

Opengeoscience 1: igneous intrusions and lavas

Opening geological maps to the world

Open the British Geological Survey 'OpenGeoscience' website at <http://www.bgs.ac.uk/OpenGeoscience/> In the section 'What is OpenGeoscience', click on 'Geology of Britain' to open the BGS 'Geology of Britain viewer'. You can use this to see how geological formations appear on maps and also how they affect the shape of the land – and apply this understanding anywhere in the world.

The viewer is part of the BGS's 'Opengeoscience' website showing geological maps down to 1:50,000 scale, of the whole of Britain. The BGS viewer uses different basemaps; by clicking 'Switch basemap' and 'Imagery' you can choose an aerial view for one end of the scale and a geological map at the other – with all gradations in between. So you can choose a geological feature on the map and then slide the slider, then click the location again to see how it affects the landscape.

Follow the instructions to find the examples of igneous features below – and much more.

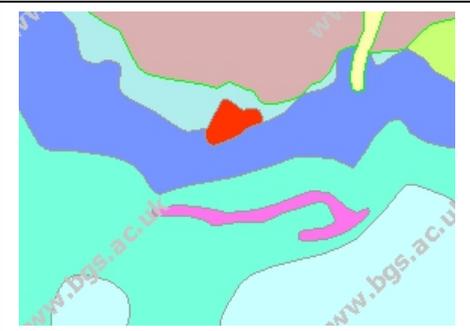
Pluton – type 'Shap Fells' into the Opengeoscience viewer to see the Shap granite in Cumbria, a typical roughly oval igneous pluton that looks like this on the geological map:



Derived from the 1:50 000 scale BGS digital geological map, British Geological Survey © NERC. All rights reserved. IPR/145-63CT

The 'Imagery' view shows that the pluton is marked out by an area of dark peat which was excavated in the past. It also shows the Shap Granite quarry in the south east and how the motorway had to be diverted around the upland area.

Volcanic vent and lava – type 'Castleton, Derbyshire' to see the vent or neck of a volcano in red, and a lava flow in pink. The snaking view of the lava flow appears like this because it is sandwiched between two layers of limestone on a hillside, shown in turquoise below.



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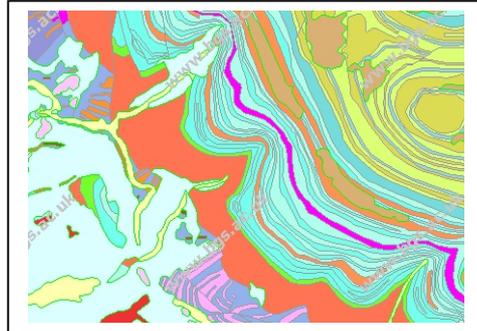
A dyke – see a vertical dyke cutting straight across the countryside and the geology by typing 'Goathland' into the search box, as below.



Derived from the 1:50 000 scale BGS digital geological map, British Geological Survey © NERC. All rights reserved. IPR/145-63CT

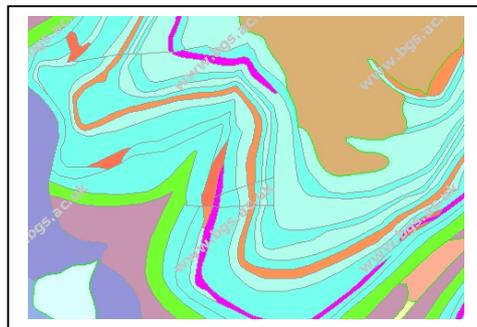
This is the Cleveland Dyke which cuts across much of Northern England, but is covered over by the glacial till (boulder clay), a superficial deposit shown in pale blue on the left of the map extract.

A sill – by typing 'Ousby' (Cumbria) into the search box, and scanning to the East (right) you will find the Whin Sill outcropping as though it was a sedimentary bed, shown in dark pink below.



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The sill has a very different outcrop pattern from a dyke since it was intruded along the bedding, and so looks like a bedded rock when it appears in a hillside, as here. One of the features of sills that helps to distinguish them from lava flows, is that they can 'jump from bed to bed' as you can see for the Whin Sill, by typing 'Keisley' into the box, as below.



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Try it out for yourself

Try identifying the following features:

- those shown in green when you type 'Edinburgh' into the search box;
- the pink outcrops and the narrow orange outcrops seen by typing 'Redruth' into the box;
- the outcrops shown in pink by typing 'Camasunary' into the viewer.

The back up

Title: Opengeoscience 1: igneous intrusions and lavas.

Subtitle: Opening geological maps to the world.

Topic: Using the 'Geology of Britain' web browser on the interactive British Geological Survey (BGS) 'Opengeoscience' website to explore how geological features appear on maps and how the formations are linked to relief features seen on the 'Imagery' basemap.

Age range of pupils: 14 – 19 and adults

Time needed to complete activity: To view the examples shown takes about 15 minutes, but it is easy to get 'hooked' and spend a long time looking for other geological features and landforms.

Pupil learning outcomes: Pupils can:

- access geological information from the BGS 'Opengeoscience' website;
- use examples from the web browser to show how different types of geological formations appear on geological maps;
- show how landforms are related to the geological formations beneath them.

Context:

The examples used in the activity above only show the geological map, since we have received kind permission from the BGS to show the geological maps in our Earthlearningidea work; gaining copyright permission to show the aerial imagery as well proved too complex.

Try it out for yourself

- In the Edinburgh area in Scotland you can see the famous volcanic plug of microgabbro (a medium-grained dark igneous rock) that underlies Edinburgh Castle and the microgabbro sills (shown in green) that form part of Arthur's Seat near Holyrood Park.

- Near 'Redruth' in Cornwall you can see part of the large Carnmenellis granite pluton, cut by dykes, that also cut the surrounding rock. In order of decreasing age, the rocks are: surrounding rocks – granite – dykes. The dykes cut both the granite and the surrounding rocks, showing that they came last.
- Near 'Camasunary' on the Isle of Skye in Scotland you will find a complex of lava flows and dyke swarms with a range of other igneous features nearby, that together form the Skye igneous complex.

Following up the activity:

If you have a Smartphone in the UK, you can download a free application (App) from the BGS website at: <http://www.bgs.ac.uk/igeology/>. This will show you the geological map of the areas where you are, anywhere in the country (with mobile phone reception), like the viewer used above – and also gives the name and rock type of each formation.

Underlying principles:

- Geological maps are 'bird's eye views' of the geology seen at the Earth's surface.
- Many igneous features have characteristic outcrop patterns that can be recognised on geological maps

Thinking skill development:

Visualising how the igneous features shown on geological maps link to the characteristic of the features themselves requires some tricky 3D thinking.

Resource list:

- a computer with internet access

Useful links:

<http://www.bgs.ac.uk/igeology/> - noted above.

Source: Written by members of the Earthlearningidea Team

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