Edexcel Geography GCSE

The UK's Physical Landscapes

Detailed Notes

Geology

In the UK, the rock type beneath our feet has played an important part in shaping our physical landscape. The UK has a **varied landscape** which changes in height and shape greatly. This section explains how the **geology** of the rocks will determine the landscape.

Types of Rock

There are three types of rocks found in the world: **Igneous, Sedimentary** and **Metamorphic**. These rocks vary in how they are formed, their characteristics and their appearance. These rock characteristics will impact how the rock survives under **erosional** and **weathering processes**.

Igneous Rocks

Igneous rock forms from **volcanic activity** which means all igneous rock would have been created at **plate boundaries**. The magma cools on the surface or lava cools within the chamber and is flung out of the volcano during an eruption. The molten rock **crystallises** as it cools which can produce **sparkly quartz** within the rock.

In the UK, all igneous rocks are very old as the UK is not near any plate boundaries, this means the rock has moved over thousands of centuries (due to **tectonic drift**). Some **small islands** in the UK have been formed entirely from igneous rock, as a lava plume emerged from the sea.

Some igneous rocks found in the UK include:

	
Granite - Formed underground from continental crust, it contains interlocking quartz and is regularly used in kitchen worktops.	**Basalt** - Lava flow that breaks onto the surface cools to Basalt. The Giant's Causeway in Northern Ireland is formed from basalt.

To find the nearest igneous rocks near you, the Geographical Society has created a map!

Sedimentary Rocks

Sedimentary rock forms **gradually** over time as **dead organic matter** and **eroded rocks** are **transported out to sea**. These sediments are **deposited** on the seafloor, which over time accumulate and **compress under pressure**. The weight of the sediment on top (which is continually being added too!) will push the sediments together under pressure. **Fossils** can become trapped in sedimentary rock so many dead mammals and sea creatures have been preserved.

Sediments come in a variety of **resistances** since there are various types of sedimentary rock based on the type of sediments used to form the rock. For example, there are a variety of **materials** that can compress to form sedimentary rocks over the centuries: sand, mud, dead plants, chemicals dissolved in water, rocks weathered or eroded from cliffs.

There are many sedimentary rocks found in the UK, including:

	
Chalk - Made from plankton, it is well known for its distinctive appearance (such as the White Cliffs of Dover)	**Sandstone** - Formed from sand which cements together under intense pressure, it is the most common rock type in the world, and can be found from the Highlands of Scotland across the length of the UK.
	
Limestone - Made from calcium carbonate, limestone is particularly vulnerable to chemical weathering and acid rain. Limestone forms from biological materials, mainly sea creatures with shells.	**Conglomerate** - Meaning a mixture, conglomerate rocks contain large rocks and pebbles cemented together with sand and mud.

Again, there is a map of sedimentary rocks and some key places they are found in the UK, produced by the Geological Society.

Metamorphic Rocks

Metamorphic rocks begin as **sedimentary rocks**, found close to tectonic activity. They are formed under **extreme pressure** and **temperature**, which compresses the rocks further and squeeze out many faults and vulnerabilities to collapse.

Metamorphic rocks are often **banded**, with similar types squashed into layers within the rock. This means that though metamorphic rocks don't erode quickly, they can split if force is applied between the horizontal layers (which are often known as **bedding planes**).

Some examples of **metamorphic rock** found in the UK are:

	
Slate - Quarried largely in the UK, slate is the most common metamorphic rock in the UK. It is formed from a mixture of clay, shale (sedimentary silt) and volcanic ash.	**Marble** - Formed from limestone, heated at a continental plate boundary, marble consists of interlocking crystals which make this rock extremely resistant to erosion and very dense!

Metamorphic rocks are found across the entire UK, but this map highlights some key locations of metamorphic rocks.

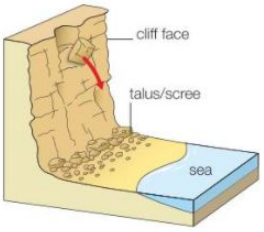
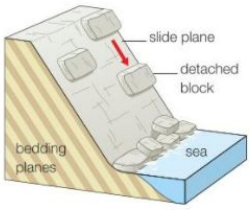
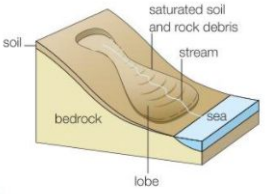
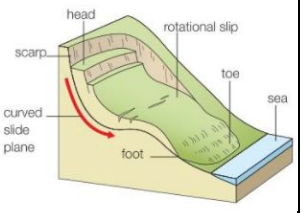
The UK's Geology

The UK has a **varied relief** and **landscape**, which is largely due to the **geology** of the bedrock. Historically, the UK used to be close to a plate boundary and at this time there was a large amount of rock formation, especially igneous and metamorphic rocks.

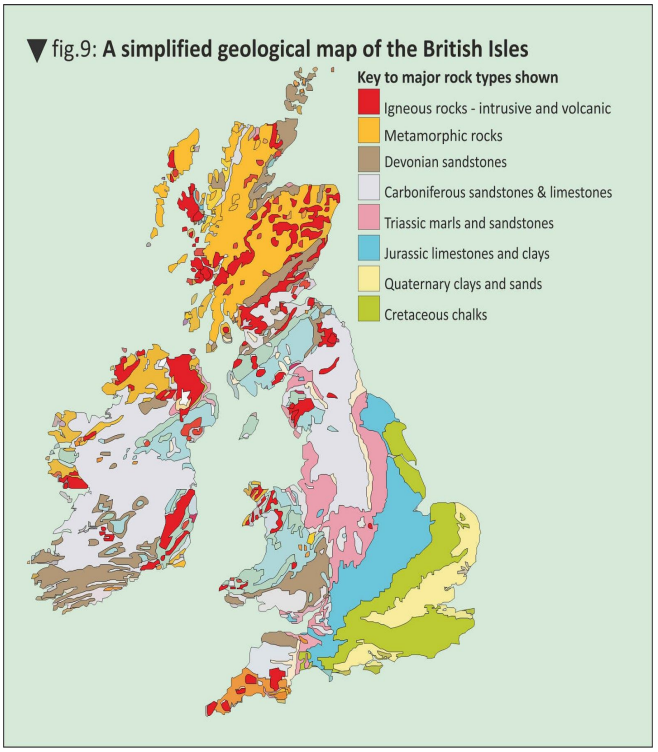
However, many processes have evolved the shape of the UK landscape, including:

- **Weathering and Erosion** - Continuously break down rock faces and surfaces anywhere in the UK. Weathering happens to all rocks on the surface, whereas erosion is caused by **water bodies** such as at the coast or in rivers. Weathering and erosion acts as fuel, providing sediments to create new sedimentary rocks.
- **Glacial Erosion** - During the UK's ice age, the land was under **immense pressure** due to the weight and erosive action of glaciers. **Post-glacial lakes** and rivers tend to have large valleys and can be found in the Lake District, Scotland and Wales.
- **Slope Processes** - Any **highlands** or hills will have slope processes acting to drag rocks down to a lower level. Slope processes include **mass movement** and can occur on any hill/rockface, not just along the coast. Slope processes include:

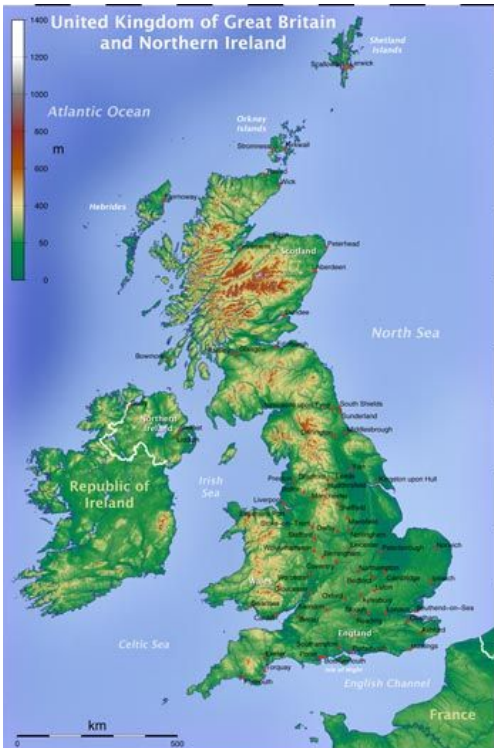
- **Rock falls** - Occur on sloped cliffs (over 40° to the beach floor) when the rock becomes exposed to mechanical weathering (often freeze thaw).
- **Landslides** - Water between sheets of rock (called **bedding planes**) and the rock face reduces friction and allows large chunks of rock to slide down the cliff .
- **Mudflow** - Saturated (waterlogged) soil flows down the face of a hill like a fluid, bulging at the bottom in a **lobe**.
- **Rotational Slip** - Also known as **slumps**, soil and rock fragments become saturated with water. However, instead of sprawling down the hill like a mudflow, chunks of rock and soil slip, creating stepped 'heads' down the cliff face.

			
Rock Fall	**Landslide**	**Mudflow**	**Rotational Slip**

Different Landscapes in the UK



The Geology of the UK



The Relief of the UK

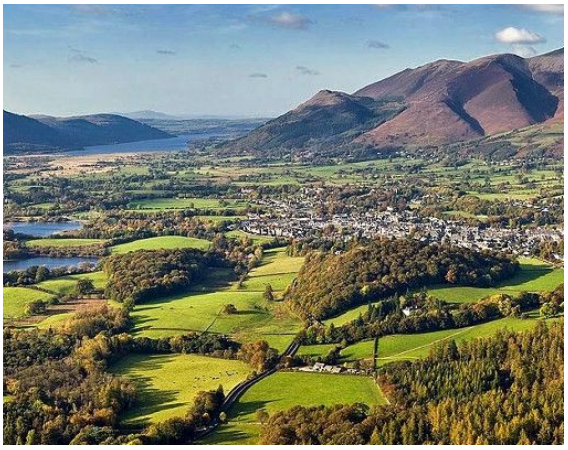
It is clear to see that the UK is made up from a **varied geology**, which explains the different landscape types across the country.

Upland and Lowland Landscapes

The UK's landscape can broadly be separated into **upland landscapes** and **lowland landscapes** depending on the rock type and relief of the area.

Upland landscapes: Located in the north and the west of England, Wales and Scotland. These are areas that are usually **higher above sea level** (hence ***up****lands*).

In upland areas you can find the majority of the UK's **igneous** and **metamorphic** rocks, for example, granite in the Scottish Highlands. Upland landscapes are usually **older** and are more **resistant to weathering and erosion**. However, past **tectonic processes** have created **faults and uplifts** here.



The Lake District, an upland area in NW England.

Lowland landscapes: Located in the south and east of England. These are areas that are located at lower levels to the uplands (hence ***low****lands*).

Sedimentary rocks such as clays and sands are usually found in the lowlands. These landscapes are much **younger** than the uplands, and sedimentary rocks erode very easily, creating landscapes formed through erosion and weathering processes.

The Weald, a lowland area in SE England.

Upland and lowland landscapes are **distinctly different from each other** for many reasons. We can look at the interactions of different physical processes that have shaped these landscapes over **hundreds of thousands of years**.

The Lake District - an upland landscape	**The Weald - a lowland landscape**
 Wasdale valley, Lake District. (Source:wikimedia.org/w/index.php?curid=39403903)	 Low Weald, Sussex (Source: http://longmanwalks.co.uk/walking-in-sussex/)

The Lake District's landscape is full of **high mountains** and **low valleys** due to the **glacial and tectonic processes** that have affected the area. However, other physical processes have also left their mark on the landscape.

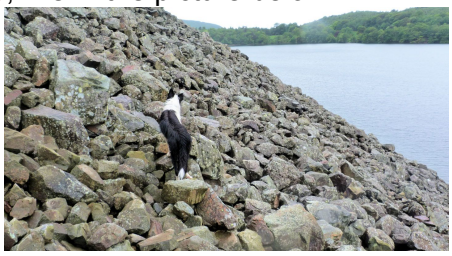
Post-glacial river processes

The Lake District was once covered in glaciers, which carved the landscape into deep **U-shaped valleys**.

Over time, the valleys filled up with water to form lakes, and now many small rivers flow through the valleys (known as **misfit rivers** as they look out of place in these large, wide valleys). You can see a misfit river flowing to **Wastwater** in the image above!

Weathering and slope processes

Many of the slopes surrounding the Lake District are covered in **angular rocks** called **scree**, like in the picture below.



(Source: where2walk.co.uk/walk/wastwater-screes/)

These landscapes have been created by **freeze-thaw weathering**. When temperatures **fall below freezing in the Lake District**, water in the cracks of rocks **freezes and expands**, and this repeated process causes the rocks to break off from the rock face. As the area has a **steep relief**, rocks fall to the bases of mountains and in depressions, making some of the terrain very rocky.

The Lake District is one of the wettest areas of the country, which leads to frequent landslides on the high relief slopes. **Rilling and gullying** (erosion from water flowing into small channels on slopes) is also common, seen below.

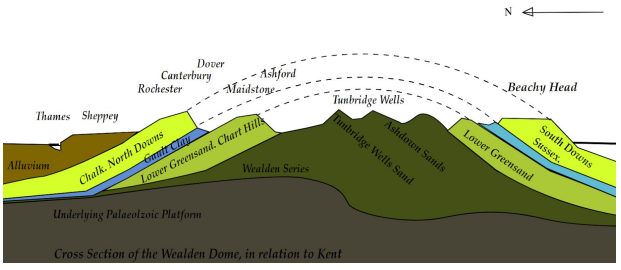
The Weald consists of **gentle rolling hills** that are located at much lower elevations than the hills and mountains of the Lake District, but still create distinctive landscapes.

Weathering and slope processes

The Weald used to be a large mound of layered rocks called an **anticline**, caused by **tectonic uplift**.

However, over time this mound has **eroded away** to create the hilly landscape seen today. This type of topography is known as **scarp and vale topography**.

- **Chalk** is resistant to weathering and erosion, it is only really affected by slow **chemical weathering**, when rainwater dissolves the calcium carbonate. The chalk forms steep **escarpments,** seen on the left of the image above.
- Softer, highly erodible **clays** lay below the chalk, forming low, flat **vales** (on the right).



Post-glacial river processes

When the climate was much **colder**, the ground over the Weald was completely frozen. **Rivers flowed and created valleys and other river landforms** over the landscape.

However, when the climate warmed, the frozen land began to melt and water from the rivers seeped through the **very permeable chalk** and disappeared. This has left **dry valleys** in the Weald.

Metamorphic rock and igneous rock are **very resistant to erosion** since the rocks are very compact from the extreme pressures when formed. This means metamorphic and igneous rock formations are usually very old, like in upland landscapes.

However, where you find clays and sands (**sedimentary rocks**) the UK tends to be **low-lying** and with a **small relief**. This is because clays and sands don't bind together strongly, and so are vulnerable to erosion and weathering.

There are many more examples of how the relief of the UK has been affected by geology - **can you see any other correlations?**

Landscape Shaped by Humans

The UK's landscapes have also been impacted by **human activities** and housing. Over centuries, human intervention has changed the landscapes for some regions. For example:

- **Forestry** - Some regions have become more vegetated by trees and plants (known as **afforestation**), after humans have planted them. The **Forestry Commision** and the **Woodland Trust** are UK charities that protect and increase the forests in the UK. This has resulted in relatively new forests being created, such as the Hertfordshire Project.

On the other hand, many forests have been **felled** or replaced with **non-native trees**. This was to improve the **timber industry**, since fast growing trees have been needed for timber since WW1. Therefore in some places in the UK, forests have been lost through **deforestation**.

Source: https://geographycatsite.wordpress.com/2018/05/31/how-are-rural-areas-changing-in-the-uk/

- **Settlements** - Where humans have settled, historically there has been change in the landscape surrounding them. For example, the land surrounding a village may be cleared and rotivated for **farmland**, clearing it of any vegetation and some rocks. Alternatively, rock **quarries** may carve into the highlands and could reduce the relief of the land. Often, **landslides** have been cleared and used to build rock walls and houses. Finally, land is cleared and sometimes flattened for houses, to create the ideal environment to live in.