Bristol and Gloucester district - Geology

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Recent surface deposits

The Bristol and Gloucester region lay just outside the extent of the ice-sheets that have dominated the evolution of the British landscape over the past 2 to 3 million years; so there are no extensive glacial sediments preserved within this region despite it experiencing prolonged periods of extreme cold. The dominant geological process during this time has been one of uplift of the land; this has led to the erosion of the landscape, with the main rivers cutting deep valleys and depositing sand and gravel deposits along their valley floors. Since the end of the last glacial event in Britain around 11,000 years ago, extensive deposits of clay and peat up to 10 m thick have built up on the Somerset Levels and along the Severn Estuary.

Bedrock geology

Beneath the recent surface deposits, or with just a cover of soil where such deposits are absent, are older rocks which geologists broadly split into two distinct types:

- The sedimentary bedrock geology is composed of quite hard rocks which were deposited a few hundred to tens of millions of years ago as layers of sediments in shallow seas, deserts and vast river systems in times when Britain lay closer to the Equator and the climate and landscape were very different from those of today.
- The basement geology, which underlies the bedrock, is over 415 million years old and mainly comprises harder, denser rocks which have been strongly compacted and folded. They include both rocks originally deposited as sediments and others that are products of volcanic activity.

In the course of the past 415 million years there have been periods when the area of the UK formed a landmass and was being eroded, and other periods when it was sinking and new layers of sediment were being deposited. The history of erosion and deposition has not been the same in all parts of the UK. In the Bristol and Gloucester region the older sedimentary bedrock was deposited from 415 to 305 million years ago as a series of sandstones, limestones and coal-bearing mudstones. These rocks give the region its most distinctive geological features including its famous gorges, caves and river valleys, as well as most of its natural resources including coal, hard rock for construction, lead, zinc and iron ore. These older rocks were uplifted, folded and faulted to form a complex series of up-folds (termed anticlines) and down-folds (synclines) during a major mountain building event around 280 million years ago (see Figure P902246). Although only accounting for around a third of the surface outcrop in this region, these older rocks dominate the subsurface geology at depths below about 500 m.
Subsequently, a younger sequence of sedimentary rocks, including limestones, sandstones and mudstones, was laid down to form a variable, but relatively thin cover of gently tilted layers referred to in this account as the younger sedimentary bedrock. This younger sedimentary bedrock was deposited from 250 to 145 million years ago and includes a sequence of reddish sandstones (Sherwood Sandstone) and mudstones (Mercia Mudstone), and the honey-coloured Jurassic limestones and mudstones of the Cotswolds. In the time between the end of deposition of the older sedimentary bedrock and the start of the deposition of the younger sedimentary bedrock, uplift and erosion took place. As a result, when deposition restarted the younger sediments were laid down on a variety of different older sediments. This situation where younger rocks rest directly on rocks of different older ages because of uplift and erosion is referred to by geologists as an unconformity.

Small areas of the even older basement rocks more than 415 million years old are also encountered at the surface most notably in the area around Tortworth between Bristol and Gloucester. These comprise tilted, strongly folded and faulted sedimentary rocks with layers of volcanic lavas.

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