‘Exposed coalfields of England and Wales, c. 1830 GIS shapefile documentation’ by Max Satchell

Filename: ExposedcoalfieldsEnglandandWales1830.shp

This shapefile of exposed coalfields of England and Wales c. 1830 was created by Max Satchell using the ***Digital Geological Map Data of Great Britain 1: 625,000 bedrock*** produced by the British Geological Survey (BGS).[1] Exposed coalfields can be defined as those sections of coalfields where coal-bearing strata are not concealed by geologically younger rocks. They may, however, be overlain by natural (and man-made) sediments of the Quaternary period where they would form overburden in the exposed coalfield. Quaternary deposits are often unconsolidated sediments comprising mixtures of clay, silt, sand, gravel, cobbles and boulders. Exposed coalfields are of major historical importance because they were places where coal seams crop out at or near the ground surface making coal easiest to both discover and mine. Before c. 1830 coal mining was almost exclusively confined to the more accessible areas of the exposed coalfields and this dataset therefore gives near universal coverage of places that *could* or had been mined by this date. It is important to appreciate that this shapefile does not represent all accessible coal deposits c.1830. Where transport costs were low, the most accessible coal had already been worked out in some places. By the same token, drainage problems, high transport costs, weak local demand and many other factors meant that it was not necessarily economic to mine coal in other parts of the exposed coalfields until after 1830. Coal seams were harder to find and harder to mine in areas where geological bedrock - the mass of solid rock which forms the Earth's crust - was overlain by bodies of water or Quaternary sediments - areas of unconsolidated sediments, such as sand, gravel, clay, and silt. Until the advent of stream powered drainage access to parts of the Lancashire coalfield, for example, were all but impossible due to the overlying Quaternary geology, which in parts was over 100 metres thick.

The structure of the BGS data also influences the extent to which the shapefile represents accessible coal deposits. Put very simply, geological bedrock consists of series of layers of different types of rock one above the other. Where geological bedrock crops out at the ground surface is overlain younger Quaternary deposits, the resulting surface is termed geological rockhead. The BGS bedrock geology maps show bedrock geology at this surface. As a consequence, the shapefile can give no indication of the presence of concealed coalfields - places where coal-bearing strata of the Carboniferous period are buried by younger post-Carboniferous strata, such as the concealed coalfield of Kent, which is buried at depth of approximately 1000 metres by younger Jurassic and Cretaceous deposits. Even at the margins of the exposed coalfields, if younger geological units a few metres thick without coal occur at geological rockhead, but is just above a coal seam, the BGS polygon will not indicate the coal and the area will be omitted from this dataset. This is more or less of a problem depending on the historical period in question. Most coalfields encompassed both exposed and concealed sections, but there was generally little mining on the latter until the second half of the nineteenth century.[2] Those coalfields, which were wholly concealed, such as those of Oxfordshire and Kent, were not worked at all until after 1900.

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[1] Max Satchell conceived the idea and executed the work in 2013 while employed under a Isaac Newton Trust grant held by Leigh Shaw-Taylor.

[2] M.W. Flinn and D. Stoker, *The History of the British Coal Industry: Volume 2 1700-1830: The Industrial Revolution* (Oxford, 1984), 6-23, 70; J. T. Coppock, The changing face of England : 1850 - circa 1900' in H. C. Darby ed., *A New Historical Geography of England after 1600* (Cambridge, 1976), 295-373: pp. 329-31. The only substantial output from a concealed coalfield by 1830 was at Hetton le Hole just beyond the eastern margin of the

It is also important to be aware that the geological complexities and geographical limits of the exposed coalfields at 1:625 000 scale have been simplified (and a little distorted) by the BGS primarily because of issues of scale. The BGS 1:625 000 digital data was created using 1:50 000 BGS baseline digital data for the purpose of producing a two-sheet paper map of the bedrock geology map of the U.K.[3] With a scale of 1:625 000 a 1 cm square on the map represents 9652.5 acres (39.0625 square km) and the number of features that will be visible to the human eye is very limited. As a consequence, it was necessary to simplify the 1:50 000 BGS digital data. This process of simplification was as follows. First polygons were selected, grouped together and reclassified. Thus, coal and individual polygons of other predominant rock types of the coalfields, limestone, ironstone, mudstone and so on, were selected from the 1:50 000 scale data and merged into single composite polygons. These polygons were then further edited so that small outliers were deleted, combined with others, or enlarged (in order to make them visible on the paper map at a 1: 625 000 scale). Complex geological boundaries were also smoothed.[4] This means that the boundaries of the exposed coalfields are a little less accurate than if they had been generated directly from the 1:50 000 BGS digital data especially for small outliers. It would have been preferable to use the 1:50 000 data to create this exposed coalfields GIS, but then copyright would have prevented making the dataset freely available.

Method

The British Geological Survey shapefile Digital Geological Map Data of Great Britain 1: 625 000 bedrock data was downloaded from the BGS website. It was then loaded into ArcGIS 10 and a wild card search for the word "coal" was made in the "RCS_X" field of its attribute table. The RSC_X field consists of one or more BGS classification codes of different types of rock. For formations containing more than one rock type, codes are separated by a "+". The polygons, which included the rock type “coal”, were then exported as a new shapefile. To simplify the attribute data the BGS polygons were then merged into one and split using the ArcMap "Explode Multipart Features" tool, which converted them into single polygons for each geographically distinct grouping. The converted BGS 1:625 000 data was further edited so that Scottish exposed coalfields were excluded and its coastline of c. 2005 was clipped using the outline of the Cambridge Group 1831 England and Wales Ancient Counties shapefile so that those sections of exposed coalfields that lay below the upper tidal limit c. 1830 were excluded. The area of the polygons in square metres, hectares and acres was then calculated and added to the attribute data.

Attribute data

Field	*Data type*	*Description*
FID	Object ID	Unique ID for each row in the table

exposed part of the Durham coalfield. This was a very recent development. Pioneer borings did not successfully penetrate the overlay of younger Magnesian Limestone to reach the rich Hetton seam till 1820-22: M. Sill, 'Hetton-le-Hole: The genesis of a coalmining landscape 1770-1860', unpublished MA thesis, University of Durham, 1974, pp. 67, 75-6; Flinn and Stoker, op cit., pp. 23-4.

[3] British Geological Survey, Bedrock geology UK South; Bedrock geology UK North 1: 625 000, 5th edn, 2007.

[4] The process of simplification did lead to the exclusion of a few areas of coal mining. In Britain, coal is predominantly found in rocks laid down during the Carboniferous period. The GIS does not capture a handful of tiny post Carboniferous coal deposits, such as that at Cleveland (Yorkshire) which was worked in the 19th century. The omission of these is not a problem because these deposits were only ever of local importance.

Shape	Polygon	Polygon/s for each census unit/subdivision
OBJECTID	Numeric	Unique identifier for each polygon
AREA	Numeric	Area of each polygon in square metres
HECTARES	Numeric	Area of each polygon in hectares
ACRES	Numeric	Area of each polygon in acres

Co-ordinate system

British_National_Grid

Projection: Transverse_Mercator

False_Easting: 400000.000000

False_Northing: -100000.000000

Central_Meridian: -2.000000

Scale_Factor: 0.999601

Latitude_Of_Origin: 49.000000

Linear Unit: Meter

GCS_OSGB_1936

Datum: D_OSGB_1936

Citation Guidelines

The citations in this document should be used to reference any maps and/ or data when they have been included in any essays, dissertations or other academic works. You should cite the data even if it does not appear as an image or map in your work if it has been used to generate findings or a new dataset that is used. To meet the requirements of the BGS data licence the following acknowledgement must also accompany any reproduced material: Contains data supplied by the permission of the Natural Environment Research Council © NERC [year of citation to go here][5]

Citation

Satchell, M. and Shaw-Taylor, L., 'Exposed coalfields of England and Wales' (2013). This dataset was created from the British Geological Survey. 2008. Digital Geological Map Data of Great Britain scale 1: 625,000 (DiGMapGB-625) Bedrock data. Version 5.17 Keyworth Nottingham. British Geological Survey. Release date 11-2-2008**.** A description of the dataset can be found in Satchell, M., **'**Exposed coalfields of England and Wales, c. 1830 GIS shapefile

[5] The BGS citation requires you to put the year in which you make the citation within the square brackets.

documentation available at: http://www.campop.geog.cam.ac.uk/research/projects/occupations/datasets/documentation.html. Contains data supplied by the permission of the Natural Environment Research Council © NERC ****

Digital Data

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Satchell, M., Shaw-Taylor, L., Wrigley, E., Kitson, P., Newton, G., Stanning, G. (2018), *1831 England and Wales ancient counties*. [data collection]. UK Data Service. SN: 852939, http://doi.org/10.5255/UKDA-SN-852939

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