

Edexcel A Geography GCSE

Topic 1 - The Changing Landscapes of the UK

Detailed Notes

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Characteristics and Distribution of Rock Types in the UK

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**; we can see different heights and shapes all over the country. This section explains how the **geology** of the rocks determines the landscape.

Types of Rock



There are three types of rocks found in the world: **igneous**, **sedimentary** and **metamorphic**. These rocks vary in their formation, 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** at **plate boundaries** or on **hotspots**. Molten rock under the ground (magma) spills out onto the surface during a volcanic eruption. The molten rock cools and **crystallises** during this process, forming igneous rocks. In some igneous rocks, you may be able to see **sparkly quartz** within the rock.

The igneous rocks found in the UK are **very old**, forming thousands of centuries ago when the UK was located on tectonic plate boundaries. The UK has since moved far away from these boundaries due to **continental drift**, but the igneous rocks still cover our landscape today. Some **small islands** in the UK are formed entirely from igneous rock! In these places, **huge lava plumes** erupted from under the sea and cooled to form the islands millions of years ago.

Some igneous rocks found in the UK include:

	
<p>Granite - Formed underground from continental crust, it contains interlocking quartz and is regularly used in kitchen worktops as it is very hard and durable.</p>	<p>Basalt - Lava flows that erupt onto the Earth's surface cool to form basalt. The Giant's Causeway in Northern Ireland is formed from basalt.</p>







Sedimentary Rocks

Sedimentary rocks are formed when layers of different **sediments** are deposited and **compressed** over long periods of time until they form rocks.

Processes like **erosion** and **weathering** break down rocks into sediment, which are **transported and deposited** somewhere like a lake or the bottom of a sea. Deposited rocks **form layers** over time (**sedimentation**) as different sediment sizes settle out at different depths.

Over centuries more and more sediment accumulates, putting **pressure on the layers below** and **compressing them under their weight** (**compaction**). When enough pressure builds, any water within is **pushed out** and minerals within the rocks **stick together** (**cementation**). Layers can also contain **organic matter** like dead organisms. This is why **fossils** are often found within sedimentary rocks.

There are different types of sedimentary rocks, and their **resistance** (how strong they are) depends on the type of sediment that was deposited to form the rock. There are a variety of **materials** that can compress to form sedimentary rocks over centuries. For example, if the sedimentary rock is predominantly composed of **sand and mud** it's likely to be **easily eroded**. Conversely, limestone is usually made from the minerals **calcite and aragonite** which makes it **strong** and **hard to erode**. There are many sedimentary rocks found in the UK, including:

	
<p>Chalk - Made from plankton, it is well known for its distinctive white appearance (such as the White Cliffs of Dover)</p>	<p>Sandstone - Formed from sand which cements together under intense pressure, it's the most common rock type in the world, and can be found from across the whole length of the UK, even in the Scottish Highlands.</p>
	
<p>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.</p>	<p>Conglomerate - Meaning a mixture, conglomerate rocks contain large rocks and pebbles cemented together with sand and mud.</p>





Metamorphic Rocks

Metamorphic rocks begin as **different types of rock**. They are formed under **extreme heat and pressure**, such as near tectonic plate boundaries or deep within the Earth. This combination causes **physical, chemical and mineralogical changes** to the rock in a process known as **metamorphism**.

Metamorphic rocks can be **banded**, meaning they have layers of different structures of rock within them. These layers mean metamorphic rocks can quite easily **split along the horizontal layers** (which are often known as **bedding planes**) if force is applied here.

However, they are usually very resistant to processes such as **weathering** as the grains within them are **very tightly compacted** due to the intense pressure they were under during formation.

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

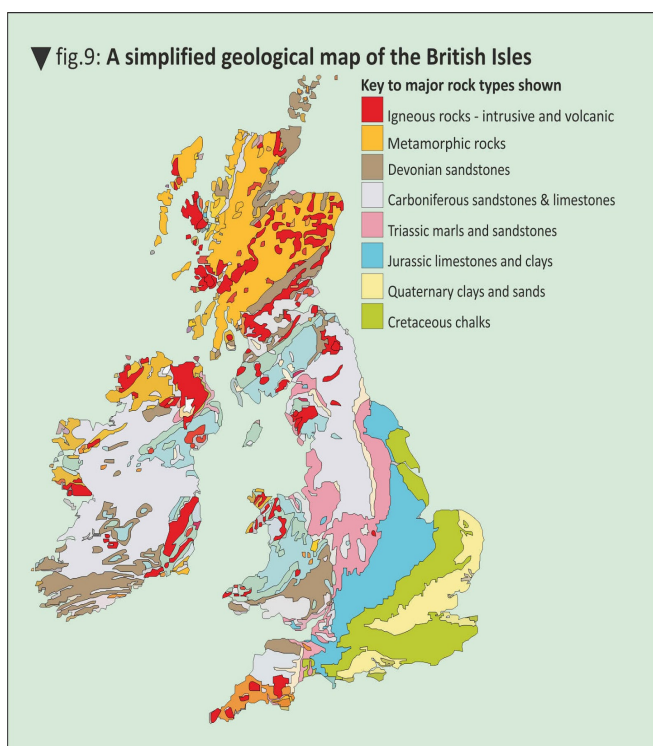
	
<p>Slate - Quarried largely in the UK, slate is the most common metamorphic rock in the UK. It is formed from a mixture of clay, shale (sedimentary silt) and volcanic ash.</p>	<p>Schist - Schist is formed from rocks like mudstone and shale. Sheet-like grains make up its structure, causing the rock to break into flat slabs along the alignment of the grains when it fractures.</p>



The UK's Geology

The UK has a **varied relief** and **landscape**, which is largely due to the **geology** of the **bedrock** (the rock structure which is under the soil). Millions of years ago, the UK used to be close to a plate boundary meaning there was a large amount of **igneous and metamorphic** rock formation. The UK was also once under water, where sedimentary rocks such as limestone were formed!

Different Landscapes in the UK



The Geology of the UK



The Relief of the UK

It is clear to see that the UK has a **varied geology**, which explains the different landscape types across the country. 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 **uplands**).

In upland areas you can find the majority of the UK's **igneous** and **metamorphic** rocks. These rocks are **very resistant to erosion** as they are highly compact from the **extreme pressures** they were formed under. This means metamorphic and igneous rock formations in upland landscapes are usually very old. 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 compared to the uplands (hence *lowlands*).

Sedimentary rocks make up lowland landscapes. These landscapes are much **younger** than the uplands; sedimentary rocks erode very easily because materials like clays and sands don't bind together strongly, so are vulnerable to erosion and weathering.

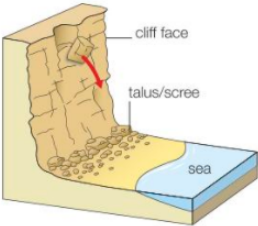
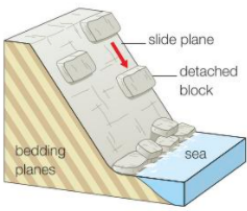
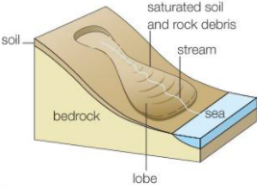
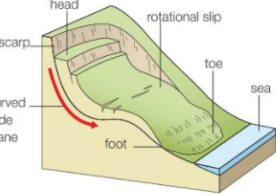


The Weald, a lowland area in SE England.

Erosional and weathering processes within these landscapes have created areas that are much more **low lying** compared to the upland landscapes formed from **resistant igneous and metamorphic rock**.

Different **physical processes** affect these landscapes, including:

- **Weathering and Erosion** - These processes continuously break down surfaces. Weathering is caused by the weather (e.g. **rain** or **freezing** temperatures). Erosion is caused by **physical forces** such as **rivers**, the **sea**, or **wind**. Weathering and erosion creates new sediments which form sedimentary rocks.
- **Glacial Erosion and Deposition** - 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. The **eroded sediments** have also been **deposited**, creating **depositional landforms**.
- **Slope Processes** - Any **upland landscapes** 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:

			
<p style="text-align: center;">Rock Fall</p> <p>Occur on sloped cliffs (over 40°) when the rock becomes exposed to mechanical weathering (often freeze thaw).</p>	<p style="text-align: center;">Landslide</p> <p>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.</p>	<p style="text-align: center;">Mudflow</p> <p>Saturated (waterlogged) soil flows down the face of a hill like a fluid, bulging at the bottom in a lobe.</p>	<p style="text-align: center;">Rotational Slip</p> <p>Also known as slumps, soil and rock fragments become saturated with water. Instead of sprawling down the hill like a mudflow, chunks of rock/ soil slip, creating stepped 'heads' down the cliff.</p>



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



Wasdale Valley, Lake District.

(Source: [wikimedia.org/w/index.php?curid=39403903](https://www.wikimedia.org/w/index.php?curid=39403903))

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/](https://www.where2walk.co.uk/walk/wastwater-screes/))

The Weald - a lowland landscape



Low Weald, Sussex

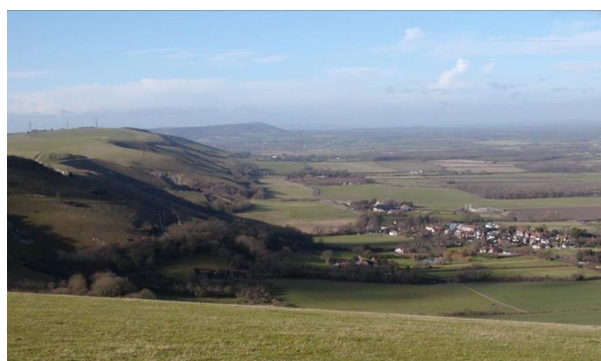
(Source: <http://longmanwalks.co.uk/walking-in-sussex/>)

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

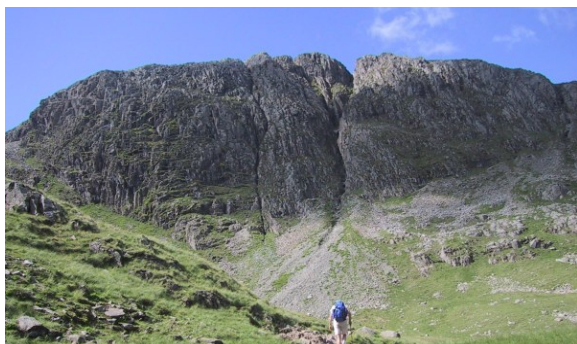
The Weald used to be a large mound of layered rocks called an **anticline**, caused by **tectonic uplift**.

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**.



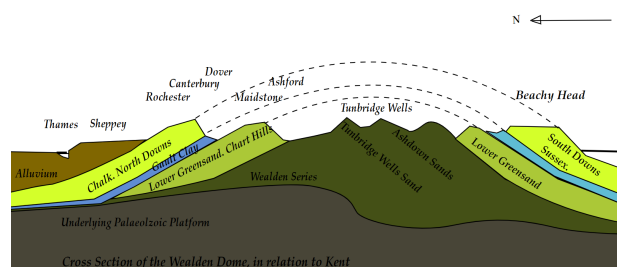
These landscapes have been created by **freeze-thaw weathering**. When temperatures **fall below freezing in the Lake District**, water in the cracks of rocks **freezes and expands**, and this repeated process causes the rocks to break off from the rock face. As the area has a **steep relief**, rocks 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 gulying** (erosion from water flowing into small channels on slopes) is also common, seen below.



Formation of 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.

Landscape Shaped by Humans

The UK's landscapes have also been impacted by **human activities**. Over centuries, human interventions have changed the landscapes across all regions. For example:

Agriculture

Agricultural activity in the UK has caused widespread changes in the natural landscape - today **70% of England is classed as agricultural land**. Many areas in the past have had to be **cleared of natural vegetation, flattened and ploughed** to create low-relief, flatter landscapes that are suitable for farming machinery, especially for arable (crop) farms.

Soil erosion due to intensive use of the fields or trampling by livestock has also **stripped the landscape of its topsoils**. Fertiliser use has created issues such as **eutrophication** in **waterways**.



(Source: www.farminguk.com)



Forestry

For hundreds of years, UK woodlands have been deforested to provide for the **timber industry**. After WWI, widespread deforestation meant that only 5% of the UK was left covered by forests.

After this extensive felling, a lot of places were **reforested** using fast-growing, non-native **coniferous trees** to provide large quantities of wood and to protect areas with poor soil quality. However, there are now many projects in place throughout the UK to restore and create **native woodlands**.



(Source: www.wildlifetrusts.org/habitats/woodland/coniferous-plantation)

The **Forestry Commission** and the **Woodland Trust** are UK charities that protect and increase the forests in the UK. By planting trees throughout the UK (**afforestation**) forest cover is now at 13% and increasing, but many areas are still left bare and vulnerable to erosion from deforestation.

Settlements

One of the biggest changes that the UK has seen in its landscapes is the introduction of **settlements**. Huge areas of land have been altered beyond recognition to create places for humans to live and work in. During the industrial revolution, cities began to grow rapidly throughout the UK and huge areas of **natural land had to be cleared to accommodate this growth**. Infrastructure such as transport systems, telephone lines, water and sewage systems etc. have all altered the landscape to support the growth and maintenance of our settlements.

Many settlements reflect the natural landscape that once stood before it. For example Portstewart, which has built on the coast, or Edinburgh, which has built over its hilly topography.



(Source: www.bbc.co.uk/bitesize)



(Source: uceap.universityofcalifornia.edu)

Other areas of the UK have also been altered to support these settlements, such as digging out **quarries** or creating **farmlands** to provide **materials** and **food** for the growing population.

