Climate through time

Our rocks reveal the story of change

Earth’s climate is predicted to change rapidly in ways that could have serious consequences for humanity. However, the climate has varied throughout the billions of years of Earth’s geological history. Rocks record evidence of past climates including the extreme conditions that have been linked to mass extinctions. ‘The present is the key to the past’ is a vital principle of geology. As geological understanding improves, so we are better able to forecast the impact future change may have on us — the past is the key to the future.

Many environments and therefore the rocks formed in them, are directly influenced by climate. On this poster each environment is represented by a particular colour. Change areas on the map, for example, shows where rocks that formed in ancient deserts may now be found. On this timeline, orange represents those geological periods when the climate was hot and air pollution was high in Britain and Ireland. The white colour is used to highlight photographs of a present-day desert and examples of ancient desert sandstones.

In other cases, however, rocks are formed by geological processes regardless of climate. For example, gas within bubbles, shown in red are formed during upward movements of tectonic activity independent of surface conditions. The formation of these rocks may influence climate. For instance, thick sequences of coal ‘lock-up’ atmospheric carbon dioxide as they formed. This greenhouse gas is now being released as we burn fossil fuels at an unprecedented rate, leading to global warming. An example of recent activity is the eruption of Mount St. Helens in the Pacific Northwest of the United States.

On the map, letters in each coloured region refer to the age of the rocks, as shown in the timeline; for instance, ‘r’ represents rocks of Permian to Triassic age.

Evidence:
- Igneous intrusions: Examples of igneous intrusions, such as the Granites of Cornwall, England, and Wales, formed deep underground. These are the products of molten rock that has solidified in the Earth’s crust.
- Sedimentary beds: Examples of sedimentary beds, such as the Cretaceous deposits of the North Sea, formed from the accumulation of sediments over time. These can provide insights into ancient environments and climates.
- Volcanic eruptions: Examples of volcanic eruptions, such as the Tungurahua Volcano in Ecuador, formed from the eruption of molten rock into the atmosphere.
- Metamorphic rocks: Examples of metamorphic rocks, such as the Gneisses of Scotland, formed from the transformation of existing rocks under high pressure and temperature.
- Continental drift: Examples of continental drift, such as the movement of Pangaea, formed from the theory that the Earth’s continents have moved over time.

Environment:
- Continent: Examples of continents, such as Africa and Europe, formed from the separation and movement of Earth’s tectonic plates.
- Sea: Examples of seas, such as the Atlantic Ocean, formed from the accumulation of water over time.
- Mountain range: Examples of mountain ranges, such as the Rockies, formed from the collision of tectonic plates.
- Volcano: Examples of volcanoes, such as Mount Everest, formed from the eruption of molten rock into the atmosphere.
- Lake: Examples of lakes, such as Lake Baikal, formed from the accumulation of water over time.
- River: Examples of rivers, such as the Nile, formed from the flow of water over time.
- Snow: Examples of snow, such as the Arctic, formed from the accumulation of ice over time.