SPECIMEN MATERIAL

Please write clearly, in block capitals, to allow character computer recognition.

Centre number ☐☐☐☐☐ Candidate number ☐☐☐☐

Surname

Forename(s)

Candidate signature

A-level
GEOGRAPHY

Paper 1 Physical geography

Specimen Question Paper

Time allowed: 2 hours 30 minutes

Materials

For this paper you must have:
- a pencil
- a rubber
- a ruler.

You may use a calculator.

Instructions
- Answer **all** questions in Section A.
- Answer **either** Question 2 **or** Question 3 **or** Question 4 in Section B.
- Answer **either** Question 5 **or** Question 6 in Section C.

Information
- The total number of marks available for this paper is 120.

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ANSWER IN THE SPACES PROVIDED

Section A

Water and carbon cycles

Answer **all** questions.

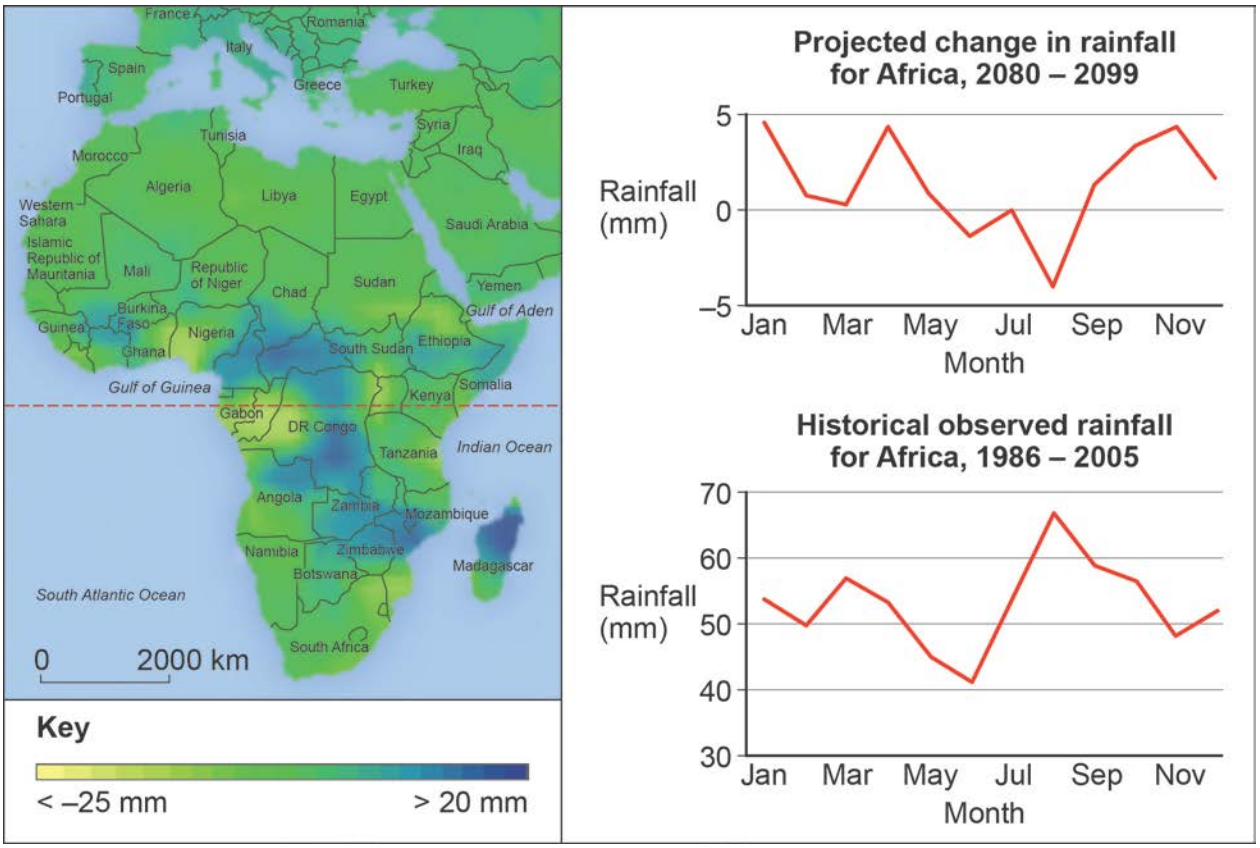
0 1 . 1 Explain the concept of dynamic equilibrium in relation to the water cycle.

[4 marks]

Question 1 continues on the next page

Figure 1 represents data from a climate model for Africa. The map shows how rainfall totals are expected to change in Africa by 2099 compared with 1986–2005 averages. The graphs show predictions for rainfall change by month between 2080 and 2099, compared with average rainfall taken from 1986–2005.

Figure 1



0 1 . 2 Using **Figure 1**, analyse projected rainfall change in Africa.

[6 marks]

Question 1 continues on the next page

0 1 . 3 Using **Figure 2** and your own knowledge, assess the natural and human induced causes of the 2005 flood in Carlisle.

[6 marks]

Figure 2

There were two separate aspects within this period of storm which affected the River Eden drainage basin around the city of Carlisle, England. Three rivers converge in the city, which has a population of approximately 72 000. There had been several weeks of above average rainfall for January. The January 2005 flood was a major event. Rainfall was very high for the period 6 to 8 January, during which two months' worth of rainfall was released in 24 hours. Some areas within the catchment received rainfall of up to 150 mm.

The upper parts of the catchment are dominated by the mountains of Skiddaw and the surrounding fells. The rocks here are hard and volcanic, soils are thin and the gradients of many tributaries are steep. In the lower reaches rivers flow through wide, shallow valleys.

The Eden channel itself has a steep gradient. The head of the catchment is around 690 m, falling rapidly to 160 m. The Eden's glaciated valley opens out and the channel gradient reflects this change: the River Eden steadily loses height at around 1.8 m per km on its journey to Carlisle. The valley floor is over 2.5 km wide in many places. This forms extensive areas of floodplain.

In terms of land use, the drainage basin is has a wide range of agricultural activity, both arable and pastoral farming. There are also golf courses and a small amount of managed forestry. As the River Eden reaches the coast, the area to the south is the heavily developed city of Carlisle. Much of the area is rural apart from this. 67% of the flooding resulted from rivers and watercourses. 25% of flooding was caused by surface water. 8% was due to flooding from sewerage and infrastructure

In Carlisle, the River Eden peaked at an estimated 1520 cumecs at the Sheepmount Gauging Station at 2.30 pm on 8 January. This flow has a return period in the order of 175–200 years (0.5%). The previous highest recorded flow on the River Eden at Carlisle was 1075 cumecs in 1987.

Question 1 continues on the next page

0 1 . 4 Assess the extent to which there are inter-relationships between processes in the water cycle and factors driving change in the carbon cycle.

[20 marks]

END OF SECTION A

Section B

Answer **one** question.

Answer **either** Question 2 **or** Question 3 **or** Question 4.

Question 2 Hot desert systems and landscapes

0 2 . 1 Outline the impact of temperature variation on weathering processes in hot deserts.

[4 marks]

Question 2 continues on the next page

Figure 3a and Figure 3b show temperature data for the Sahara Desert and the Sonoran Desert.

Figure 3a

Summer average temperatures in the Sahara Desert 1955–2010

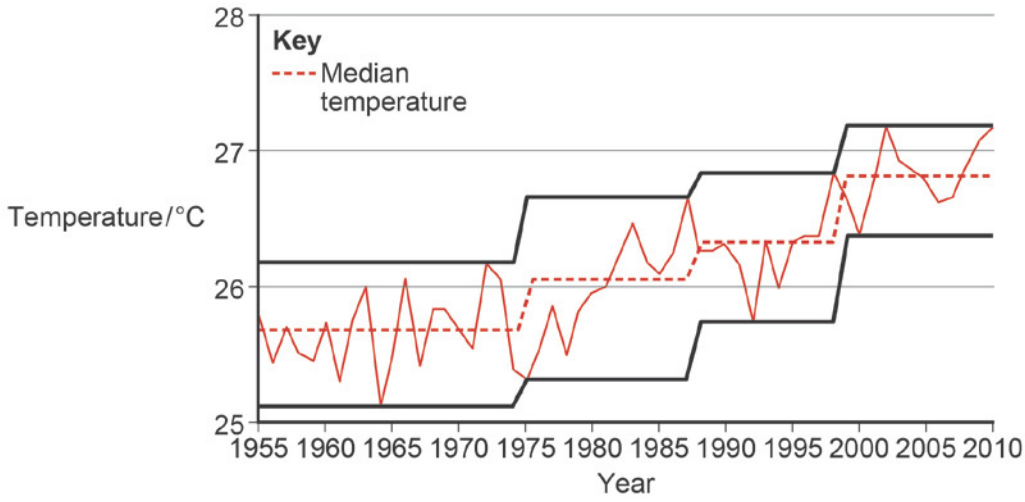
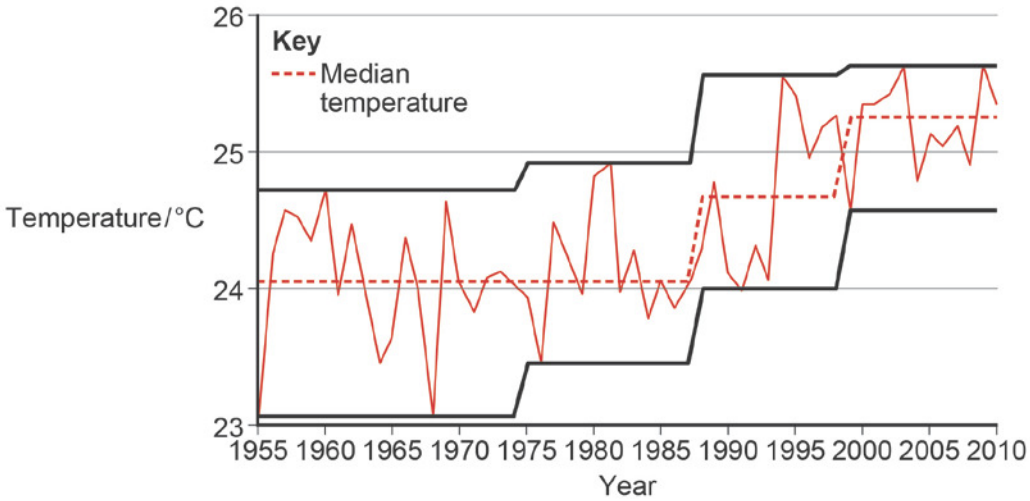


Figure 3b

Summer average temperatures in the Sonoran Desert 1955–2010



0 2 . 2 Using **Figure 3a** and **Figure 3b**, compare the temperature variations for the Sahara Desert and the Sonoran Desert.

[6 marks]

Question 2 continues on the next page

0 2 . 3 Using **Figure 4** and your own knowledge, assess the benefits of the shelterbelt system in combatting desertification.

[6 marks]

Figure 4

Surrounded by mountains and far from any sea or ocean, the region of Xinjiang Uygur in the north-west region of the People's Republic of China represents the largest stretch of drylands in China. Xinjiang territory stretches over 1 650 000 km^2 of which 49.5% are mountainous zones and 22.5% is desert. It is estimated that 400 million people are suffering from the impact of desertification and the effects of sand dust that can attack skin and lungs. Desertification in China is mainly caused by human induced factors and by extreme climatic conditions.

An oasis is an area with a plentiful supply of water in an otherwise arid environment. Vegetation growth will be adapted to the conditions in the oasis and will contain different species to the surrounding environment.

What is shelterbelt system in the Xinjiang Oasis?

- Around the perimeter of the oasis, shelterbelts made up of shrubs and grasses have been planted.
- Within the inner zone of the oasis, a forest belt of mature trees reinforces the function of the shelterbelt.
- Deep inside the oasis, a forest network has been planted in the interior, between the agricultural lands. This is composed four to six narrow rows of trees planted closely together.
- In general, the width of the shelterbelt should not be less than 200 m.

Ground wind speed is reduced by the presence of shrubs and grasses standing 50 cm to 60 cm high. In areas where sand accumulates, vegetation can reduce the development of dunes once the vegetation covers 40% of the surface.

The shelterbelt also acts as a biological drainage system that plays an important role in the Xinjiang oases. In Anjiahi, in the northern part of Xinjiang, the groundwater level of farmland has been lowered by between 20 cm and 70 cm. The tree network creates a microclimate. In some instances, the rate of water consumption for one kilogram of wheat or corn has decreased by between 15% and 22.8%.

0 2 . 4 Assess the relative importance of the roles of water and wind in shaping desert landscapes.

[20 marks]

Question 3 Coastal systems and landscapes

0 3 . 1 Explain the concept of the sediment cell.

[4 marks]

Question 3 continues on the next page

Figure 5 shows data relating to coastal flooding in Great Britain. The investigation is trying to determine whether any stretch of the coastline of Great Britain may be more or less susceptible to coastal flooding. The 96 most severe floods have been analysed.

The coastlines have been split into four broad categories: north west, north east, south west and south east.

This is the null hypothesis: there is no significant difference in the location of the worst floods to affect Great Britain.

Below is a partly completed Chi-squared test.

Figure 5

	North west	**North east**	**South west**	**South east**	**Total**
O	22	16	38	20	96
E	24	24	24	24	96
O – E	–2	–8	14	–4	-
$(O - E)^2$	4	64		16	-
$\frac{(O - E)^2}{E}$	0.17		8.17	0.67	$x^2 =$

O – Observed frequencies
E – Expected frequencies

Figure 6

Critical values for Chi-squared with 3 degrees of freedom.

Degrees of freedom	**Significance level**	
	0.05	0.01
3	7.82	11.34

0 3 . 2 Complete **Figure 5** and interpret your Chi-square result using **Figure 6**.

[6 marks]

Question 3 continues on the next page

0 3 . 3 Using **Figure 7** and your own knowledge, assess the role of mass movement upon the development of this area of the Holderness coastal landscape.

[6 marks]

Figure 7

Holderness is overlaid with unconsolidated glacial deposits which lie on top of chalk. The landscape is dominated by deposits of till, boulder clays and glacial lake clays. The glacial deposits form a continuous lowland plain. Rainfall is below national average but the area is prone to heavy storms.

0 3 . 4 'No amount of coastal intervention by people can halt the natural processes which continue to present potentially serious risks to coastal communities now and even more so in the future.'

To what extent do you agree with this view?

[20 marks]

Question 4 Glacial systems and landscapes

0 4 . 1 Explain the development of warm based glaciers.

[4 marks]

Question 4 continues on the next page

Figure 8 shows the location of three US glaciers.

Figure 9 shows the change in their size (mass balance) between 1958 and 2005.

Figure 10 shows the cumulative impact of the annual change in mass balance within the three glaciers.

Figure 8 **Figure 9**

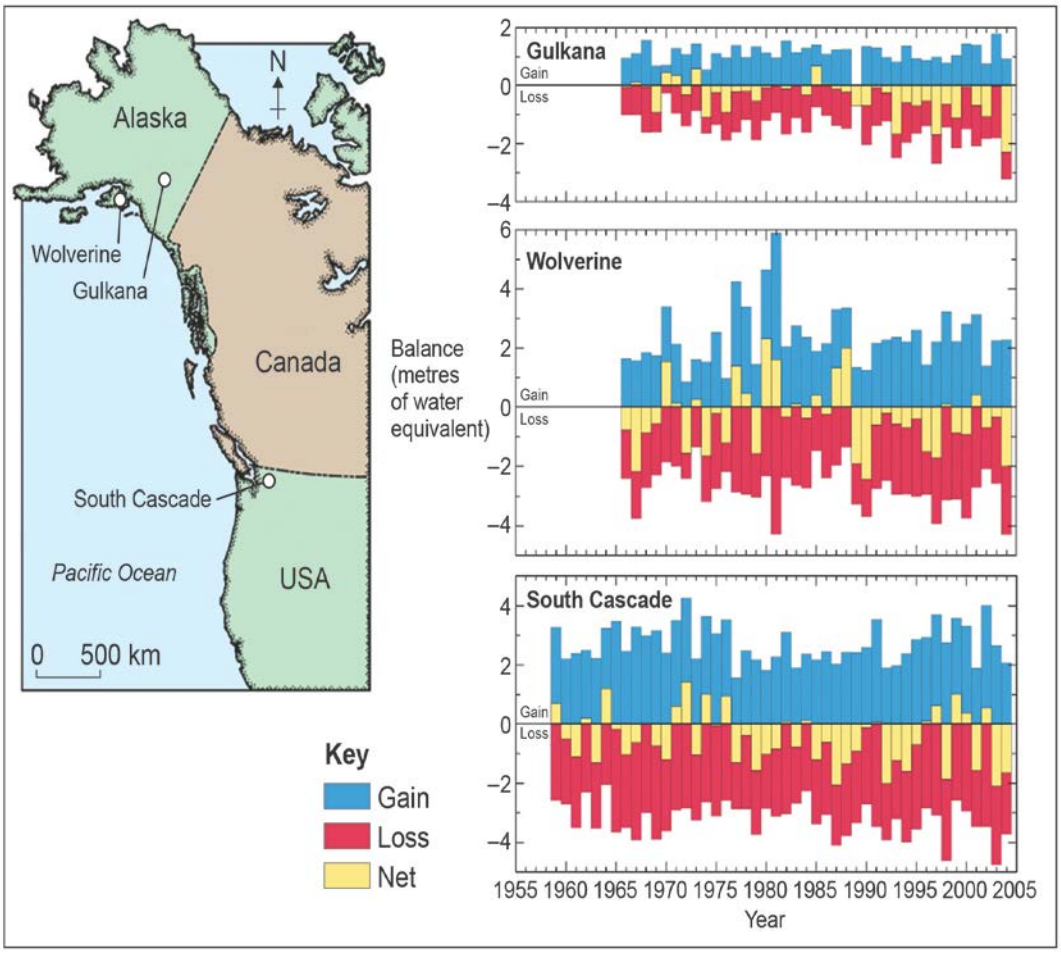
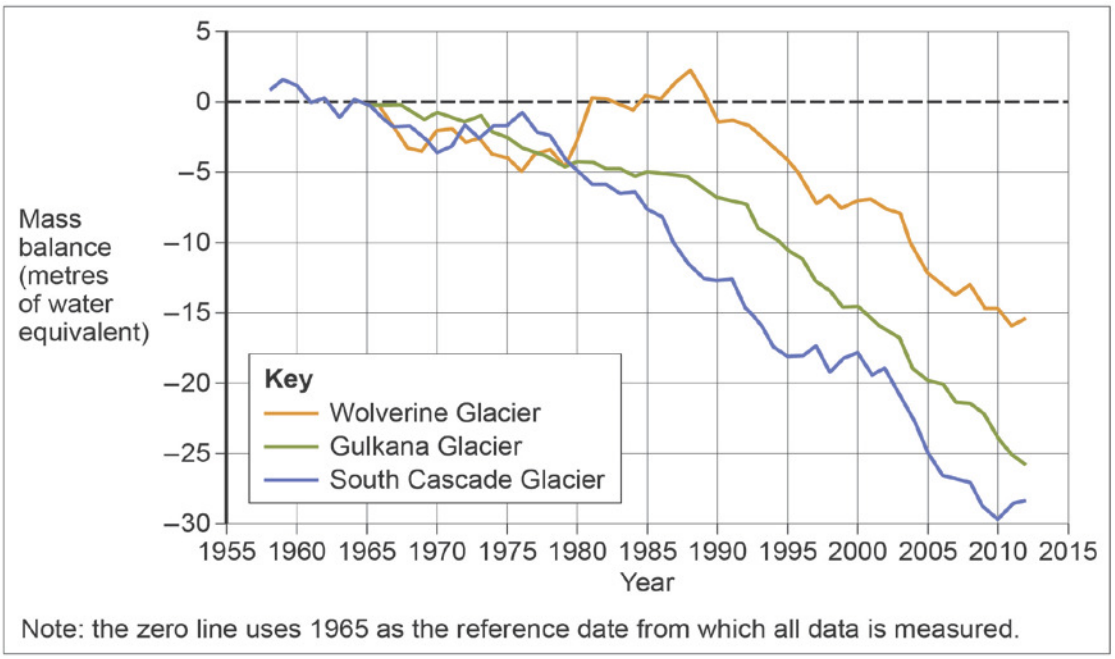


Figure 10



Note: the zero line uses 1965 as the reference date from which all data is measured.

0 4 . 2 Using **Figures 8**, **9** and **10**, compare the differences between the glaciers.

[6 marks]

Figure 11 and **Figure 12** show information about the active layer and ground temperature in Svalbard, which is within the Arctic Circle. **Figure 13** provides further information about the island of Svalbard.

Figure 11

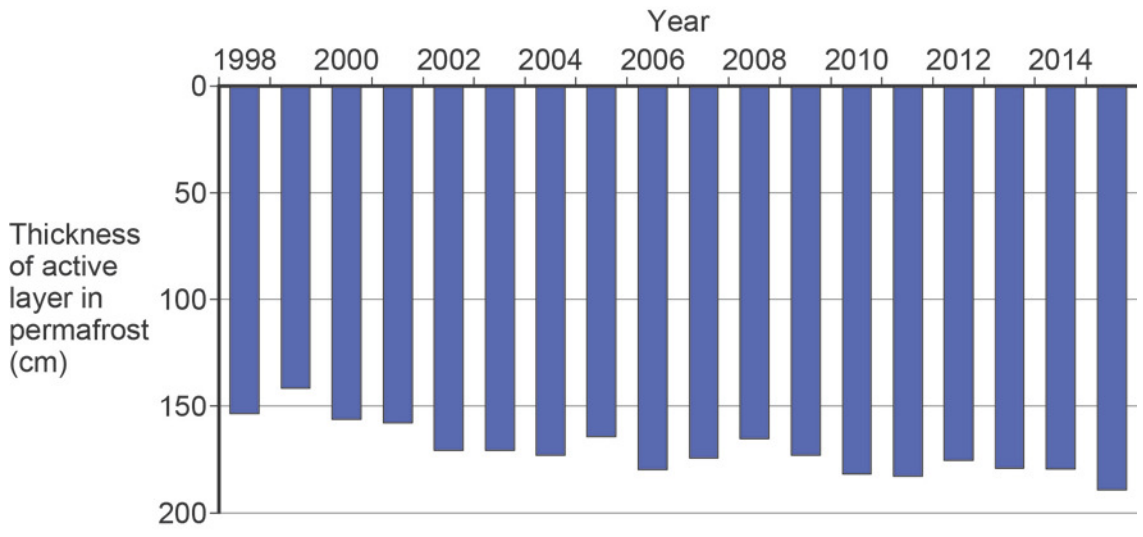


Figure 12

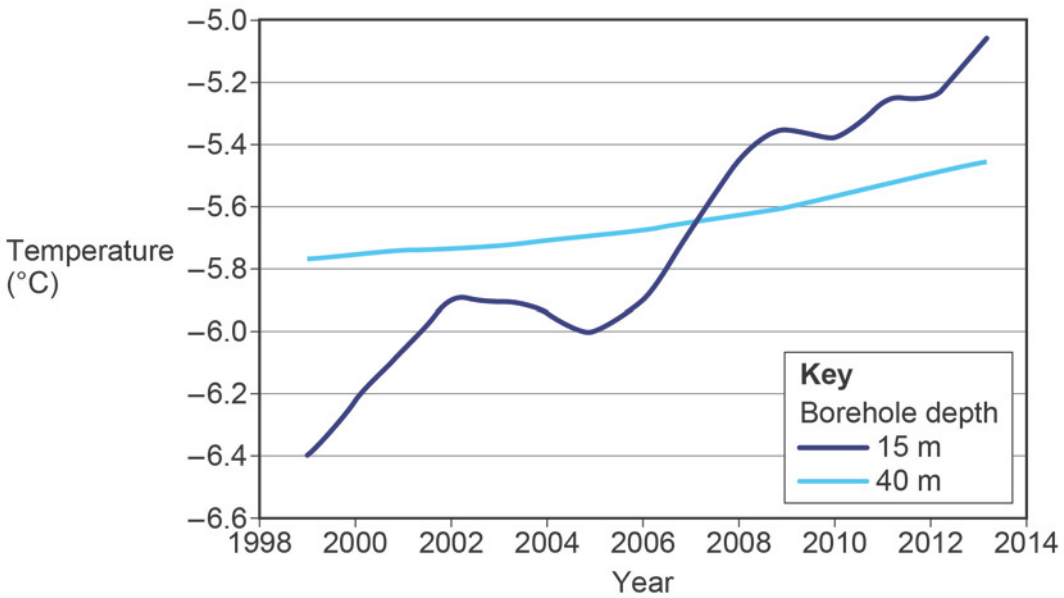


Figure 13

All buildings in the Svalbard settlements are built on piles driven into the permafrost, and roads, bridges, airports and other infrastructure are also constructed on permafrost. In addition, the permafrost is essential for stabilising steep mountainsides. There are also ramifications for natural vegetation. The most important consequence of the warming and thawing of the permafrost is, that large volumes of greenhouse gases, like CO2 (carbon dioxide) and CH4 (methane), may be released if ever deeper layers of the permafrost thaw. These gases have been kept out of the atmosphere because the organic carbon has been frozen in the ground.

0 4 . 3 Using **Figure 11**, **Figure 12, Figure 13** and your own knowledge, assess the potential impact of these data upon this area.

[6 marks]

Question 4 continues on the next page

0 4 . 4 Assess the relative importance of water and ice in the development of landscapes of glacial deposition.

[20 marks]

END OF SECTION B

Section C

Answer **one** question.

Answer **either** Question 5 **or** Question 6.

Question 5 Hazards

0 5 . 1 Outline processes which lead to the formation of fold mountains.

[4 marks]

Question 5 continues on the next page

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0 5 . 2 **Figure 14** and **Figure 15** show information about an ash cloud following the eruption of an Icelandic volcano in 2010.

Figure 14

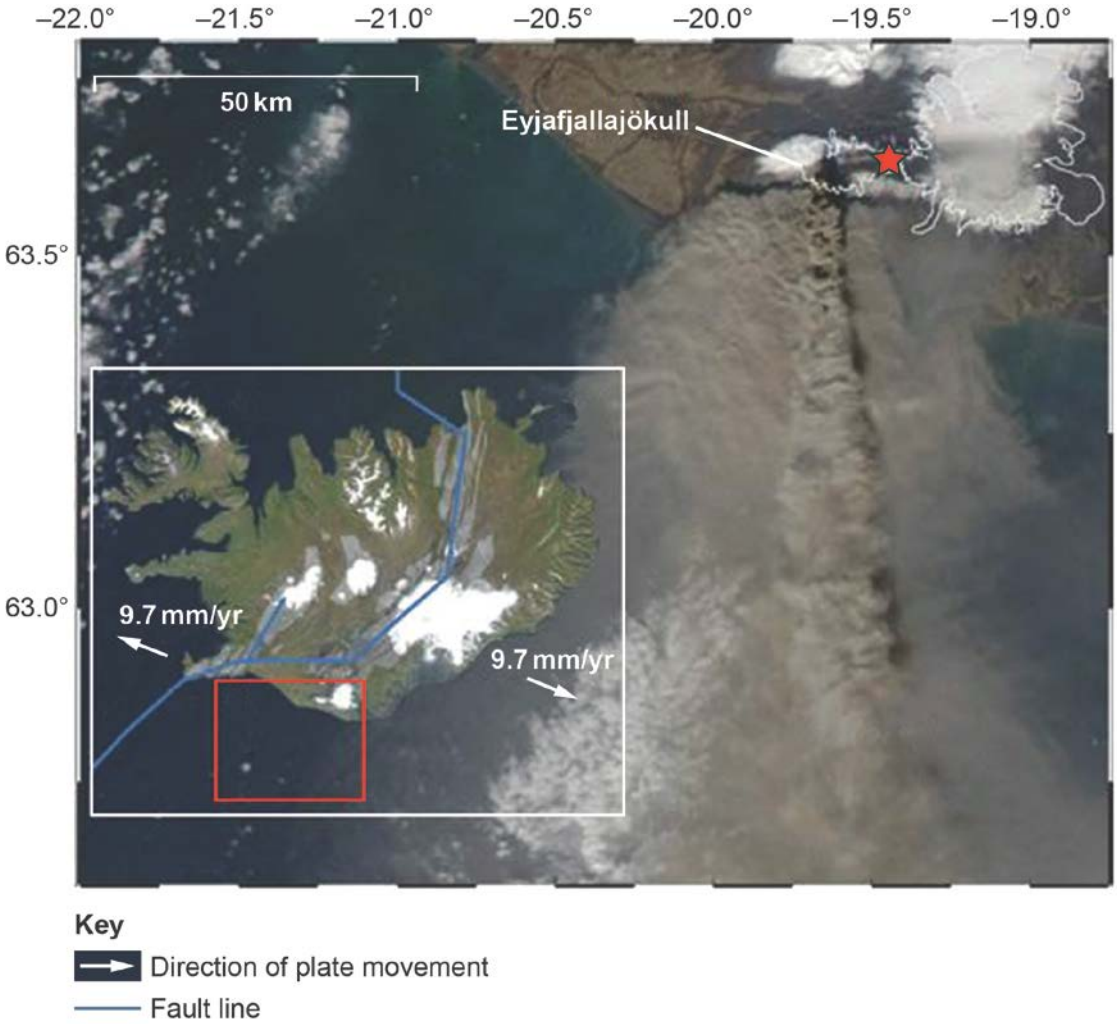
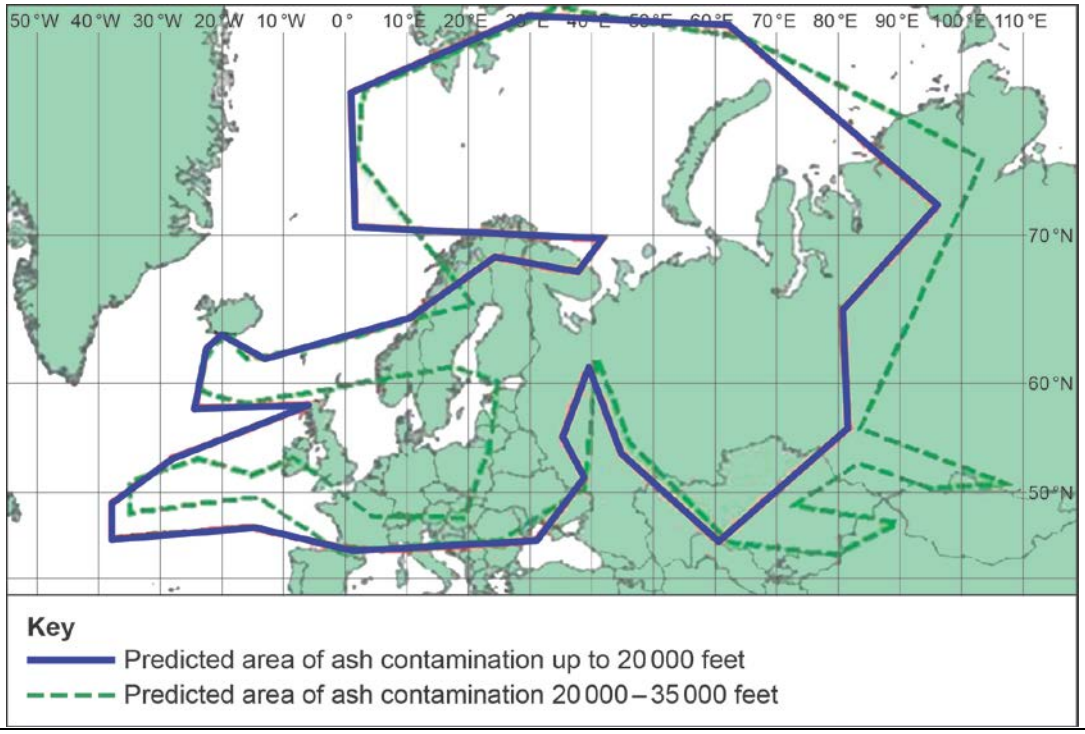


Figure 15



Using **Figure 14** and **Figure 15**, assess the scale of the eruption.

[6 marks]

0 5 . 3 To what extent do you agree that seismic events will always generate more widespread and severe impacts than volcanic events?

[9 marks]

0 5 . 4 Assess the importance of factors in globalisation in supporting the response to major seismic hazards.

[9 marks]

0 5 . 5 'The Disaster Response Curve (The Park Model) has contributed to improved understanding and therefore management of the impact of tropical storms.'

To what extent do you agree with this view?

[20 marks]

Question 6 Ecosystems under stress

0 6 . 1 Explain the concept of sub climax in succession.

[4 marks]

Question 6 continues on the next page

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Figure 16 shows the temperature and precipitation associated with different world biomes.

Figure 17 shows information about productivity in various ecosystem types.

Figure 16

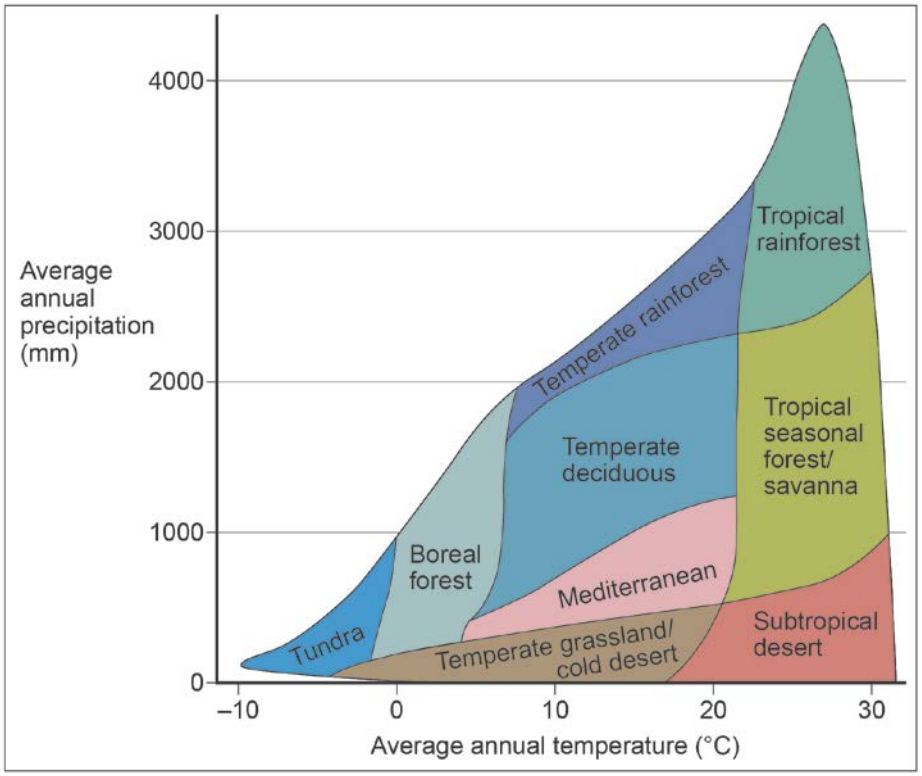

Figure 17

Biome	**Area**	**Mean net primary productivity**	**Mean biomass**
	(10^6 km^2)	**(g/m^2/yr)**	**(kg/m^2)**
Tropical rainforest	17	2 200	45
Temperate deciduous forest	7	1 200	30
Savanna	15	900	4
Tundra	8	140	0.6
Subtropical desert	18	90	0.7

0 6 . 2 With reference to any **two** biomes shown in **Figure 16** and **Figure 17**, analyse the relationship between climate characteristics and natural vegetation.

[6 marks]

Question 6 continues on the next page

0 6 . 3 With reference to a tropical rainforest, evaluate the role of governance in environmental management.

[9 marks]

0 6 . 4 Analyse the role of nutrient cycling within a hydrosere or lithosere that you have studied.

[9 marks]

0 6 . 5 ‘It is impossible to achieve economic development within marine ecosystems whilst adhering to the principles of sustainability.’

To what extent do you agree with this view?

[20 marks]

END OF QUESTIONS

There are no questions printed on this page

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