

Why remap?

The northern England perspective

by David Millward, David Lawrence and Brian Young

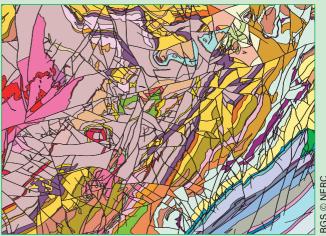
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GS field geologists are frequently confronted by the questions: 'Surely the area has been mapped before?', and 'The geology hasn't changed, has it?' So why are we still mapping after nearly 170 years? The answers lie in the fact that a geological map is an interpretation of the data available at the time of survey, and made in the context of the current state of geological knowledge. The geologist is thus a detective, striving to reveal the truth, but finding that much of the evidence is missing! In this article, illustrated with examples from northern England, we explain why revision mapping is such an important and continuous part of modern geological survey work.

Surely the area has been mapped before?

It is true that, except for some of the remoter areas, most of Great Britain has been surveyed geologically at least once. Commencing with the birth of the Geological Survey in 1835, the primary survey was initiated by the need for information on the country's natural resources to support industry. Subsequent resurvey has been carried out in response to the national need for economic resources in wartime, an increase in available geoscience data, the emergence of new geological theories and the changing purposes for which the maps are used. However, with a patchwork of surveys at different dates, the quality of many maps even today is inadequate for





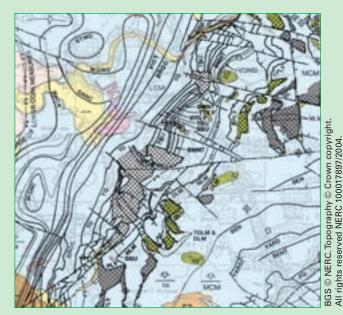
Cumbrian fells

The rugged Cumbrian fells are the heart of the Lake District National Park, visited by millions of tourists each year. There is also significant scientific interest in the 450-million-year-old volcanic rocks that compose these mountains. Glacial sculpting during the last two million years has provided a superb three-dimensional picture through these ancient volcanic deposits. The primary survey of 1882 shows the major divisions of the bedrock geology and some spreads of alluvial deposits within the major valleys (see extract from Ambleside Sheet, *above left*). Advances in volcanology during the one hundred year interval up to the resurvey (1981–90), have enabled greater detail to be recognised and depicted on the new edition *(above right)*. The recent mapping, published in 1996, has contributed both to a novel interpretation of the Lake District volcanoes and to our understanding of the volcanic processes involved. The map shown above is actually an extract from the BGS's digital geological map at 1:50 000 scale (DiGMapGB-50); topographical and some other information has been removed for clarity in this illustration.

Modern geological mapping







Northumberland coalfield

Industrial development in north-east England owed much to the abundance of coal. Though the latter part of the twentieth century saw the closure of all but one of the deep coal mines in the north-east, coal extraction has continued through extensive opencast working. The primary survey of the area was published in 1871 and a revised edition with superficial (drift) deposits in 1892 (above left). The resurvey of 1922–37 (not published until 1955) included details of numerous coal seam outcrops, but also included a full survey of the extensive cover of superficial deposits. The latest geological map (above right), published in 2001, shows the effects of opencast operations as 'worked-out opencast' areas (cross-hatched). More significantly, abundant geological data derived mainly from coal exploration and site investigation has enabled a more detailed and reliable new map to be made, compared with previous editions.

modern planning, environmental, hydrogeological and resources needs. For example, there remain areas, including the Hexham sheet in Northumberland, for which there is no map of the superficial deposits. Such areas have a high priority for resurvey within the current BGS programme.

The geology hasn't changed, has it?

In most instances, the answer to this is 'No'. What has changed is the amount of geological data available and the current state of geological science which enables us to interpret the information to produce a new map. Such advances have generally resulted in more detailed interpretations and, in particular, to more comprehensive depiction of component units on the geological map. The Ambleside area in the Lake District is an example of such revision mapping. Though the rocks have not changed, the greater detail on the new map reflects the greatly improved understanding of the geology (see Cumbrian Fells example, *opposite*).

In the later decades of the twentieth century, geological maps became more

widely used, with changing demands for, among others, geotechnical, hydrogeological and land-use planning information. In north-east England and west Cumbria, the legacy of deep coal mining and of extensive opencast coal extraction has involved the large-scale landscaping of spoil heaps, and reinstated opencast and brownfield sites. An example of remapping in such an area is the recent Morpeth sheet. Here, as a result of widespread opencast coal extraction, the geology really has changed and the new map shows a range of artificial deposits (see example extracts, above).

Clearly, an up-to-date geological map is essential in order to meet the demands of sustainable twenty-first century living. This can only be achieved by a programme of revision mapping. Increasingly, the results of such resurveys are being captured digitally and stored in a variety of databases and formats. This allows ready access to information, rapid updates and development of 3D models to aid the user of geological information.

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