

Name _____

Date _____

Use with textbook pages 464–475.

Natural causes of climate change

Vocabulary

carbon sink	natural greenhouse effect
catastrophic events	paleoclimatologists
climate	shape
convection currents	tilt
Coriolis effect	water vapour
El Niño-Southern Oscillation	weathering
	wobble

Use the terms in the vocabulary box to fill in the blanks. Use each term only once.

1. climate describes the average conditions of the atmosphere in a large region over 30 years or more.
2. paleoclimatologists gather information about glaciers using ice cores to determine what types and amounts of gases existed in the atmosphere when the ice was formed.
3. Life on Earth is adapted to the conditions provided by the natural greenhouse effect, which balances incoming solar radiation and outgoing heat.
4. The combined effects of tilt, wobble, and the shape of Earth's orbit can be linked to the cooling of the global climate in the past and the cause of the ice ages.
5. water vapour is the most abundant greenhouse gas in the atmosphere. CO₂ is # 2
6. convection currents in the oceans transport large amounts of heat around the globe.
7. Currents of air or water are deflected to the right in the northern hemisphere and to the left in the southern hemisphere due to the coriolis effect.
8. The variation in the winds, including El Niño and La Niña events, are described as El Niño - southern oscillation.
9. The deep ocean is considered a carbon sink because it removes carbon dioxide from the atmosphere.
10. weathering is the gradual physical or chemical process that breaks rock into smaller pieces.
11. Earth has experienced many catastrophic events or large-scale disasters such as large volcanic eruptions or being struck by meteorites.

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Factors that affect climate

1. What would be the temperature on Earth if the amount of greenhouse gases decreased?

very cold

2. What would be the effect on the climate in the northern hemisphere if the tilt of Earth increased from 23.5° to 24.5° ?

greater angle of incidence in winter → colder winters
lower angle of incidence in summer → hotter summer

3. Over time, the wobble in Earth's rotation will change. What effect will this have?

change angle of incidence → climate change.

4. What is the relationship between the shape of the Earth's orbit and solar radiation?

oval orbit, sometimes closer = more solar rad
sometimes farther = less solar rad.

5. What effect does an increase in yearly temperatures have on climate?

warmer air this year → hold more water vapour
more water vapour → traps more heat → warmer still next year.

6. What is the main problem caused by melting glaciers?

rising water levels affect coastlines

7. What would happen to Earth's temperature if the levels of carbon dioxide released into the atmosphere continues to increase?

warmer temperatures / global warming.

8. What are some of the effects of a volcanic eruption that could affect climate?

ash + dust block solar radiation
can cool climate

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El Niño and La Niña

1. Answer the questions using the figures below.

<p>(a) What weather phenomenon is illustrated by the figure above? <u>El Niño</u></p> <p>(b) Describe the weather patterns caused by this phenomenon. <u>warm winds</u> <u>blow towards Canada</u> <u>brings more rain.</u></p>	<p>(c) What weather phenomenon is illustrated by the figure above? <u>La Niña</u></p> <p>(d) Describe the weather pattern caused by this phenomenon. <u>warm air blows west</u> <u>cold water comes up to</u> <u>replace warm water</u> <u>= colder weather.</u></p>

2. Using the weather maps of North America below, answer the following questions.

<p>(a) What weather phenomenon is illustrated by the map above? <u>La Niña</u></p> <p>(b) Describe the weather patterns in North America caused by this phenomenon. <u>decreased rain</u></p>	<p>(c) What weather phenomenon is illustrated by the map above? <u>El Niño</u></p> <p>(d) Describe the weather patterns in North America caused by this phenomenon. <u>increased rain</u></p>

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Match each Term on the left with the best Descriptor on the right. Each Descriptor may be used only once.

Term	Descriptor
1. <u>D</u> carbon sink	A. a body or process that releases carbon dioxide into the atmosphere
2. <u>A</u> carbon source	B. a system of ocean and atmospheric changes in the tropical Pacific Region
3. <u>E</u> El Niño	C. cooler-than-normal water coming to the surface in the eastern Pacific Ocean due to upwelling
4. <u>B</u> El Niño-Southern Oscillation	D. a body or process that removes carbon dioxide from the atmosphere and stores it
5. <u>H</u> greenhouse gases	E. an unusually warm ocean current that develops periodically off the coast of Ecuador and Peru
6. <u>C</u> La Niña	F. people who study climates of the past
7. <u>G</u> natural greenhouse effect	G. the closed system, provided by the atmosphere, that keeps Earth's temperatures within a range
8. <u>F</u> paleoclimatologists	H. gases in Earth's atmosphere that absorb and trap radiation as thermal energy

Circle the letter of the best answer.

9. Ice core data have been used to measure the amounts of which type of gas?
- A.** oxygen **C.** carbon monoxide
B. nitrogen **D.** carbon dioxide
10. An increase in greenhouse gases in the atmosphere will
- A.** decrease temperatures on Earth
B. increase temperatures on Earth
C. make temperatures fluctuate
D. have no effect on Earth's temperature
11. Which of the following are factors that affect the path of surface water currents?
- I.** wind
II. Earth's rotation
III. shape of continents
- A.** I only **C.** I and III only
B. I and II only **D.** I, II, and III
12. An El Niño event results in
- A.** cool temperatures in British Columbia
B. cool temperatures in California
C. warm temperatures in British Columbia
D. warm temperatures in California
13. The remains of ancient marine organisms are composed of
- A.** carbon dioxide **C.** calcium carbonate
B. sulphur dioxide **D.** sodium carbonate
14. Catastrophic events, such as large volcanic eruptions, can affect climate by
- A.** increasing the temperature of the troposphere
B. decreasing the temperature of the troposphere
C. decreasing carbon dioxide emissions
D. increasing carbon dioxide emissions