff at Aldbrough.

Landslides

Active landsliding has been observed at the Aldbrough site. The principal mode is that of rotational slumping (Figure 4 and Figure 5). The secondary mode is toppling and falls (Figure 6). Toppling failures, though relatively small, are sudden and frequent, and present a major hazard in this area. Mudflows form a third minor mode, given the morphology of the cliff and the strong action of the sea, these are small and short-lived.

Survey results

As part of the continued programme of work monitoring coastal erosion and landsliding at several sites around the coast of Great Britain, BGS is studying the cliffs at Aldbrough in the East Riding of Yorkshire. The principal method of survey is long-range terrestrial laser scanning — see Terrestrial LiDAR Survey Techniques.

The final results from this work will be published soon.

Photo gallery

Principal mode of landsliding in upper cliff: rotational slumping

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References

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