Mark Scheme

Q1.

Question Number	Answer - Compare global temperatures before and after the year 1980 (1.3.4.3)	Mark
(i)	A02 (2 marks) • Global temperatures remained below the long-term average temperature (0˚) before 1980 and after 1980 global surface temperatures have moved above the long-term average temperature (0˚) (1) • Global temperatures were more stable/didn't fluctuate as much before 1980 when compared with after 1980 • Global temperatures show a continued increase since 1980 whereas before 1980 temperatures have been relatively stable (1) • Global temperatures show a narrower range of approx. 0.2 degrees before 1980 whereas since 1980 the range has increased to around 0.8 degrees (1) N:B The command word is compare and so candidates need to identify a difference before and after 1980 to gain credit. They should not gain credit for description of the overall trend.	**(2)**

Question Number	Answer - Explain one way volcanic eruptions can cause short-term climate change (1.3.4.2)	Mark
(ii)	AO1 (3 mark) • When volcanic eruptions eject large amounts of ash and sulphur dioxide into the atmosphere (1), they reduce the amount of solar radiation/sunlight reaching the Earth's surface (1), this can lead to a temporary cooling of the Earth's surface temperature (1). • Volcanoes can eject of large amounts of volcanic aerosols into the atmosphere (1) it can disrupt atmospheric circulation patterns, such as the jet stream and monsoon systems (1), this disruption can lead to changes in weather patterns and precipitation distribution across different regions (1).	**(3)**

Q2.

Question number	Explain how Figure 5 helps us understand the causes of long-term natural climate change (1.3.4.2)
	AO1 (5 marks)/AO2 (5 marks) **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include:

	AO1: The cycles affect the amount of sunlight and therefore energy that earth absorbs from the sun. They provide a framework for understanding long term climate change and are responsible for triggering the beginning and end of glaciation periods (Ice Ages). Milankovitch cycles are major changes which occur between 26,000- and 100,000 years dependent on the cycle. These cycles affect the amount of sunlight and therefore, energy that the Earth absorbs from the sun. Milankovitch cycles are thought to cause variations of up to 25% in the amount of incoming radiation at the mid-latitudes. Precession (Axial Rotation): As the Earth rotates, it wobbles slightly upon its axis and the cycle of precession occurs over a period of roughly 26,000 years. Axial precession makes seasonal contrasts more extreme in one hemisphere and less extreme in another. Currently the precessions makes the Southern Hemisphere summers hotter and moderates Northern Hemisphere seasonal variations. Eccentricity (orbital shape): Eccentricity, is the shape of the Earth's orbit around the Sun. Over time, the pull of gravity from Jupiter and Saturn causes the shape of the Earth' orbit to vary from being nearly circular to being mildly elliptical. This explains why our seasons are slightly different lengths i.e. summers being 4.5 days longer than winters in the Northern Hemisphere. When the Earth's orbit is at its most elliptic, about 23% more solar radiation reaches Earth each year than it does at its furthest point. Axial tilt (Obliquity): The angle of the Earth's axis of rotation is tilted as it travels around the sun and explains why we have seasons. Over the last million years, it has varied between a tilt of 22.1° to 24.5° and back again. As obliquity decreases the seasons become milder, resulting in warmer winters, and cooler summers that gradually allow snow and ice at high latitudes to build up into large ice sheets. This then reflects more of the Sun's energy back into space, promoting even more cooling.

	AO2: Eccentricity is thought to contribute very little to global annual solar radiation amounts, because the variations in eccentricity are small. The Milankovitch cycles act separately and together to influence Earth's climate over a long-time span. Obliquity is thought to be the most important cycle

	because it affects the amount of solar radiation in the Earth's northern high-latitude regions during the summer. They are thought to provide a strong framework for understanding long-term changes in Earth's climate, but they can't account for the current period of rapid warming Earth has experienced since the pre-industrial period and particularly since the mid-20th Century. Over the last 150 years, Milankovitch cycles have not changed the amount of solar energy absorbed by Earth very much, and in the past 40 years solar radiation has actually decreased. Scientists are confident Earth's recent warming is due to human activities. However, the Milankovitch cycles are just one factor that may contribute to climate change in the past, as other factors such as changes in the extent of ice sheets and atmospheric carbon dioxide are key in driving the degree of temperature fluctuations. The extent of ice sheets is important in considering the long term climate change as they affect how much of the Sun's incoming energy is reflected back to space and therefore the Earth's temperature. Carbon dioxide levels have also fluctuated over millions of years, with levels of 180 ppm during glacial cycles driven by the Milankovitch cycle changes, compared with postindustrial levels of 412ppm driven by mass industralisation. Accept other appropriate responses

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	**1-4**	Demonstrates isolated elements of geographical knowledge. (AO1) Demonstrates isolated elements of geographical understanding, some of which may be inaccurate. (AO1) Applies knowledge and understanding to geographical information / ideas, making limited logical connections / relationships. (AO2) Applies knowledge and understanding to geographical information / ideas to produce an interpretation that is not relevant and / or supported by evidence. (AO2)
Level 2	**5-7**	Demonstrates geographical knowledge, which is mostly relevant and may include some inaccuracies. (AO1) Demonstrates geographical understanding, which is mostly relevant and may include some inaccuracies. (AO1) Applies knowledge and understanding to geographical information / ideas logically, making some relevant connections / relationships. (AO2) Applies knowledge and understanding to geographical information / ideas to produce a partial but coherent interpretation that is mostly relevant and supported by evidence. (AO2)
Level 3	**8-10**	Demonstrates accurate and relevant geographical knowledge throughout. (AO1) Demonstrates accurate and relevant geographical understanding throughout. (AO1) Applies knowledge and understanding to geographical information / ideas logically, making relevant connections / relationships. (AO2) Applies knowledge and understanding to geographical information / ideas to produce a full and coherent interpretation that is relevant and supported by evidence. (AO2)

Q3.

Question number	Explain how long-term climate change is reconstructed using evidence from the past.	Mark
	AO1 (6 marks) **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include: • Tree rings - trees add a growth layer annually which can be analysed to determine past temperatures. Wider rings refer to a warmer climate, indicating more favourable growing conditions. • Ice cores - air trapped in bubbles in the ice core hold information about past climates. It is possible to analyse the concentration of gases, e.g. carbon dioxide, to determine the atmospheric concentration in past atmospheres. • Ocean sediments - ocean sediment cores contain calcium carbonate shells that will have lived near the surface in the past. Oxygen isotope analysis in oceans - show that as O16 evaporates more readily in warm weather - there will be a relative abundance of O18 in oceans during this period. • Pollen analysis - pollen extracted from peat bogs and lakes can be used to reconstruct past climates and can indicate historical vegetation patterns. Credit reference to timescales and the accuracy/completeness of different types of evidence. Accept any other valid responses.	**(6)**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1-2	• Demonstrates isolated elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Understanding addresses a narrow range of geographical ideas which lack detail. (AO1)
Level 2	3-4	• Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1) • Understanding addresses a range of geographical ideas which are not fully detailed and/or developed. (AO1)
Level 3	5-6	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Understanding addresses a broad range of geographical ideas which are detailed and fully developed. (AO1)

Q4.

Question number	Answer - Explain how the Milankovitch cycles provide an explanation for long-term climate change (1.3.4.2)	Mark
	AO1 (6 marks) **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include: • Milankovitch cycles are major changes which occur between 26,000 and 100,000 years dependent on the cycle. • The cycles affect the amount of sunlight and therefore energy that earth absorbs from the sun. They provide a framework for	(6)

understanding long term climate change and are responsible for triggering the beginning and end of glaciation periods (Ice Ages).

- Precession (Axial Rotation): As the Earth rotates, it wobbles slightly upon its axis and the cycle of precession occurs over a period of roughly 26,000 years. Axial precession makes seasonal contrasts more extreme in one hemisphere and less extreme in another. Currently the precession makes the Southern Hemisphere summers hotter and moderates Northern Hemisphere seasonal variations.
- Eccentricity (orbital shape): Eccentricity, is the shape of the Earth's orbit around the Sun. Over time, the pull of gravity from Jupiter and Saturn causes the shape of the Earth' orbit to vary from being nearly circular to being mildly elliptical. This explains why our seasons are slightly different lengths i.e. summers being 4.5 days longer than winters in the Northern Hemisphere. When the Earth's orbit is at its most elliptic, about 23% more solar radiation reaches Earth each year than it does at its furthest point.
- Axial tilt (Obliquity): The angle of the Earth's axis of rotation is tilted as it travels around the sun and explains why we have seasons. Over the last million years, it has varied between a tilt of 22.1° to 24.5° and back again. As obliquity decreases the seasons become milder, resulting in warmer winters, and cooler summers that gradually allow snow and ice at high latitudes to build up into large ice sheets. This then reflects more of the Sun's energy back into space, promoting even more cooling.

Accept any other valid responses.

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	**1-2**	• Demonstrates isolated elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Understanding addresses a narrow range of geographical ideas which lack detail. (AO1)
Level 2	**3-4**	• Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1) • Understanding addresses a range of geographical ideas which are not fully detailed and/or developed. (AO1)
Level 3	**5-6**	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Understanding addresses a broad range of geographical ideas which are detailed and fully developed. (AO1)

Q5.

Question Number	Answer Explain why the evidenced used to reconstruct past climate records may be unreliable.	Mark
	AO1 (4 marks) Award 1 mark for a basic explanation of why past climate records may be unreliable and a further extension point • Pre 1850 records are pre-instrumental compared to post 1850 when climate recording equipment was first used. • Accuracy of past climate records is disputed because earlier records are often based on proxies such as diaries/paintings/grape harvests etc. (1) which may be interpreted differently (1) • Pollen and tree ring data is questioned because it may be contaminated by disease or insect attack(1) as well as being very localised (1) • IT technology and precision are improving over time (1) so comparison with past records cannot be made with confidence (1) • Siting of weather stations has not always been appropriate (1) which undermines confidence in the validity of the data collected (1) Accept other correct explanations.	**(4)**

Q6.

Question Number	Answer - Suggest one way sources such as this provide evidence of climate change in the past (1.3.4.1)	Mark
(i)	**AO1 (1 mark) and AO2 (1 mark)** The River Thames is shown to be frozen (1) showing that temperatures were significantly colder allowing a major river to freeze (1) Frost fairs were held on the surface of the River Thames (1) showing that temperatures were significantly colder allowing the markets to be held (1) It allows a comparison of current and past weather (1) for example the River Thames was frozen but now is not (1)	**(2)**

Question Number	Answer - Explain one source that could provide evidence for long-term climate change (1.3.4.1)	Mark
(ii)	**AO1 (3 marks)** Trees add a new layer of growth each year with the thickness varying with climatic conditions (1) wider rings indicate favourable growing conditions e.g. warm and wet (1) by analysing these scientists can reconstruct annual records of temperature and prediction (1). Ice cores drilled from glaciers and ice sheets contain trapped air bubbles that preserve samples of the ancient atmosphere (1) by analysing the gases e.g. carbon dioxide/methane, (1) scientists can infer past atmospheric composition and temperature (1) Ocean sediment cores contain layers of sediments that accumulate over time (1) these layers include microfossils (1) whose shell composition reflect the temperature and chemistry of the ocean at the time they lived (1). Plants produce pollen grains that settle in lakes and soils and are preserved over thousands of years (1). Pollen records allow scientists to see which plants thrived in different climates (1) this allows them to infer what the climate was like when the layer was formed (1) Accept other correct explanations.	**(3)**

Q7.

Question number	'Mega-disasters require a different scale and type of response compared to other natural disasters.' (1.3.2.3/1.3.3.3)
	AO1 (5 marks)/AO2 (15 marks) **Marking instructions** Markers must apply the descriptors in line with the general marking guidance (page 3) and the qualities outlined in the levels-based mark scheme below. Responses that demonstrate only AO1 without any AO2 should be awarded marks as follows: • Level 1 AO1 performance: 1 mark • Level 2 AO1 performance: 2 marks • Level 3 AO1 performance: 3 marks • Level 4 AO1 performance: 4 marks **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include: **AO1** • A mega disaster describes an exceptionally large-scale and devastating disaster that causes widespread destruction, loss of life, and significant socioeconomic impacts. • These events typically exceed the capacity of affected communities, regions, or even entire countries to cope and respond effectively. • Mega disasters can result from natural hazards such as earthquakes, tsunamis, hurricanes, typhoons, cyclones, floods, droughts, wildfires, volcanic eruptions, and landslides. • These events often occur suddenly and with little warning, leading to extensive damage to infrastructure, housing, agriculture, and ecosystems, as well as loss of life and displacement of populations. **AO2** **Agree**: • Mega-disasters, by definition, are extreme events that exceed the coping capacity of affected regions, regardless of their economic development level. Such events can include massive earthquakes, tsunamis, hurricanes, and volcanic eruptions, which can cause widespread destruction and loss of life irrespective of a country's economic status.

	- Responding to mega-disasters requires significant resources in terms of personnel, equipment, supplies, and funding compared to smaller-scale disasters. The scale of the response must match the magnitude of the disaster to effectively meet the needs of affected populations and support long-term recovery efforts. - Mega-disasters present complex challenges that go beyond the capabilities of standard disaster response mechanisms. Addressing issues such as widespread displacement, breakdown of critical infrastructure, environmental contamination, and secondary hazards requires a coordinated and multifaceted approach involving various stakeholders. - Past mega-disasters such as the 2011 Tohoku earthquake and tsunami in Japan, Hurricane Katrina in the United States, the 2004 Indian Ocean tsunami, and the 2010 Haiti earthquake reveals significant impacts on both developed and developing countries, despite differences in economic development. **Disagree**: - While mega-disasters may require a larger scale of response, the fundamental principles of disaster response remain the same regardless of the scale of the disaster. These principles include rapid assessment, coordination, resource mobilisation, and meeting the immediate needs of affected populations. The same response framework can often be adapted and scaled up to address mega-disasters. - Effective disaster preparedness measures can help mitigate the impact of mega-disasters and ensure a more efficient response. By investing in risk reduction strategies, early warning systems, and community resilience-building initiatives, the severity of mega-disasters can be minimised, and - While the initial response to mega-disasters may require a larger scale of resources, the long-term recovery process may not necessarily differ significantly from that of smaller-scale disasters. Both require sustained efforts to rebuild infrastructure, restore livelihoods, enhance resilience, and address underlying vulnerabilities to reduce the risk of future disasters. - Depending on the definition of a mega disaster, Haiti could be seen as not a mega disaster as it only affected one country, but still required international response. Assessment: The scale, scope, and challenges associated with mega-disasters often require a response that is tailored to their magnitude. However, effective disaster preparedness, coordination, and resilience-building efforts can help mitigate the impact of mega-disasters and ensure a more efficient response.

	N.B - Answers that don't differentiate between mega disasters and normal disasters are likely to self-penalise

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	**1-5**	• Demonstrates isolated elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Applies knowledge and understanding of geographical ideas, making limited and rarely logical connections / relationships. (AO2) • Applies knowledge and understanding of geographical information / ideas to produce an interpretation with limited coherence and support from evidence. (AO2) • Applies knowledge and understanding of geographical information / ideas to produce an unsupported or generic conclusion, drawn from an argument that is unbalanced or lacks coherence. (AO2)
Level 2	**6-10**	• Demonstrates geographical knowledge and understanding, which is occasionally relevant and may include some inaccuracies. (AO1) • Applies knowledge and understanding of geographical information / ideas with limited but logical connections / relationships. (AO2) • Applies knowledge and understanding of geographical ideas in order to produce a partial interpretation that is supported by some evidence but has limited coherence. (AO2) • Applies knowledge and understanding of geographical information / ideas to come to a conclusion, partially supported by an unbalanced argument with limited coherence. (AO2)
Level 3	**11-15**	• Demonstrates geographical knowledge and understanding, which is mostly relevant and accurate. (AO1) • Applies knowledge and understanding of geographical information / ideas to find some logical and relevant connections / relationships. (AO2) • Applies knowledge and understanding of geographical ideas in order to produce a partial but coherent interpretation that is supported by some evidence. (AO2) • Applies knowledge and understanding of geographical information / ideas to come to a conclusion, largely supported by an argument that may be unbalanced or partially coherent. (AO2)
Level 4	**16-20**	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Applies knowledge and understanding of geographical information / ideas to find fully logical and relevant connections / relationships. (AO2) • Applies knowledge and understanding of geographical information / ideas to produce a full and coherent interpretation that is supported by evidence. (AO2) • Applies knowledge and understanding of geographical information / ideas to come to a rational, substantiated conclusion, fully supported by a balanced argument that is drawn together coherently. (AO2)

Q8.

Question number	"The magnitude and pace of current climate warming is different from climate change in the past" To what extent do you agree? (1.3.4.1/1.3.4.2)

AO1 (5 marks)/AO2 (15 marks)

Marking instructions

Markers must apply the descriptors in line with the general marking guidance (page 3) and the qualities outlined in the levels-based mark scheme below.

Responses that demonstrate only AO1 without any AO2 should be awarded marks as follows:

- Level 1 AO1 performance: 1 mark
- Level 2 AO1 performance: 2 marks
- Level 3 AO1 performance: 3 marks
- Level 4 AO1 performance: 4 marks

Indicative content guidance

The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include:

AO1

- Climate change is the significant variation of average weather conditions becoming, for example, warmer, wetter, or drier—over several decades or longer.
- The largest global-scale climate variations in Earth's recent geological past are the ice age cycles which are cold glacial periods followed by shorter warm periods. The last few of these natural cycles have recurred roughly every 100,000 years.
- Trends in globally averaged temperature, sea level rise, upper-ocean heat content, land-based ice melt, arctic sea ice, depth of seasonal permafrost thaw provide consistent evidence of a warming planet.
- Earth's climate is now changing faster than at any point in the known history of the climate, primarily as a result of human activities. Atmospheric levels of carbon dioxide ($C0_2$) were fairly stable over the past 2000 years at 270 to 285 parts per million (ppm) until the 18th century. Global $C0_2$ levels have been increasingly rapidly breaking the 400ppm threshold (highest level in the last three million years).

AO2

- We know about past climates and how they changed because of evidence left in tree rings, layers of ice in glaciers, ocean sediments, coral reefs, and layers of sedimentary rocks. The chemical make-up of the ice provides clues to the average global temperature over the past 800,000 years.
- Milankovitch cycles are major changes which occur between 26,000- and 100,000-years dependent on the cycle. The cycles affect the amount of sunlight and therefore energy that earth absorbs from the sun. They provide a framework for understanding long term climate change and are responsible for triggering the beginning and end of glaciation periods (Ice Ages).

	• Precession (Axial Rotation): As the Earth rotates, it wobbles slightly upon its axis and the cycle of precession occurs over a period of roughly 26,000 years. Axial precession makes seasonal contrasts more extreme in one hemisphere and less extreme in another. Currently the precessions make the Southern Hemisphere summers hotter and moderates Northern Hemisphere seasonal variations. • Eccentricity (orbital shape): Eccentricity, is the shape of the Earth's orbit around the Sun. Over time, the pull of gravity from Jupiter and Saturn causes the shape of the Earth' orbit to vary from being nearly circular to being mildly elliptical. This explains why our seasons are slightly different lengths i.e. summers being 4.5 days longer than winters in the Northern Hemisphere. When the Earth's orbit is at its most elliptic, about 23% more solar radiation reaches Earth each year than it does at its furthest point. • Axial tilt (Obliquity): The angle of the Earth's axis of rotation is tilted as it travels around the sun and explains why we have seasons. Over the last million years, it has varied between a tilt of 22.1° to 24.5° and back again. As obliquity decreases the seasons become milder, resulting in warmer winters, and cooler summers that gradually allow snow and ice at high latitudes to build up into large ice sheets. This then reflects more of the Sun's energy back into space, promoting even more cooling. • These orbital changes are very small over the last several hundred years, and alone are not sufficient to cause the observed magnitude of change in temperature since the Industrial Revolution, nor to act on the whole Earth. • Recent estimates of the increase in global average temperature since the end of the last ice age are 4 to 5 °C. That change occurred over a period of about 7,000 years, starting 18,000 years ago. $CO2$ has risen more than 40% in just the past 200 years, much of this since the 1970s. • Carbon dioxide levels have risen mostly due to the large-scale burning of fossil fuels that began during the Industrial Revolution. Prior of this the concentration of C02 in the atmosphere stood around 280ppm in 1750. In more recent years emerging countries such as China and India have continued to use coal-based energy in order to fuel their industrialisation. • Deforestation accounts for around 20% of global C02 emissions. This is both from the removal of the carbon store as well as burning trees for fuel. Deforestation rates have increased in countries such as Brazil who are using their natural resources in order to improve their level of economic development. • Methane has increased due to increased demand for meat due to the spread of the western diet. Cattle, sheep and goats from CH_4 as part of their normal digestive process. Potential areas of assessment: • The speed of the current climate change is faster than most of the past events, making it more difficult for human societies and the natural world to adapt.

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Level 2	**6–10**	• Demonstrates geographical knowledge and understanding, which is occasionally relevant and may include some inaccuracies. (AO1) • Applies knowledge and understanding of geographical information / ideas with limited but logical connections / relationships. (AO2) • Applies knowledge and understanding of geographical ideas in order to produce a partial interpretation that is supported by some evidence but has limited coherence. (AO2) • Applies knowledge and understanding of geographical information / ideas to come to a conclusion, partially supported by an unbalanced argument with limited coherence. (AO2)
Level 3	**11-15**	• Demonstrates geographical knowledge and understanding, which is mostly relevant and accurate. (AO1) • Applies knowledge and understanding of geographical information / ideas to find some logical and relevant connections / relationships. (AO2) • Applies knowledge and understanding of geographical ideas in order to produce a partial but coherent interpretation that is supported by some evidence. (AO2) • Applies knowledge and understanding of geographical information / ideas to come to a conclusion, largely supported by an argument that may be unbalanced or partially coherent. (AO2)
Level 4	**16-20**	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Applies knowledge and understanding of geographical information / ideas to find fully logical and relevant connections / relationships. (AO2) • Applies knowledge and understanding of geographical information / ideas to produce a full and coherent interpretation that is supported by evidence. (AO2) • Applies knowledge and understanding of geographical information / ideas to come to a rational, substantiated conclusion, fully supported by a balanced argument that is drawn together coherently. (AO2)

Q9.

Question Number	Answer State the typical number of years in a sunspot cycle	Mark
i	AO1 (1 mark) • 11 years (1)	**(1)**

Question Number	Answer Describe the trend in sunspot activity between 1750 and 1850	Mark
ii	AO2 (2 marks) Award 1 mark for each description of the trend of sunspot activity and a 2nd mark for an extension of the description. Maximum 2 marks. • Sunspot activity has fluctuated since 1750 (1) but declined in the 1800s (1) • Sunspot activity has increased overall from 1750-1800 (1) but declined from 1810 (1) • Sunspot activity peaked by 1790 (1) and fell dramatically until 1820 before rising again (1) Credit other valid descriptions.	**(2)**

Question Number	Answer - Suggest one impact of sunspot numbers between 1650 and 1700 on Earth's climate.	Mark
iii	AO1 (2 marks) Award 1 mark for correct suggestion of an impact of the reduced sunspot activity and a further extension mark of why this impact has taken place. • Reduced solar radiation (1), so increased risk of cold/extreme weather (1). • Increased snowfall/frosts (1), so reducing the ability of people to farm (1) • Increased wind/rainfall in mid-latitudes (1), impacting of flood risk/farming (1). • Lower average temperatures (1), therefore extended period of cooling/ Little Ice Age/glaciers/ice sheets expanding (1). Accept other correct explanations.	**(2)**