Climate Change

Elementary School Level: K-6

Courtesy of the Center for Global and Regional Environmental Research
Overview of content

- Weather vs. Climate: what’s the difference?
- What do we know about climate change?
- Earth’s climate history
- Human influence on climate
- Discussion

Courtesy of the Center for Global and Regional Environmental Research
1. WEATHER VS. CLIMATE

What's the difference?
What is weather?

- Weather is what we experience every day

- NWS: Iowa City, Iowa
What is climate?

- What makes climate different from weather?

- How would you describe the climate for...
  - A desert?
  - A rainforest?
Try this:

- Measure rain fall (or snowfall), temperature, and cloud cover
  - Once a day, every day, for 2 weeks
  - Do it yourself, or use the NWS website
- Average the weather data to figure out what your climate is.
Summary

- Weather is what we experience day-to-day
  - It can vary a lot
- Climate is a long-term average
  - It represents what is typical for a region
- Climate change is a big deal!
2. WHAT DO WE KNOW ABOUT CLIMATE CHANGE?
Who is the climate change authority?

- Intergovernmental Panel on Climate Change (or, IPCC for short)
- Combines all scientific information on climate change
Where does data come from?

- Observing weather from weather stations
  - Only goes back about 100 years

Courtesy of the Center for Global and Regional Environmental Research
Where does data come from?

- Observation data: for approx. 150 years
- Historical documents
  - Artwork
  - Stories

The Scream, by Edvard Munch
1893

Courtesy of the Center for Global and Regional Environmental Research
Where does data come from?

- **Ice Cores**
  - Like finding fossils in rock, ice cores give history of Earth’s climate

- **Can go back millions of years**
Summary

- Actual observations go back only 100 years
- We can estimate climate from historical documents
- Ice cores give us clues to Earth’s climate millions of years into the past
- All this information together gives us the best idea of what climate history was like
3. CLIMATE CHANGE: EARTH’S HISTORY

Courtesy of the Center for Global and Regional Environmental Research
Earth’s climate history

- Ice cores tell us Earth’s temperature history
How does $\text{CO}_2$ change Earth’s climate?
Summary

- Temperature has changed naturally over Earth’s history
- Ice volume has changed naturally over Earth’s history
4. CLIMATE CHANGE: HUMAN INFLUENCE
CO$_2$ is increasing in our atmosphere

How do we know CO$_2$ is from humans?
1. Timing is right
2. Amount is right
3. Dynamics can only be explained by human GHG emissions.
The “Hockey Stick”

Courtesy of the Center for Global and Regional Environmental Research
Effects of our changing climate

- **YouTube: Arctic methane vent**
- **YouTube: Arctic sea ice melt 2007**
- **YouTube: First year sea ice**

Courtesy of the Center for Global and Regional Environmental Research
Summary

- Greenhouse gases are increasing along with global temperature
- Observations make it look like climate change may be our fault
- Melting sea ice impacts ecosystems and climate
5. THE FUTURE

Courtesy of the Center for Global and Regional Environmental Research
Our changing oceans

- Sea ice is melting
- So is Antarctica, and Greenland

Images from Roger Braithwaite.

Courtesy of the Center for Global and Regional Environmental Research
Sea level rise with melting ice caps

U.S. Area Under Water

Courtesy of the Center for Global and Regional Environmental Research
Summary

- The future of our climate depends on how we react now.
- Melting polar ice will have an impact on society and the economy unless we do something.
6. RENEWABLE ENERGY

Courtesy of the Center for Global and Regional Environmental Research
Solar panels

- Harnesses the energy from the sun
- Technology of solar panels continue to improve
- Can store energy from the sun in large batteries
  - So electricity is available at night time and on cloudy days

Courtesy of the Center for Global and Regional Environmental Research
Wind power

Courtesy of the Center for Global and Regional Environmental Research
Biodiesel and Ethanol

- Ethanol from:
  - Corn, sugar cane, sugar beets, potatoes

- Biodiesel from:
  - Waste cooking oil, soybeans, canola

- Cars are already able to run on ethanol and biodiesel.

Courtesy of the Center for Global and Regional Environmental Research
7. LETS DISCUSS!

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For more information...

- IPCC
- NOAA
- NWS

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