Wydon, Northumberland

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Introduction

The Wydon GCR site, on the north bank of the River South Tyne, 1.5 km south-west of Haltwhistle station, is an excellent natural exposure of the Haltwhistle Dyke, a tholeiitic basalt associated with the Whin Sill-complex (Figure 6.37). The dyke is orientated ENE–WSW and is part of the St Oswald's Chapel Subswarm that extends discontinuously between Haltwhistle and Druridge Bay and has also been proved beneath the North Sea (Randall, 1995b). Natural inland exposures of dykes associated with the Whin Sill-complex are rare and, although many dykes have been quarried, most of the quarries have been infilled or have become overgrown. In coalfield areas, natural exposures and quarries have been lost through opencast working of coal from the surrounding strata. This rare exposure is therefore of considerable national significance.

The general geology of the site is also of interest. The dyke is intruded into flat-lying Namurian sandstones with thin intercalations of mudstone, and is overlain by Quaternary till containing a wide variety of igneous and sedimentary clasts.

The general geology of the nearby Roman Wall district has been described by Wallis (1769), Winch (1817), Tate (1868) and Johnson (1959). The Geological Survey mapped central and southern Northumberland in the 1870s and six-inch sheets 106NE and 106SE were published in 1881. A revision survey was completed in 1975 and 1:50 000 Sheet 13 (Bellingham), with an accompanying memoir, was published in 1980 (Frost and Holliday, 1980). It was Holmes and Harwood (1928) who first suggested that the dykes were comagmatic with the Whin Sill complex, and Thorpe and Macdonald (1985) included analyses of the dykes in their geochemical study of the complex. Popular field guides of the area include those by Scrutton (1995) and Johnson (1997).

Description

The sense of the *en échelon* offsets in the St Oswald's Chapel Subswarm is sinistral, like that of the High Green Subswarm to the north, but the offsets are not as well developed. Near Haltwhistle the subswarm trends ENE, almost parallel to the Roman Wall outcrops of the Great Whin Sill, and following closely the line of the River South Tyne. Near Hexham, it swings to a more north-easterly trend, converging on the High Green Subswarm. Dykes regarded as part of the St Oswald's Chapel Subswarm also include the Erring Burn Dyke, the Bavington Dyke and the Causey Park Dyke, which has been traced for some distance offshore (Randall, 1995b).

At the Wydon GCR site the dyke forms a significant feature, over 10 m in height and *c.* 6 m in width (Figure 6.38). Contacts with the surrounding sedimentary rocks are obscured by slumped and fallen rock debris but flat-lying sedimentary rocks crop out in low cliffs along the river to the east and in parts of the scarp to the west. These rocks comprise sandstones with thin intercalated layers of carbonaceous mudstone. The basalt of the dyke is uniformly fine grained and it is petrologically and geochemi-cally very similar to rocks of the Whin Sill-complex (Frost and Holliday, 1980; Thorpe and Macdonald, 1985). Plagioclase feldspar is normally zoned, accessory olivine is replaced mainly by talc, augite is partially altered to smectite and there are abundant fresh opaque oxides. The segment of this subswarm farther to the east, known as the Erring Burn Dyke, is petrologically slightly different, containing ragged hypersthene crystals and rare large xenocrysts of labradorite.

Interpretation

The rocks of the Whin Sill-complex and dyke-swarm produce notable magnetic anomalies. Whereas anomalies over the sills are relatively low, those associated with the dykes are pronounced, enabling them to be traced where there is no

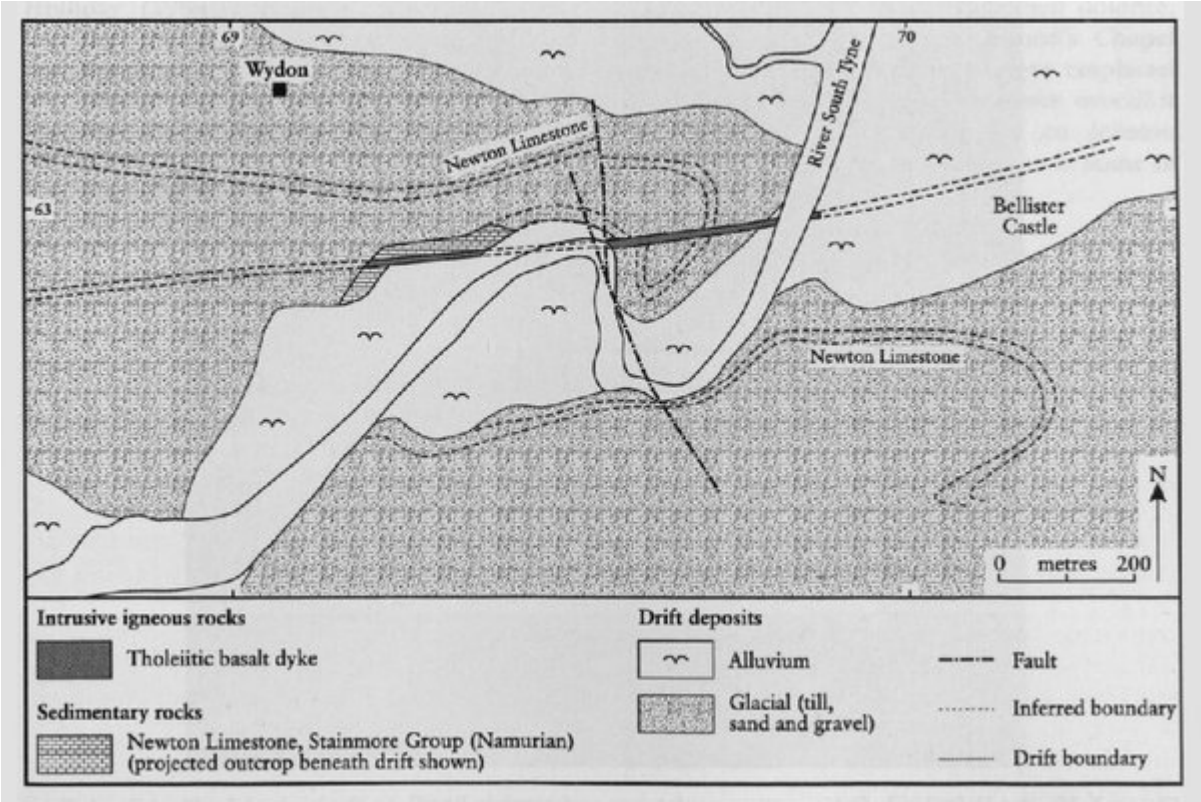
surface exposure and enabling their sub-surface form to be ascertained. Frost and Holliday (1980) traced the dykes of the St Oswald's Chapel Subswarm across the Bellingham district and found that several of the *en échelon* segments coincide with faults. However, overall the subswarm follows an ENE trend, which is similar to the fabric of the Lower Palaeozoic basement.

Holmes and Harwood (1928) suggested that the two most northerly subswarms (the Holy Island and High Green subswarms) were emplaced along *en échelon* fractures during a period of east–west compression, and further work by Shiells (1961) and Wilson (1970) tended to support this. However, Anderson (1951) preferred to consider the dykes as sub-parallel and emplaced during regional tension. The more southerly St Oswald's Chapel and Hett subswarms were considered to have been affected by the edges of the Alston Block (Randall, 1995b) because they are more linear and the *en échelon* structure is not as well developed.

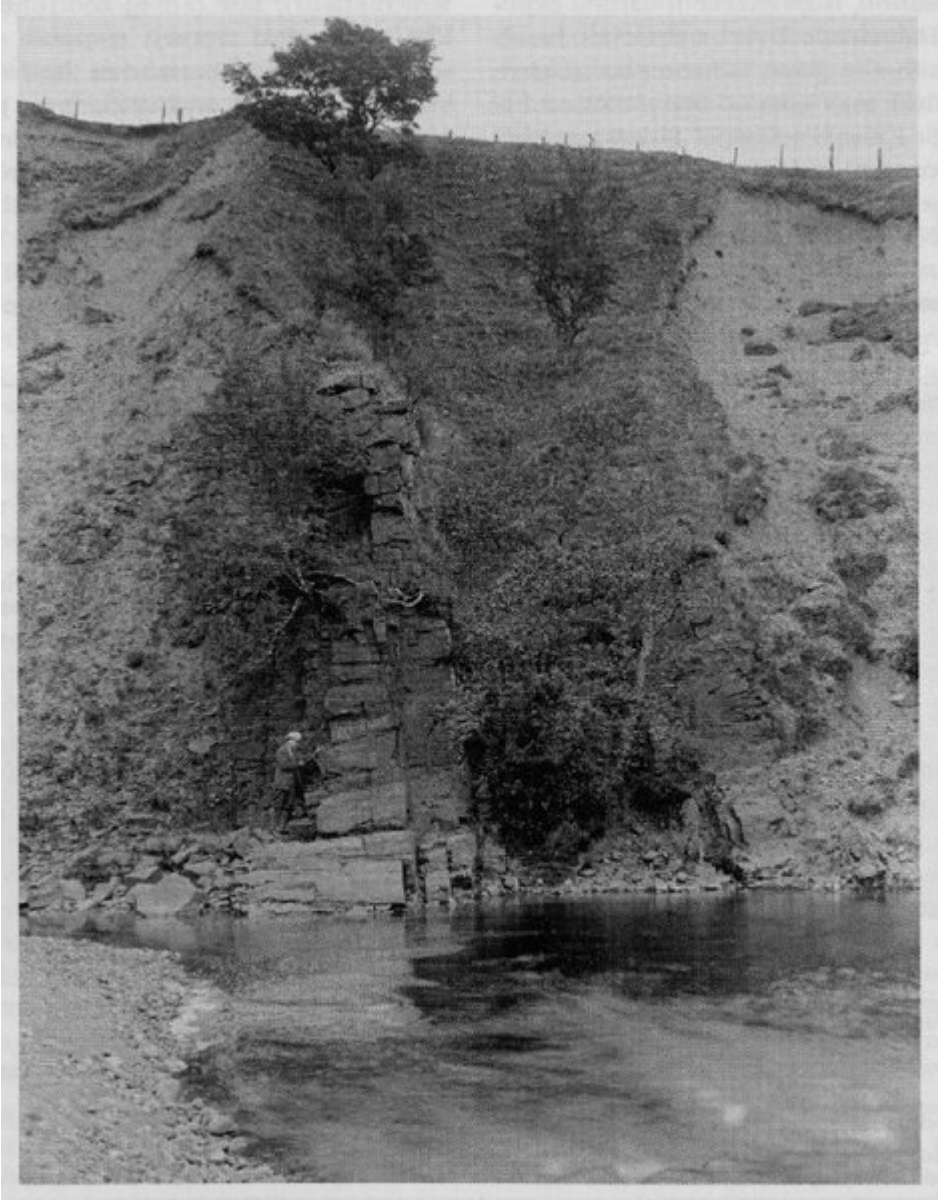
Conclusions

The Wydon GCR site provides one of the best natural exposures of a Late Carboniferous tholeiitic dyke in northern England. The dyke is only 6 m wide but it forms a positive topographical feature that runs for a considerable distance along the banks of the River South Tyne. The dyke cooled rapidly because it is thin and it is therefore a uniformly fine-grained basalt, rather than a medium-grained dolerite. The dyke is part of the St Oswald's Chapel Subswarm, segments of which were emplaced along pre-existing fractures. However, overall it follows a curving path and the *en échelon* structure is not as well developed as in some of the other subswarms.

References



(Figure 6.37) Map of the area around the Wydon GCR site. Based on Geological Survey 1:10 560 Sheet Northumberland, New Series 89SW (1926).



(Figure 6.38) The Haltwhistle Dyke, cutting sandstones and overlain by till, on the bank of the River South Tyne near Wydon. (Photo: British Geological Survey, No. A4129, reproduced with the permission of the Director, British Geological Survey, © NERC.)