

Lesson 5

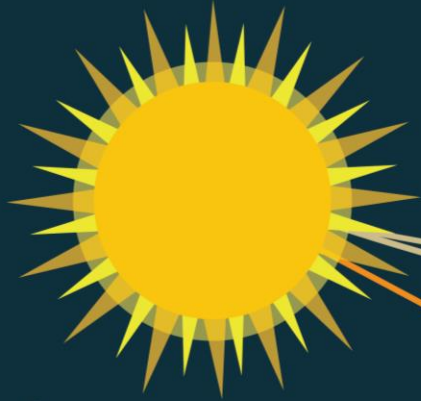
Our Changing Climate



An aerial photograph of New York City, showing a dense urban landscape with numerous skyscrapers. The Empire State Building is prominent in the center. The Hudson River is visible on the left, and the East River is on the right. A semi-transparent dark grey box is overlaid on the image, containing text and a list. The text is white, and the list items are preceded by small white squares.

Weather vs. Climate

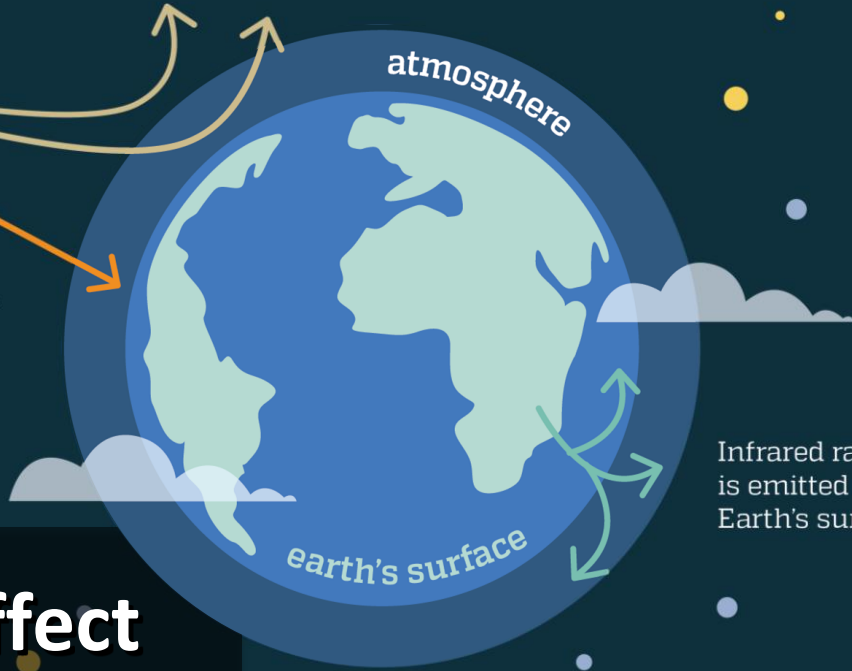
- The temperature in New York City averaged 82 degrees Fahrenheit on July 20, 2010.
- The temperature in New York City averaged 77 degrees Fahrenheit for the month of July between 1981 and 2010.



Some solar radiation is reflected by the Earth and the atmosphere.

Some of the infrared radiation passes through the atmosphere. Some is absorbed and re-emitted in all directions by greenhouse gas molecules. The effect of this is to warm the Earth's surface and the lower atmosphere.

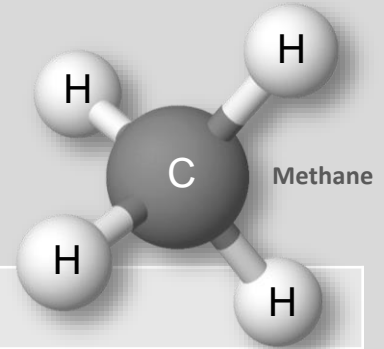
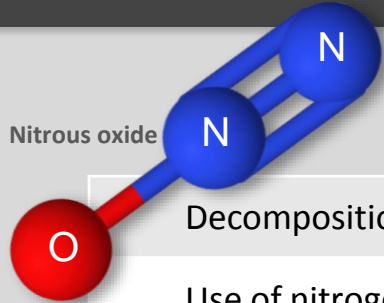
Most radiation is absorbed by the Earth's surface and warms it.



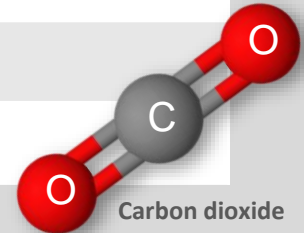
Infrared radiation is emitted by the Earth's surface.

The Greenhouse Effect

Sources of Greenhouse Gases



Decomposition of food waste in landfills	Methane, nitrous oxide
Use of nitrogen-based fertilizer on crops	Nitrous oxide
Transporting food products	Carbon dioxide, nitrous oxide, methane
Bacterial decomposition in rice paddies	Methane, nitrous oxide
Livestock manure	Methane, nitrous oxide
Clearing forests for farmland	Carbon dioxide
Cattle belching	Methane, carbon dioxide, nitrous oxide
Running agricultural machinery	Carbon dioxide, nitrous oxide, methane



Drought



Photo credit - Bob Nichols, 2013. Texas drought affecting corn crops. USDA. Creative Commons CC BY 2.0.

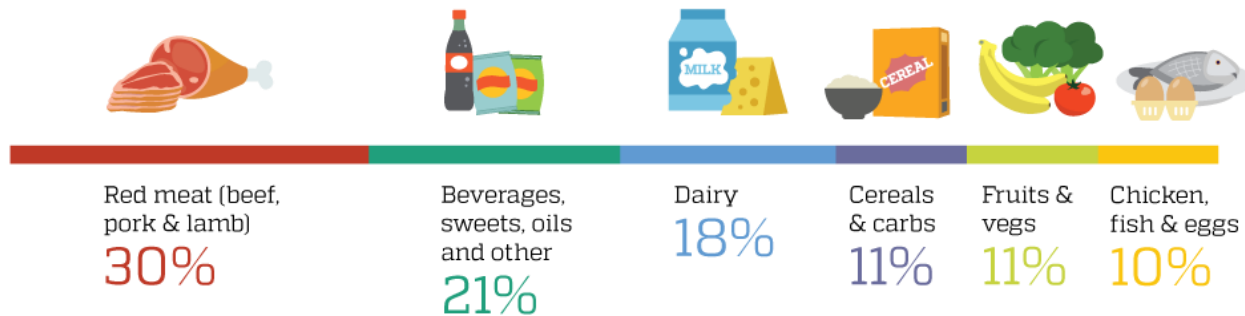
Climate Change Impacts on Agriculture

- Loss of topsoil
- Fungus invasion in corn crop
- Saltwater contamination of freshwater supply
- Increased cost to fight weeds
- Increase in a crop's water needs
- Higher food prices
- Depletion of freshwater sources for irrigation



Food System Greenhouse Gas Emissions

U.S. GHG emissions by food type



U.S. GHG emissions by supply chain stage



Livestock Greenhouse Gas Emissions

- Livestock are responsible for 15% of global GHG emissions from human activities – more than transportation
- 39% of livestock's GHG emissions are from enteric fermentation, a digestive process that produces methane
- Cattle release most of the methane through belching

