

A photograph of two people standing on a massive glacier, looking down into a deep crevasse filled with bright blue water. The glacier's surface is marked by numerous vertical and diagonal ridges and grooves, showing its ancient and dynamic nature. The sky above is a pale, overcast blue.

CHASING ICE

A Discussion Guide for Middle School Students

Introduction

CHASING ICE presents undeniable evidence of how our planet is changing as a result of climate change. But instead of rattling off the same data and statistics we hear in the news, James Balog and his team at Extreme Ice Survey present us with an innovative way to see what often feels like an abstract scientific phenomenon. The captivating images and videos of CHASING ICE are a new kind of climate change data--one that merges science and art, creating a 'visual voice' for the issue of our day, a voice that resonates with people of all ages and backgrounds.

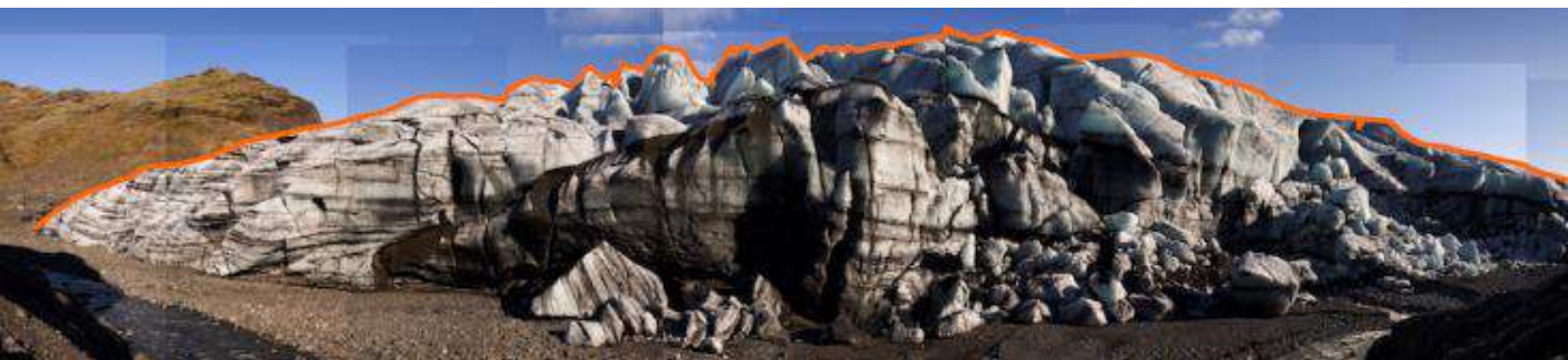
This discussion guide is intended to provide you and your students with thought-provoking questions around the topic of climate change and the themes of the documentary. These questions are designed to help your students engage in meaningful conversation about



the sometimes complex issues that climate change raises. The CHASING ICE team encourages you to frame the challenges that climate change presents as opportunities to do things differently. Instead of driving our cars less, for example, we can design and use cars that don't run on fossil fuels, or find a different way to travel, say, by public transportation or bike. The solutions to climate change do not require reverting back to the way life was before industry, combustion engines, and cell phones, but instead demand that we harness the power of human ingenuity and innovation to find different, more sustainable ways of living now.

Tips for Leading a Successful Student Discussion

- Establishing guidelines for student discussions is essential. Develop a short list of 'discussion rules' to post on the board, like: 'Do not interrupt. Be respectful of all opinions. Don't make it personal; disagree with an idea, not the speaker.' Remind students of these guidelines periodically to maintain an atmosphere of respect.
- Have a volunteer take notes on the board (or take notes yourself) during the discussion. Ensure they are capturing everyone's comments.
- Ask follow-up questions to clarify or summarize a speaker's opinion, guide the discussion, and keep students on topic. Ask open-ended questions (e.g. What makes you say that? How else can we explain this?), and encourage students to support their claims with evidence.
- Avoid taking a stance. Let students form opinions through discussion.
- Encourage alternate perspectives and ideas; there are no 'right answers.'
- Encourage students to address each other by arranging seats in a circle.
- Be conscious of students who contribute often, and try to engage those who usually shy away from speaking in class. Using a 'talking stone' or other item that can be passed from speaker to speaker can help distribute speaking time among all students.
- Deal openly and directly with conflicts if they arise.
- As the discussion wraps up, review the topics covered and conclusions.
- Use lingering ideas or questions as the basis for a writing assignment, follow-up classroom debate, or other activity.



Solheim Glacier, Iceland as seen from James Balog's "Waypoint 11." April 2006.
Photo by James Balog

Vocabulary

Atmosphere – The mixture of gases encompassing the Earth that provides the air we breathe and protects the planet from UV radiation from the sun; extends 20 miles up from the surface of the earth.

Calving – The act of an iceberg falling off the face of the glacier into the sea.

Carbon Dioxide (CO₂) – One of the primary gases that compose the atmosphere, produced during respiration of plants and animals, organic decomposition, and in the burning of fossil fuels; though naturally occurring in the atmosphere, increases in CO₂ are linked to our rising global temperature.

Climate – The general weather that characterizes a place over a long period of time, helping us understand the normal variations of weather in that place.

Climate Change – Changes to the global climate patterns as a result of increased CO₂ in the atmosphere.

Cryoconite – Dust in the air, made of rock, microbes, carbon soot that builds up on ice sheets and glaciers, resulting in dark areas in and on the ice. These dark areas absorb solar radiation, melting the ice below causing holes to form in the glacier (cryoconite holes).

Glacier – A large mass of slow moving ice, formed as successive snowfalls are compacted over time.

Glacial Retreat – The process by which glaciers melt at a faster rate than the snow can accumulate, resulting in a loss of glacial ice.

Ice Cores – A cylindrical length of ice, obtained by drilling deep into ice sheets and glaciers. Similar to a tree ring, ice cores show yearly snow accumulation, and hold tiny air bubbles frozen in the ice that scientists use to understand the history of our climate.

Melt zone – Edges of the ice sheet, where ice is melting and the water is running out to sea.

Weather – The changes we see in the atmosphere, usually described by temperature, wind, and precipitation over a period of hours and days.

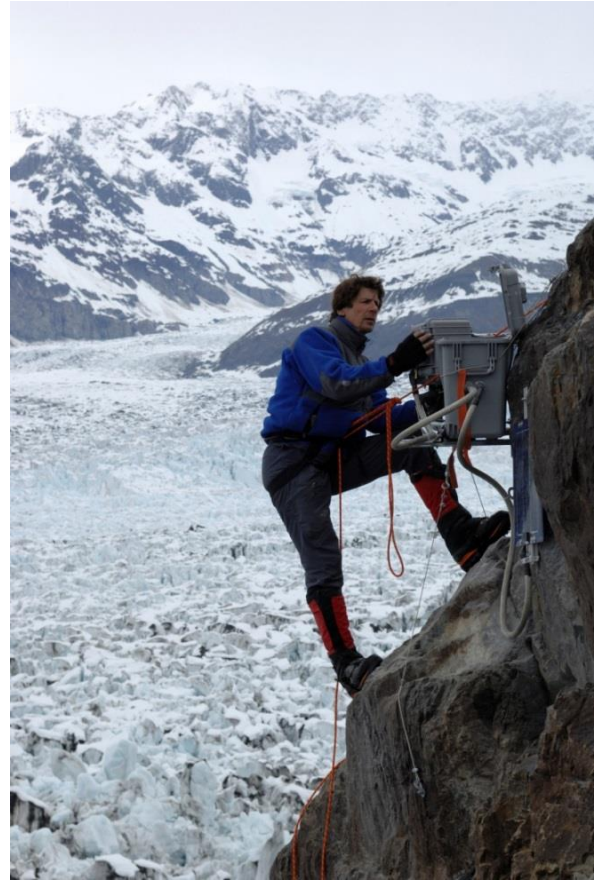


Solheim Glacier, Iceland as seen from James Balog's "Waypoint 11." October 2006, six months later.
Photo by James Balog

Discussion Questions

Seeing Climate Change

- Consider what you knew about climate change before watching the film. Have your ideas shifted or changed? Explain how you are thinking about climate change now.
- How is 'seeing' climate change in the film through the story of the glaciers different than learning about climate change through a book or a news story?
- James, the photographer in the movie, admits that he was previously skeptical about humans' ability to alter the chemistry of the air we breathe. But he changed his mind after learning new information about the history of our climate from the ice cores. Why is this process of re-evaluating your ideas based on new information so important to scientists? When have you had a similar experience?
- James has shown us one impact of climate change through his photos and the movie. But climate change impacts different places around the world in different ways. Where do you see the impacts of climate change in your community?
- Some people have said that the photos and videos from the Extreme Ice Survey of the retreating glaciers made them feel emotional. Why do you think this might be? What is it about images that make us react differently than graphs or statistics, for example?



Ethical and Moral Considerations

- After learning about the relationship between glaciers and climate change, and how our planet is changing, what kind of responsibility do you feel to do something?
- If you were President, what would you do about climate change? What kinds of laws would you pass? What might prevent those laws from passing?
- Some people say that we must tackle climate change so that we leave the next generation a healthy planet. Do you believe we have a responsibility to future generations to change the way we are impacting the planet? If all the glaciers and sea ice melt how do you imagine that would impact the people and animals that will come after us?
- Would it be ok to do nothing about climate change? Why or why not?



Art as a Scientific Process

- According to James, the photographer in the film, his photos have given a 'visual voice' to climate change. What does this mean to you? Why does this new way of looking at climate change matter?
- What do you think art has to teach scientists? How else can you imagine using art to tell a scientific story?
- There were many challenges in collecting the photos and videos from the Extreme Ice Survey. (The equipment had to be made especially for the project, the photographers and their delicate cameras had to contend with severe weather conditions.) Why do you think the Extreme Ice Survey team continued to persevere in the face of those challenges? What do you think motivates scientists to tackle challenging problems like climate change?

Make a Difference

- Think about the many choices you make each day (e.g., what to wear, what to eat, how to get to school). What could you change in your own life that could have an impact on climate change? What would you like to change, but don't feel that you can?
- What could your parents do to have an impact on climate change? What might be difficult for them to do differently? How could you help your parents to make different choices?
- How can you encourage your community, or school, to take on climate change? What do you think would be the best things to do? What else could you be doing in your community to address climate change?
- If you could design a solution to a climate change challenge in your community, what would it look like? How could you make this idea happen?

Action in the Classroom

Giving students the space to discuss all aspects of climate change is critical to helping them understand the many challenges this issue presents. But equally critical is giving students the opportunity to do something to address climate change. Possible classroom extensions include:

- Conduct an energy or waste audit of where students identify ways to reduce the carbon output of a classroom or entire school.
- Create personal climate action plans identifying small (or large!) changes in daily life.
- Create a classroom contest with students competing to reduce the amount of electricity they use at home and school.
- Keep student eco-journals tracking of what they recycle or throw away, the number of hours they use electricity, or various other actions. Have student graph their data to see changes over time.
- Have students research and present local climate change success stories to other students and school stakeholders.
- Document climate change like James Balog, using photos and observations to tell the story of climate change where you live.



Resources to Learn More

- [Clean Network](#) – Access climate change educational resources from around the web; each resource is reviewed by scientists and educators for alignment with The Essential Principles of Climate Science, scientific accuracy, and pedagogical soundness.
- [Climate Literacy: The Essential Principles of Climate Science](#) – Developed by the U.S. Global Change Research Program/Climate Change Science Program, this document presents the concepts for understanding our climate, the impacts of climate change, and how to address the challenges of climate change.
- [Earth Day Network](#) – Access lesson plans and resource guides on a variety of environmental issues through the Educator's Network site.
- [Extreme Ice Survey](#) – Learn more about James and the Extreme Ice Survey Team.
- [Intergovernmental Panel on Climate Change \(IPPC\)](#) – Comprised of thousands of scientists from all over the world, the IPCC reviews the most recent data and research on climate change to provide current and accurate information to inform leaders and decision makers.
- [Skeptical Science](#) – A comprehensive resource for exploring the science of climate change and understanding how climate data is analyzed and interpreted. Download the [Skeptical Science app](#).

Get Involved

- [Chasing Ice](#) – Learn more about the film and future projects, and arrange a viewing of the movie to educate others. Connect with the Chasing Ice Team through social media:
 - twitter [@chasingice](#)
 - Instagram [chasingice](#)
 - Facebook www.facebook.com/chasingice
- [Contact your Congressperson](#) – Explain what you think they should be doing about climate change.
- [Eco-Schools](#) – Help your school become a certified Eco-School.
- [EPA Climate Change Ambassador Program](#) – Help others address climate change with resources from the Environmental Protection Agency.
- [iMatter](#) – An youth-run organization that empowers kids to take action on climate change.

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Developed in Partnership with

