tpo_10_passage_2

One of the most difficult aspects of deciding whether current climatic events reveal evidence of the impact of human activities is that it is hard to get a measure of what constitutes the natural variability of the climate. We know that over the past millennia the climate has undergone major changes without any significant human intervention. We also know that the global climate system is immensely complicated and that everything is in some way connected, and so the system is capable of fluctuating in unexpected ways. We need therefore to know how much the climate can vary of its own accord in order to interpret with confidence the extent to which recent changes are natural as opposed to being the result of human activities. Instrumental records do not go back far enough to provide us with reliable measurements of global climatic variability on timescales longer than a century. What we do know is that as we include longer time intervals, the record shows increasing evidence of slow swings in climate between different regimes. To build up a better picture of fluctuations appreciably further back in time requires us to use proxy records. Over long periods of time, substances whose physical and chemical properties change with the ambient climate at the time can be deposited in a systematic way to provide a continuous record of changes in those properties overtime, sometimes for hundreds or thousands of years. Generally, the layering occurs on an annual basis, hence the observed changes in the records can be dated. Information on temperature, rainfall, and other aspects of the climate that can be inferred from the systematic changes in properties is usually referred to as proxy data. Proxy temperature records have been reconstructed from ice core drilled out of the central Greenland ice cap, calcite shells embedded in layered lake sediments in Western Europe, ocean floor sediment cores from the tropical Atlantic Ocean, ice cores from Peruvian glaciers, and ice cores from eastern Antarctica. While these records provide broadly consistent indications that temperature variations can occur on a global scale, there are nonetheless some intriguing differences, which suggest that the pattern of temperature variations in regional climates can also differ significantly from each other. What the proxy records make abundantly clear is that there have been significant natural changes in the climate over timescales longer than a few thousand years. Equally striking, however, is the relative stability of the climate in the past 10,000 years (the Holocene period). To the extent that the coverage of the global climate from these records can provide a measure of its true variability, it should at least indicate how all the natural causes of climate change have combined. These include the chaotic fluctuations of the atmosphere, the slower but equally erratic behavior of the oceans, changes in the land surfaces, and the extent of ice and snow. Also included will be any variations that have arisen from volcanic activity, solar activity, and, possibly, human activities. One way to estimate how all the various processes leading to climate variability will combine is by using computer models of the global climate. They can do only so much to represent the full complexity of the global climate and hence may give only limited information about natural variability. Studies suggest that to date the variability in computer simulations is considerably smaller than in data obtained from the proxy records. In addition to the internal variability of the global climate system itself, there is the added factor of external influences, such as volcanoes and solar activity. There is a growing body of opinion that both these physical variations have a measurable impact on the climate. Thus we need to be able to include these in our deliberations. Some current analyses conclude that volcanoes and solar activity explain quite a

considerable amount of the observed variability in the period from the seventeenth to the early twentieth centuries, but that they cannot be invoked to explain the rapid warming in recent decades.

question 1

According to paragraph 1, which of the following must we find out in order to determine the impact of human activities upon climate?

A The major changes in climate over the past millennia

B The degree to which the climate varies naturally

C The best method for measuring climatic change

D The millennium when humans began to interfere with the climate

question 2

According to paragraph 2, an advantage of proxy records over instrumental records is that

A they are more-reliable measures of climatic variability in the past century

B they provide more-accurate measures of local temperatures

C they provide information on climate fluctuations further back in time

D they reveal information about the human impact on the climate

question 3

Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? Incorrect choices change the meaning in important ways or leave out essential information.

A Because physical and chemical properties of substances are unchanging, they are useful records of climate fluctuations over time.

B For hundreds or thousands of years, people have been observing changes in the chemical and physical properties of substances in order to infer climate change.

C Because it takes long periods of time for the climate to change, systematic changes in the properties of substances are difficult to observe.

D Changes in systematically deposited substances that are affected by climate can indicate climate variations over time.

question 4

According to paragraph 3, scientists are able to reconstruct proxy temperature records by

A studying regional differences in temperature variations

B studying and dating changes in the properties of substances

C observing changes in present day climate conditions

D inferring past climate shifts from observations of current climatic changes

question 5

According to paragraphs 3 and 4, proxy data have suggested all of the following about the climate EXCEPT:

A Regional climates may change overtime.

B The climate has changed very little in the past 10,000 years.

C Global temperatures vary more than regional temperatures.

D Important natural changes in climate have occurred over large timescales.

question 6

All of the following are mentioned in paragraph 5 as natural causes of climate change EXCEPT

A atmospheric changes

B the slow movement of landmasses

C fluctuations in the amount of ice and snow

D changes in ocean activity

question 7

According to paragraph 6, which of the following is true of computer models of the global climate?

A The information they produce is still limited.

B They are currently most useful in understanding past climatic behaviors.

C They allow researchers to interpret the data obtained from proxy records.

D They do not provide information about regional climates.

question 8

What is the author's purpose in presenting the information in paragraph 7?

A To compare the influence of volcanoes and solar activity on climate variability with the influence of factors external to the global climate system

B To indicate that there are other types of influences on climate variability in addition to those previously discussed

C To explain how external influences on climate variability differ from internal influences

D To argue that the rapid warming of Earth in recent decades cannot be explained

question 9

Look at the four squares [ ] that indicate where the following sentence could be added to the passage. Where would the sentence best fit?

One of the most difficult aspects of deciding whether current climatic events reveal evidence of the impact of human activities is that it is hard to get a measure of what constitutes the natural variability of the climate. We know that over the past millennia the climate has undergone major changes without any significant human intervention. We also know that the global climate system is immensely complicated and that everything is in some way connected, and so the system is capable of fluctuating in unexpected ways. We need therefore to

know how much the climate can vary of its own accord in order to interpret with confidence the extent to which recent changes are natural as opposed to being the result of human activities. Instrumental records do not go back far enough to provide us with reliable measurements of global climatic variability on timescales longer than a century. What we do know is that as we include longer time intervals, the record shows increasing evidence of slow swings in climate between different regimes. To build up a better picture of fluctuations appreciably further back in time requires us to use proxy records. Over long periods of time, substances whose physical and chemical properties change with the ambient climate at the time can be deposited in a systematic way to provide a continuous record of changes in those properties overtime, sometimes for hundreds or thousands of years. Generally, the layering occurs on an annual basis, hence the observed changes in the records can be dated. Information on temperature, rainfall, and other aspects of the climate that can be inferred from the systematic changes in properties is usually referred to as proxy data. Proxy temperature records have been reconstructed from ice core drilled out of the central Greenland ice cap, calcite shells embedded in layered lake sediments in Western Europe, ocean floor sediment cores from the tropical Atlantic Ocean, ice cores from Peruvian glaciers, and ice cores from eastern Antarctica. While these records provide broadly consistent indications that temperature variations can occur on a global scale, there are nonetheless some intriguing differences, which suggest that the pattern of temperature variations in regional climates can also differ significantly from each other. What the proxy records make abundantly clear is that there have been significant natural changes in the climate over timescales longer than a few thousand years. Equally striking, however, is the relative stability of the climate in the past 10,000 years (the Holocene period). To the extent that the coverage of the global climate from these records can provide a measure of its true variability, it should at least indicate how all the natural causes of climate change have combined. These include the chaotic fluctuations of the atmosphere, the slower but equally erratic behavior of the oceans, changes in the land surfaces, and the extent of ice and snow. Also included will be any variations that have arisen from volcanic activity, solar activity, and, possibly, human activities. One way to estimate how all the various processes leading to climate variability will combine is by using computer models of the global climate. They can do only so much to represent the full complexity of the global climate and hence may give only limited information about natural variability. Studies suggest that to date the variability in computer simulations is considerably smaller than in data obtained from the proxy records. In addition to the internal variability of the global climate system itself, there is the added factor of external influences, such as volcanoes and solar activity. [] There is a growing body of opinion that both these physical variations have a measurable impact on the climate. [] Thus we need to be able to include these in our deliberations. [] Some current analyses conclude that volcanoes and solar activity explain quite a considerable amount of the observed variability in the period from the seventeenth to the early twentieth centuries, but that they cannot be invoked to explain the rapid warming in recent decades. []

question 10

Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer that express the most important ideas in the passage. Some sentences do not belong in the summary because they express ideas that not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

A. In the absence of instrumental records, proxy data allow scientists to infer information about past climates.

B. Scientists see a consistent pattern in the global temperature variations that have occurred in the past.

C. Computer models are used to estimate how the different causes of climate variability combine to account for the climate variability that occurs.

D. Scientists have successfully separated natural climate variation from changes related to human activities.

E. Scientists believe that activities outside the global climate system, such as volcanoes and solar activity may have significant effects on the system.

F. Scientists have concluded that human activity accounts for the rapid global warming in recent decades.