Geophysics

Geophysics is the study of the physical properties of geological materials and structures.

The modern science of geophysics embraces a very wide range of often extremely complex and sophisticated, techniques for measuring such parameters as gravity variations, magnetic properties, natural radiation, seismic properties etc. Study of these enables interpretation of the form and nature geological structures, often at considerable depths beneath the surface, and the processes which may have created them.

Geophysics in the AONB

Much of our understanding of the deep structure of the North Pennines is derived from geophysical investigations. Only those aspects of the area's geophysics which have most obvious impact upon geodiversity are considered here. Key references from the substantial technical literature on the geophysics of northern England, including the North Pennines, are listed in the bibliography.

During the 1950s, the North Pennines was a focus for early work on studies of gravity variations. Detailed gravity surveys revealed a pronounced pattern of negative Bouguer anomalies which provided strong supporting evidence for a concealed granite, first suggested to explain the nature and distribution of minerals within the North Pennine Orefield. Drilling of the Rookhope Borehole in 1960-61 confirmed the presence of the Weardale Granite.

The demonstration of the close genetic relationship between the distribution of minerals in the North Pennine veins with the form and extent of the concealed Weardale Granite, represents one of the area's most important contributions to the understanding of similar orefields worldwide.

Magnetic anomalies due to iron-rich basic igneous rocks, such as the dolerite of the Whin Sill, offer a useful means of inferring the presence of such rocks at depth or where concealed by superficial or other geological materials. Interpretations of magnetic anomalies associated with these rocks have contributed greatly to research into the concealed form and likely origin of the Whin Sill within the North Pennines. Such studies failed to support suggestions that the Whin Sill may have been emplaced via a feeder beneath Upper Teesdale, but gave evidence for the emplacement of this suite of intrusions through the major bounding faults of the Alston Block, such as the Lunedale and Stublick faults.

A number of seismic profiles, mainly through areas immediately adjoining the AONB, give important evidence for the deep structure of the Alston Block.

The Rookhope Borehole, 1960-61 © University of Durham.

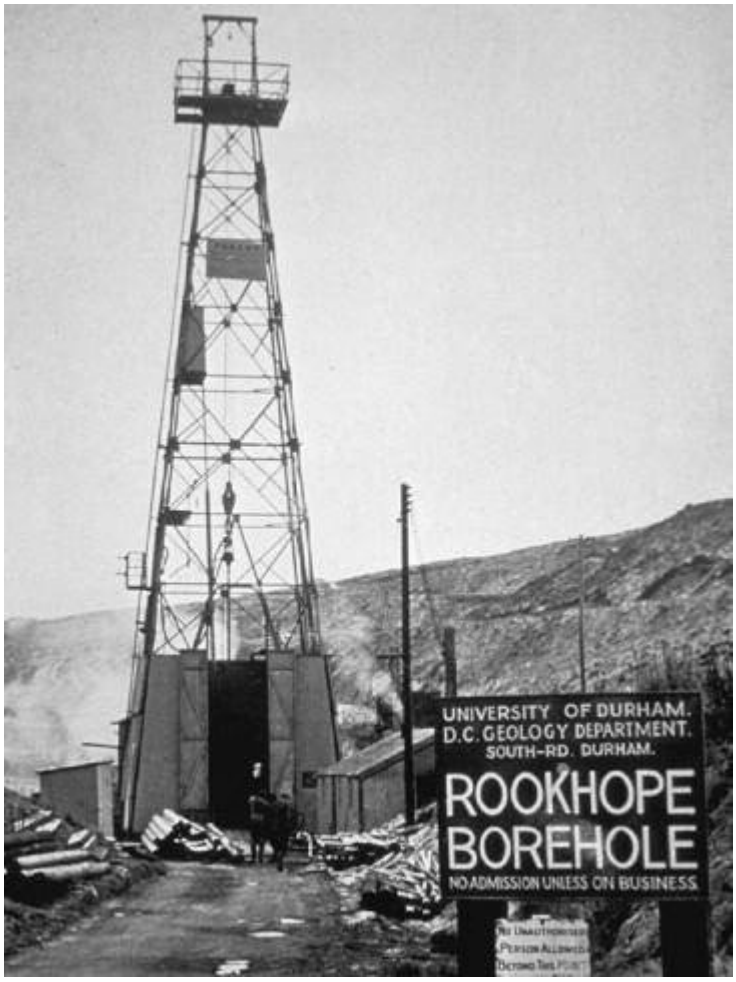
Selected references

Bott,and Masson Smith, 1953; Bott and Johnson, 1970; Dunham, 1990; Dunham and Wilson, 1985; Stone et al, 2010.

Figures

(Figure 60) The Rookhope Borehole, 1960-61. Image courtesy of © Durham University.

Full references



The Rookhope Borehole, 1960-61. Image courtesy of © Durham University.