Arctic Ecosystems Become Carbon Emitters: New Study

Description

A significant portion of one of the Earth's largest carbon sinks is now emitting carbon dioxide rather than absorbing it. According to recent research conducted by an international team led by scientists at the Woodwell Climate Research Center in Massachusetts, more than a third of the Arctic-Boreal Zone (ABZ) is releasing carbon instead of sequestering it. This includes the tundra, forests, and wetlands surrounding the Arctic Circle. Similar trends are also observed in parts of the Amazon Rainforest.

While the ABZ as a whole has historically acted as a carbon sink, recent increases in global temperatures are jeopardizing this status in certain key regions. The study highlights the need for comprehensive monitoring to assess the situation in these vulnerable areas.

Wildfires play a crucial role in this reversal, with more frequent and intense fires seen in the ABZ. When wildfires are factored in, the research shows that 40 percent of the ABZ emitted more CO2 than it absorbed between 2001 and 2020, compared to 34 percent without wildfires.

Data analysis from 200 carbon monitoring stations, known as the ABC Flux network, along with field measurements, meteorological data, and computer models, informed these findings. The study also reveals seasonal variations in carbon dynamics, with the ABZ acting as a more significant carbon sink in summer due to increased vegetation and photosynthesis, but releasing more CO2 in winter because of warmer temperatures exposing soil and organic matter.

Understanding these intricate processes is essential for predicting and mitigating global atmospheric changes. Collaborative efforts like this study are vital for unraveling the complex dynamics of regional and global carbon cycling.

Vocabulary List:

1. **Sequestering** /sɪˈkwɛs.tər.ɪŋ/ (verb): The process of capturing and storing carbon dioxide from the atmosphere.
2. **Vulnerable** /ˈvʌl.nər.ə.bəl/ (adjective): Open to harm or damage; susceptible to adverse effects.
3. **Dynamics** /daɪˈnæm.ɪks/ (noun): The forces or properties that stimulate growth development or change within a system.
4. **Comprehensive** /ˌkɒm.prɪˈhɛn.sɪv/ (adjective): Including all or nearly all elements or aspects of something.
5. **Emitting** /ɪˈmɪt.ɪŋ/ (verb): The act of producing or discharging something such as gas or radiation.
6. **Mitigating** /ˈmɪt.ɪ.geɪ.tɪŋ/ (verb): The act of making something less severe serious or painful.

Comprehension Questions

Multiple Choice

1. Which research center led the recent study on the Arctic-Boreal Zone?

   Option: Woodwell Climate Research Center
   Option: National Park Service Center
   Option: Global Environmental Research Institute
   Option: Arctic Studies Center

2. What percentage of the ABZ is currently emitting more CO2 than it absorbs?

   Option: 25%
   Option: 28%
   Option: 34%
   Option: 40%

3. What factor contributes significantly to the reversal of the ABZ as a carbon sink?

   Option: Deforestation
   Option: Wildfires
   Option: Urbanization
   Option: Industrialization

4. Which season sees the ABZ acting as a more significant carbon sink?

   Option: Winter
   Option: Spring
   Option: Summer
   Option: Autumn

5. How many years did the research span to assess carbon emissions in the ABZ?

   Option: 5 years
   Option: 10 years
   Option: 15 years
   Option: 20 years

6. What do the researchers emphasize as crucial for assessing vulnerable areas in the ABZ?

   Option: Comprehensive monitoring

Option: Rapid industrialization
Option: Increased deforestation
Option: Limited data collection

True-False

7. Wildfires do not play a significant role in the current carbon emissions from the ABZ.

8. The Arctic-Boreal Zone has always been a carbon emitter rather than a sink.

9. The study highlights seasonal variations in carbon dynamics in the ABZ.

10. Data analysis for the study was solely based on computer models.

11. The ABZ emits more CO2 in winter due to increased vegetation.

12. Collaborative efforts are considered vital for understanding regional and global carbon cycling.

Gap-Fill

13. More than a third of the Arctic-Boreal Zone is releasing carbon instead of sequestering it, jeopardizing its status as a carbon sink in certain key regions within the last _____ years.

14. The ABZ acted as a carbon sink in summer due to increased vegetation and photosynthesis, but released more CO2 in winter due to warmer temperatures exposing soil and organic matter over the past _____ years.

15. The study underlines the need for comprehensive monitoring to assess the situation in these vulnerable areas within the Arctic-Boreal Zone, highlighting the relevance of efficient _____ to address the emissions.

16. Data analysis from 200 carbon monitoring stations, field measurements, meteorological data, and

computer models were factors taken into account to inform the _____ findings.

17. Understanding the intricate processes of carbon dynamics in the ABZ is crucial for predicting and _____ global atmospheric changes.

18. _____ efforts, such as the study conducted by an international team led by scientists at the Woodwell Climate Research Center, are essential for unraveling the complex dynamics of regional and global carbon cycling.

Answer

Multiple Choice: 1. Woodwell Climate Research Center 2. 34% 3. Wildfires 4. Summer 5. 19 years 6. Comprehensive monitoring
True-False: 7. False 8. False 9. True 10. False 11. False 12. True
Gap-Fill: 13. two decades 15. mitigation strategies 16. researchers' 17. mitigating 18. Collaborative

Vocabulary quizzes

Multiple Choice (Select the Correct answer for each question.)

1. Which term describes a state of conflict or disorder?
   Option: Turbulent
   Option: Forecasting
   Option: Innovations
   Option: Sequestering

2. What type of vehicle is designed for travel or operation in outer space?
   Option: Coronal
   Option: Spacecraft
   Option: Phenomenon
   Option: Dehydration

3. Which term describes something related to volcanic activity?
   Option: Vulnerable
   Option: Radiant
   Option: Volcanically

Option: Fatigue

4. What term is used to describe actions that make something less severe harmful or painful?

Option: Microbreaks
Option: Emitting
Option: Mitigating
Option: Sustainable

5. Which term means containing a high amount of water or fluid?

Option: Emitting
Option: Electrolyte
Option: Hydrated
Option: Concoction

6. What is the term for the process of forcing something out typically in a violent manner?

Option: Dynamics
Option: Ejections
Option: Sequestering
Option: Alleviate

7. Which term refers to a location on the Earth's surface that is prone to volcanic activity?

Option: Subsequent
Option: Alleviate
Option: Fatigue
Option: Hotspot

8. What term is used to describe something emitting or reflecting light?

Option: Forecasting
Option: Radiant
Option: Vulnerable
Option: Comprehensive

9. Which term refers to the harmful reduction of the body's water content?

Option: Volcanically
Option: Dehydration
Option: Imperative
Option: Emerging

10. What is the term for isolating or hiding away something?

Option: Emissions
Option: Sequestering
Option: Dynamics
Option: Emphasize

Gap-Fill (Fill in the blanks with the correct word from the vocabulary list.)

11. _____ storms can affect power grids and satellite communications.

12. Continuous research leads to technological _____ that improve our daily lives.

13. A _____ study of the impact of climate change is necessary for effective policy-making.

14. Prolonged physical or mental exertion can lead to extreme _____.

15. Taking short _____ during work hours can boost productivity.

16. The earthquake was followed by several _____ aftershocks.

17. Applying a cold compress can help _____ the pain and swelling.

18. It is important to _____ the significance of sustainable practices.

19. Finding _____ solutions is crucial for environmental conservation.

20. Proper hydration is _____ for overall health and wellbeing.

Matching Sentences (Match each definition to the correct word from the vocabulary list.)

21. Solar flares and prominences are associated with the layer of the Sun's atmosphere.
22. Meteorologists use various tools and models for weather .
23. Endangered species are more to habitat destruction and climate change.
24. The study of the of ocean currents helps in understanding climate patterns.
25. Greenhouse gases trap heat by infrared radiation.

26. Auroras are natural light visible in the polar regions.
27. Mount St. Helens is an example of a active region in the United States.
28. Stars appear in the night sky due to their light emission.
29. The chef created a unique culinary that combined unexpected ingredients.
30. Sports drinks help in levels in the body after intense physical activity.

Answer

Multiple Choice: 1. Turbulent 2. Spacecraft 3. Volcanically 4. Mitigating 5. Hydrated 6. Ejections 7. Hotspot 8. Radiant 9. Dehydration 10. Sequestering
Gap-Fill: 11. Geomagnetic 12. Innovations 13. Comprehensive 14. Fatigue 15. Microbreaks 16. Subsequent 17. Alleviate 18. Emphasize 19. Sustainable 20. Imperative
Matching sentence: 1. Coronal 2. Forecasting 3. Vulnerable 4. Dynamics 5. Emitting 6. Phenomenon 7. Volcanically 8. Radiant 9. Concoction 10. Electrolyte

CATEGORY

1. Health - LEVEL5

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