

## **St Peter's CE Primary School** Autumn 1 - Fire and Ice Topic Overview

#### Unit Overview:

This topic focuses on the National Curriculum requirement to learn about human and physical geography by describing and understanding climate zones, biomes and vegetation belts, and how these influence human activity.

In Autumn term, pupils will build on prior learning about seasonal and daily weather patterns and the location of hot and cold places. Pupils will develop their locational knowledge, identifying the position and significance of longitude, latitude, the Equator, Arctic and Antarctic Circle, and the Tropics of Cancer and Capricorn, and linking this to the position of climate zones and biomes. Using maps, globes, digital mapping, and other sources, they will investigate the landforms which characterise the physical geography of the world's hot deserts and polar environments.

In Spring and Summer terms, pupils will complete in-depth case studies of polar (Spring) and hot desert (Summer) environments, finding out more about the flora and fauna which survive in these extreme conditions, including human activity. To prepare pupils for this, our Autumn unit will also support pupils to develop an understanding of land-use patterns, distribution of natural resources and economic activity (initially relating this to the UK) and global warming.

We will also be linking to the prior topic, Earth, by revisiting our understanding of plate tectonics to explore where and how volcanoes are formed.

#### Key Questions:

Autumn Term:

- 1. How are extreme environments created?
- 2. What is it like in hot and cold places?
- 3. How do people live in different environments?

#### Objectives covered in this unit:

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Geography (see progression in expectations document)	<ul> <li>I can locate places on a map.</li> </ul>
	<ul> <li>I understand about different places</li> </ul>
	• I can compare different places around the World.
	<ul> <li>I can ask geographical questions.</li> </ul>
	<ul> <li>I can answer geographical questions.</li> </ul>
	<ul> <li>I can use a wide range of geographical words in my work.</li> </ul>
	• I can share my geographical knowledge effectively.
	<ul> <li>I can use a wide range of geographical and fieldwork skills - field sketching, measuring, direction, using/drawing maps, scale and distance, photography, recording, questionnaires.</li> </ul>
Science	n/a



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	Geography definitions
	Geography - Geography is the study of places and the relationships between people and the natural environment. Geographers explore both the physical properties of Earth's surface and the human societies spread across it.
	<b>Human geographers</b> study the relationship different people have with the Earth. This includes where they live, what they do and how they use the Earth's resources, as well as understanding the culture and customs of different communities.
	<b>Physical geographers</b> observe, measure, and describe Earth's surface, climate, and processes. They study how landforms develop and how the Earth is changing.
How are	Volcanoes
extreme environments created?	Volcanoes are most commonly (60%) found along plate boundaries. The Earth's crust is cracked, and the pieces of the Earth's crust formed by the cracks are called tectonic plates. These tectonic plates can be seen in this map. The plates are continually moving (albeit very slowly, a few millimetres a year) and this movement helps to form volcanoes. Many of these volcanoes are situated on the 'Ring of Fire', around the Pacific Ocean. The rest sit over hot spots in the middle of tectonic plates. 75% of volcanoes are situated under water.
	Eurasian Plate       Eurasian Plate         Morth Amperican Plate       African Plate         Morth Amperican Plate       African Plate         Nazca Plate       South Plate         Nazca Plate       South Plate         Volcano       Enter boundaries
	How volcanoes are formed
	Link to prior learning from Earth topic - plate tectonics, igneous rocks, etc.

Where volcanoes form on plate boundaries, there are two types of plate boundaries; divergent boundaries (where plates are moving away from each other), or convergent boundaries (where the plates are moving towards each other).

Volcanoes form when magma travels from the Earth's upper mantle to its surface. Pressure builds up inside the volcano and pushes magma through cracks in it. When the magma reaches the surface, it erupts. Lava, steam, gaseous sulphur compounds, ash and broken rocks can come out of a volcano when it erupts. As the lava cools it begins to form the cone. Repeated eruptions make the volcano cone get bigger.

There are two main types of volcano:

 Shield- found on divergent plate boundaries, less explosive but longer eruptions (effusive), fluid lava slowly flows a long distance before cooling, no layers as volcano is made from lava and doesn't include ash - resulting volcano has gently sloping sides.

Examples include Kīlauea in Hawaii, it is the most active of Hawaii's five big volcanoes. Recent eruption from December 2020 and May 2021, and has erupted as recently as 29<sup>th</sup> September 2021. In 1790 one eruption killed more than 400 people, making it the deadliest volcanic eruption in what is now the United States.



 Composite (aka stratovolcanoes) - found on convergent plate boundaries, short, violent (explosive) eruptions, lava doesn't slow far as it is more viscous and cools quickly, layers of cooled lava and ash (hence 'strato') - resulting volcano has steep sides.

Examples include Krakatoa in Indonesia, known for its catastrophic eruption in 1883 (death toll estimated between 36,417 and 120,000 and it destroyed most of an island), and Vesuvius in Italy, whose catastrophic eruption in AD 79 buried the Roman cities of Pompeii and Herculaneum killing over 20,000 people. Both eruptions claimed thousands of lives. In modern times, Mount St. Helens in Washington State (57 people died, many ignored requests to evacuate), USA and Mount Pinatubo in the Philippines (steam explosions blasted three craters, triggered thousands of small earthquakes and the summit later collapsed), have erupted catastrophically, but with fewer deaths.

[Also dome volcanoes, which are like composite but not as tall, and formed when rock and ash settle around the vent, less lava].

Mention of recent volcanic activity e.g. Cumbre Vieja, La Palma, Spain should be used to illustrate how volcanoes form. Recent news linked to volcanoes can be found on this thread, <u>Volcanoes - BBC News</u>.

Also mention how volcanic activity is monitored so warning is now given of potential volcanic activity.

### Climate zones and biomes

Pupils need to understand that different biomes develop due to the specific climatic conditions in that part of the world (climate zone).

A biome is a geographical area with similar climate conditions which has led to unique flora, fauna, soil and human activity, influenced or controlled by the climate.

Generally, the world is divided into five climate zones. Cross referencing the average precipitation and air temperature in different parts of the world, (with mention of seasonal variations), enables you to map the different biomes and identify trends.



Average annual temperatures

Average annual rainfall

E.g., tropical rainforests are located along the Equator due to hot temperatures, but heavy rainfall. Whereas hot deserts are located along the Tropic of Cancer and Tropic of Capricorn, with high temperatures and low precipitation.



The climate zones are as follows,

- polar climate zone (very cold) including polar deserts and arctic tundra
- temperate climate zone (neither very hot nor very cold) temperate deciduous and coniferous forest

<ul> <li>sub-tropical zone (hot with wet and dry seasons) - savannah, chaparral and temperate grassland</li> </ul>
• equatorial or tropical climate zone (very hot, wet) - tropical rainforest
<ul> <li>desert climate zone (very hot, dry) - (hot) desert</li> </ul>
Note - Clarify that a desert is a place that receives less than 10 inches (25 centimetres) of rain per year, so can be a hot desert or cold (polar) desert.
LKS1 pupils need to have a secure understanding of the location and climatic conditions for desert (hot deserts) and polar (cold desert and tundra) climate zones, as well as the UK/ Europe's location in a temperate zone. UKS2 pupils need to have a secure understanding of the location and climatic conditions for all climate zones.
Note - misconceptions about the equator being hot because it's closer to the sun, it is due to the angle of the sun at the equator, or that temperature is sole reason for a place being a desert.
<u>Global warming</u>
A natural function of the Earth's atmosphere is to keep in some of the heat that is lost from the Earth. This is known as the greenhouse effect. The atmosphere allows the heat from the Sun (short-wave radiation) to pass through to heat the Earth's surface. The Earth's surface then gives off heat (long-wave radiation). This heat is trapped by greenhouse gases (e.g. methane, carbon dioxide and nitrous oxide), which radiate the heat back towards Earth. This process heats up the

Earth. Global warming is occurring because the greenhouse gases have increased mainly due to human activity, therefore more if the sun's heat is trapped in the atmosphere, warming up the Earth.



Note - Pupils will study the causes and effects of climate change more during the case studies in Spring and Summer, therefore this lesson is to understand the concept of global warming and speculate what might be the effects.

What is it like in hot and cold places?	Hot and cold deserts have very little rainfall, few plants and animals (who are specially adapted to suit the environment) and strong winds. Most deserts are mainly rocks and gravel, rather than sand (tiny particles of rocks and minerals), others are icy.				
	Hot desert landforms				
	Hot desert landforms include mountains and rock formations, valleys (low-lying areas between mountains) and canyons (narrow valleys with very steep sides), and flat plains, which include sand dunes and oases.				
	Landforms are the resulting action of thousands of years wind-blown sand, water and the heat of the sun. Sand dunes are shaped by the prevailing winds and there are four different shapes: crescent, star, linear and transverse.				
	Dunes may form wherever there is a lot of loose sand and enough wind to move it. Most windblown sand is made up of the mineral quartz. However, near volcanoes, dunes may be built of volcanic ash particles. Dunes are always changing. The wind shifts the sand into a variety of shapes and heights. As wind containing sand comes to the peak of a dune's slope, the speed of the wind drops. The wind then releases the sand it was holding. The sand falls down the dune's steeper side. As this action keeps happening, the dune moves in the direction that the wind blows.				
	<u>Polar landforms</u>				
	The Arctic includes two biomes; polar (cold) desert and tundra. It is mainly a polar desert made from a large mass of sea ice, and a large ice- covered area of land in central Greenland (which is covered year-round by a continental glacier). The rest of the land of the Artic, is tundra including parts of Russia, Alaska, Canada, Greenland, Lapland and Svalbard. Tundra does not get very much rain or snow. However, in the summer the top layer of soil melts, however due to the underlying permafrost it can't drain away, so it very wet until it freezes again or dries up. Polar desert cannot support life, whereas the summer defrost enables plants and animals to survive in the tundra. The Antarctic is a land mass surrounded by sea (which makes it colder than the Arctic). It is the largest desert in the world. Antarctica has no trees or bushes.				
	Arctic). It is the largest desert in the world. Antarctica has no trees or bushes. The only plants that can live in a place that cold are moss and algae. A few animals survive at the edges of the ice sheets.				
	Cold desert landforms include ice caps (sheet of ice covering less than 50,000 km /19,000 sq mi), ice sheet (sheet of ice covering more than 50,000 km /19,000 sq mi) ice flows (floating ice) and glaciers (large body of ice that is slowly moving over land).				
	Note - In case studies link to science adaptation of species to habitat.				

How do people live in different environments?	In this unit, we will focus on mapping of land use in the UK, linking our environment (including our climate and natural resources) to human activity, including investigating agriculture, fishing, mining, tourism, and industry.
	More than half of the UK land area is farmland (fields, orchards etc), just over a third might be termed natural or semi-natural (moors, heathland, natural grassland etc), a little under 6% is built on (roads, buildings, airports, quarries etc) and 2.5% is green urban (parks, gardens, golf courses, sports pitches etc). Note – there are variations in land use across the four countries of the UK, where England is the most populated.
	Using satellite images, maps and population data, children can establish land use, the location of larger settlements natural resources, and main industries.
	Recent University of Sheffield UK land use mapping: <u>https://figshare.shef.ac.uk/articles/dataset/A_Land_Cover_Atlas_of_the_Uni</u> <u>ted_Kingdom_Maps_/5219956</u>
	Also see Vision of Britain website <u>www.visionofbritain.org.uk/atlas/</u> could be used to explore statistical data about the UKs mining, agriculture and manufacturing.
	Statistical data on UK employment by sector <u>https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmenta</u> ndemployeetypes/datasets/employmentbyindustryemp13
	naempioyeerypes/aarasers/empioymenroymausrryemp15
	More than one billion people, one-sixth of the Earth's population, live in desert regions (no one permanently lives in Antarctica as it is too cold). In the Spring and Summer term case study units, the learning from this unit will be applied to how people live in these extreme environments.



# Fire and Ice Vocabulary

Vocabulary				
Tier 1	Volcano	Biome	Arctic circle	Land use
	Lava	Desert	Antarctic circle	Settlement
	Magma	Polar	Equator	
	Cone	Climate		
	Crater	Ecosystem	Continent	
	Vent	Temperature	Global	
	Eruption	Precipitation		
		Season		
Tier 2	Tectonic plates	Vegetation belt	Tropic of Cancer	Industrial
	Margin/boundary	Flora	Tropic of	Residential
	Mantle	Fauna	Capricorn	Agricultural
	Crust	Arid	Latitude	Natural resources
	Pressure	Tropical (aka	Longitude	Global warming
	Active	equatorial)	Northern	
	Dormant	Temperate (aka	hemisphere	
	Extinct	deciduous forest)	Southern	
	Shield volcano	Tundra	hemisphere	
	Composite volcano	Ice cap		
	Dome volcano	Ice sheet		
		Ice flow		
		Iceberg		
		Glacier		
Tier 3	Effusive eruption	Savannah	Distribution	Greenhouse gases
	Explosive eruption	Taiga (aka	Interaction	
	Magma chamber	coniferous	Interdependent	
	Pyroclastic flow	forest)		
	Ash cloud	Chaparral		
	Volcanic bomb	Drought		
		Desertification		