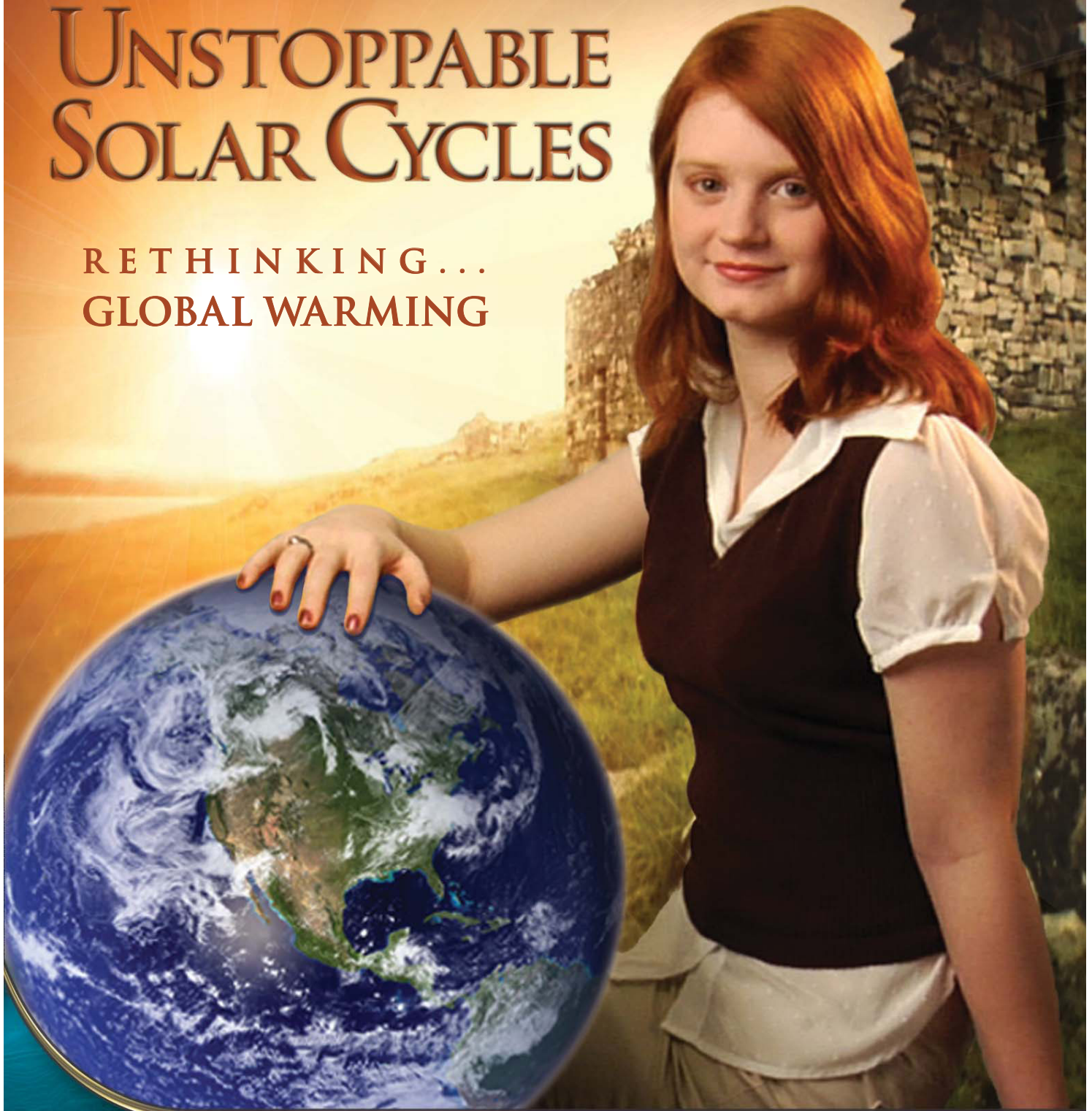


UNSTOPPABLE SOLAR CYCLES

RETHINKING...
GLOBAL WARMING



2002 Filmore Ave, Suite #1
Erie, PA 16506
Phone: (888) 242-0563
www.izzit.org

Unstoppable Solar Cycles

Teacher's Guide

This Teacher's Guide includes the following:

- **Suggested Lesson Plan**
- **Preview Questions**
- **Viewing Guide**
- **Discussion Questions**
- **Quiz**
- **Enrichment Activities**
- **Answer Key**

Suggested Lesson Plan

These materials may be used in a variety of ways. For maximum benefit, we suggest the following lesson plan progression:

- Discuss the **Preview Questions**. (These are intended to be read aloud by the teacher.)
- Distribute copies of the **Viewing Guide** for students to use as a note-taking tool during the video.
- Play the video, pausing if needed to facilitate note-taking and understanding.
- Review and discuss answers to the **Viewing Guide**.
- Use **Discussion Questions** to spark class discussion, or assign these questions as homework.
- Replay the video as preparation for the **Quiz**.
- Administer the **Quiz**.
- Optional: Assign **Enrichment Activities**.

For a list of additional resources for use with this video, see www.izzit.org/products.

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Preview Questions

1. What is climate change?
2. What human activities have increased carbon dioxide emissions over the last century?
3. What is the difference between weather and climate?
4. Has the earth ever experienced climate change before?
5. What is the scientific method?
6. What is scientific consensus?
7. Is there a scientific consensus about climate change?
8. What is skepticism? What does skepticism have to do with science?

Name: _____

Date: _____

Unstoppable Solar Cycles **Viewing Guide**

1. Climate, like weather, changes in repeating _____.
2. When the Vikings first arrived in Greenland in the 10th century, what did they find?
3. By 1350 all of the Viking communities in Greenland had been wiped out by _____.
4. According to Dr. David Legates, climate is not a _____.
5. Canals and waterways in northern Europe froze over during the _____, which ended in about _____.
6. Where does almost all of the energy that goes into the earth's climate system come from?
7. There is a correlation between _____ activity and temperatures on earth.
8. The earth's temperature has always risen _____ atmospheric CO₂ increased.
9. The world's _____ may play a role in warming by releasing _____ to the atmosphere when warmed.
10. Shrinking polar icecaps on _____ cannot be caused by human CO₂ emissions.
11. Dr. Willie Soon and Dr. David Legates believe that the _____ Panel on Climate Change has distorted the science of warming.
12. People are being urged to accept just one theory, that human-generated CO₂ is the principal cause of _____.

Name: _____

Date: _____

Unstoppable Solar Cycles **Discussion Questions**

1. What different theories might explain the climate changes that wiped out the Vikings in Greenland and caused the Thames River in England to freeze over? Could humans have caused those climate changes?
2. The best available records of temperature and atmospheric CO₂ show that over the past 650,000 years temperature has always increased before CO₂ increased. What does that indicate about the cause of previous climate changes?
3. According to the scientists interviewed in this video, how important is atmospheric CO₂ in driving climate change? What do they believe is the primary cause of earth's climate fluctuations?
4. Should we only learn about what some scientists and political leaders believe? Should other views be taken into account? Why/why not?
5. Can you think of significant ideas that were once widely held to be true but were later found to be false? Give examples.

6. Some scientists think the oceans may play a part in warming. Explain.

7. What might account for the fact that polar icecaps are shrinking on Mars as well as on the earth?

8. Why do you think people are being urged to accept the theory that human-generated CO₂ is the principal cause of global warming?

9. What is the Intergovernmental Panel on Climate Change (IPCC)? Why are Dr. Willie Soon and Dr. David Legates critical of the IPCC? Do you think their criticism is valid?

10. What if humans are not causing global warming? What if it is caused by forces beyond our control? Should we try to control the climate of the earth?

11. Has science defined an “optimal” temperature for earth? How would this be determined? If so, what — if anything — should government do to maintain it?

12. What are some potential benefits of a warmer climate? Should these be taken into account?

13. Assume we could prove beyond a doubt that people are causing global warming, and that significant problems will result. Does this tell us anything about what course of action we should take? Does it tell us what the best solution is?

14. What is the connection between energy consumption, CO₂ emissions, and living standards? How do energy consumption levels compare between developed countries and undeveloped countries? What about living standards?

15. Could efforts to stop global warming by reducing carbon emissions through cutbacks in fossil fuel use have an effect on living standards worldwide? How? What would determine the severity of the impact? Who would be harmed most?

16. How does development in Third World countries affect their citizens? What if we told some countries that they had to reduce development and they refused?

17. Should Third World countries be allowed to emit more CO₂ than developed countries? Who should regulate this?

18. If we would have to give up all of our modern conveniences and start living like people in Europe and America did 200 years ago — or like people in many developing countries do today — just to possibly slightly slow the rate of warming in the distant future, would it still be worth the effort? How and by whom should this be decided?

19. How should we weigh the costs of action versus inaction, real harm now due to economic decline versus potential harm later from warming?

20. Who is best able to determine what we should do about global warming? Scientists? Politicians? Who should make decisions about how we live?

21. Assuming we could prevent global warming, is this the only goal that matters? Are there other goals — individual freedom and economic prosperity, for example — that should be factored into any decision about how to respond to warming?

Name: _____

Date: _____

Unstoppable Solar Cycles Quiz

1. The Vikings who settled in Greenland made their living by
 - a) farming
 - b) trading ice for food
 - c) manufacturing
 - d) mining

2. The Vikings in Greenland were wiped out by
 - a) malaria
 - b) global warming
 - c) global cooling
 - d) invaders

3. According to Dr. David Legates, human-generated CO₂
 - a) has no effect on the climate
 - b) plays a small part in global warming
 - c) is the primary cause of global warming
 - d) does not enter the atmosphere

4. Records show that over the past 650,000 years
 - a) the earth's climate has not changed
 - b) human-generated CO₂ has caused all climate change
 - c) the earth's temperatures always increased first, followed by CO₂ increases
 - d) CO₂ always increased first, followed by temperature increases

5. Since the Little Ice Age ended in about 1850, the earth's climate has been generally
 - a) warming
 - b) cooling
 - c) stable
 - d) wildly fluctuating

6. What is the source of almost all of the energy that drives the earth's climate system?
- a) Fossil fuels
 - b) CO₂
 - c) The oceans
 - d) The sun
7. What is released when a can of soda pop is warmed?
- a) nitrous oxide
 - b) carbon monoxide
 - c) carbon dioxide
 - d) calcium carbonate
8. There is evidence of polar icecaps melting on
- a) Jupiter
 - b) Saturn
 - c) Venus
 - d) Mars
9. Dr. David Legates emphasizes the importance of _____ in scientific inquiry.
- a) skepticism
 - b) consensus
 - c) compromise
 - d) dogmatism
10. This video questions the assumption that
- a) humans generate CO₂
 - b) human-generated CO₂ is the principal cause of global warming
 - c) the sun could cause global warming
 - d) the oceans could play a role in warming

Unstoppable Solar Cycles

Enrichment Activities

1. Experiment: Conduct the soda bottle experiment shown in the video. Briefly describe your observations in terms of cause and effect. Explain how this same phenomenon applies to the oceans and what this has to do with global warming.
2. Essay: Compare and contrast the scientific method with the democratic process. Which types of questions/problems are best answered using each approach?
3. Essay: Over the course of human history, how have societies dealt with those who dissent from the mainstream view on important questions? What about now?
4. Visual Exhibits: “One problem with the global warming theory is that there is no way to use the scientific method to test the link between carbon dioxide and temperature levels at an atmospheric scale.” This quote from “Understanding Visual Exhibits in the Global Warming Debate” by Ronald J. Rychlak, (<http://heartland.org/policy-documents/no-115-understanding-visual-exhibits-global-warming-debate>) demonstrates a problem with the debate over global warming. How does this document show the problems with the debate over global warming? Use facts and data within the document to support your answer.
5. Scientific Consensus: Read the document “Scientific Consensus on Global Warming: Results of an International Survey of Climate Scientists” by Joseph Bast and James M. Taylor. This document can be found at <http://heartland.org/policy-documents/scientific-consensus-global-warming>. Complete one of the following activities: a) Report: What does the document show about the views of climate scientists about global warming, its causes, and predictions based on climate models? Why is there a problem with computer models? b) Develop a survey for students, covering the main points in the Scientific Consensus document. Have the class members complete the survey. Next, present to the class a summary of the 17 questions and answers in the document. Then, survey the class again. What do the answers say about the global warming debate?
6. Politics of Warming: Read “Global Politics, Political Warming” by Doug Bandow at <http://www.thefreemanonline.org/columns/global-politics-political-warming/>. For the past 100 years, people have debated climate change. What have been the prevailing positions over those years? Has the debate changed? How? Is the current position likely to be any more correct than the previous positions? Use a variety of resources to prove your point.
7. The Sky Is Falling! Research the fable of Chicken Little. There are numerous websites you can use. One such website is: <http://eleaston.com/chicken.html>. How might the fable apply today? Write an updated fable to represent one of the sides in the global warming debate.

Unstoppable Solar Cycles

Answer Key

Viewing Guide

1. cycles
2. fertile, green farmland
3. climate change
4. constant
5. Little Ice Age; 1850
6. the sun
7. sunspot or solar
8. before
9. oceans; CO2
10. Mars
11. Intergovernmental
12. global warming

Quiz

1. a) farming
2. c) global cooling
3. b) plays a small part in global warming
4. c) the earth's temperatures always increased first, followed by CO2 increases
5. a) warming
6. d) The sun
7. c) carbon dioxide
8. d) Mars
9. a) skepticism
10. b) human-generated CO2 is the principal cause of global warming



We are very interested to learn how you use our material. Please share your experiences or lesson plan ideas by visiting us at **www.izzit.org**.



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