Overview of content

1. Weather vs. Climate: what’s the difference?
2. What do we know about climate change?
3. Earth’s climate history
4. Human influence on climate
5. The future
6. Renewable energy
7. Discussion

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

What’s the difference?

Courtesy of the Center for Global and Regional Environmental Research
What is weather?

- Weather is what we experience every day

- NWS: Iowa City, Iowa

Courtesy of the Center for Global and Regional Environmental Research
What is climate?

- What makes climate different from weather?

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

Courtesy of the Center for Global and Regional Environmental Research
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
3. CLIMATE CHANGE: EARTH’S HISTORY
Earth’s climate history

- Ice cores tell us Earth’s temperature history

Antarctic (Vostok) Temperature

- Holocene
- Last Ice Age
How does 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

**Carbon Dioxide Concentrations**

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.

Courtesy of the Center for Global and Regional Environmental Research
The “Hockey Stick”

Courtesy of the Center for Global and Regional Environmental Research
\( \text{CO}_2 \) is not the only Green House Gas

- Methane
- Water vapor
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
Models predict more change

- Models show us what will likely happen if we:
  - Don’t change anything
  - Change a little
  - Change a lot
  - Stop releasing all GHGs

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

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
- Equipped with battery storage
  - Have electricity for night time and cloudy days
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. DISCUSSION

Courtesy of the Center for Global and Regional Environmental Research
For more information...

- **IPCC**
- **NOAA**
- **NWS**

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