

# Global Warming

Ch. 13 (p. 438-443)





# What is Global Warming?

- Definition: the gradual rise in the average surface temperature of the Earth
- Some regions are warming more quickly than others
  - Some have even cooled slightly
  - As a result, the term “climate change” is gradually replacing “global warming”



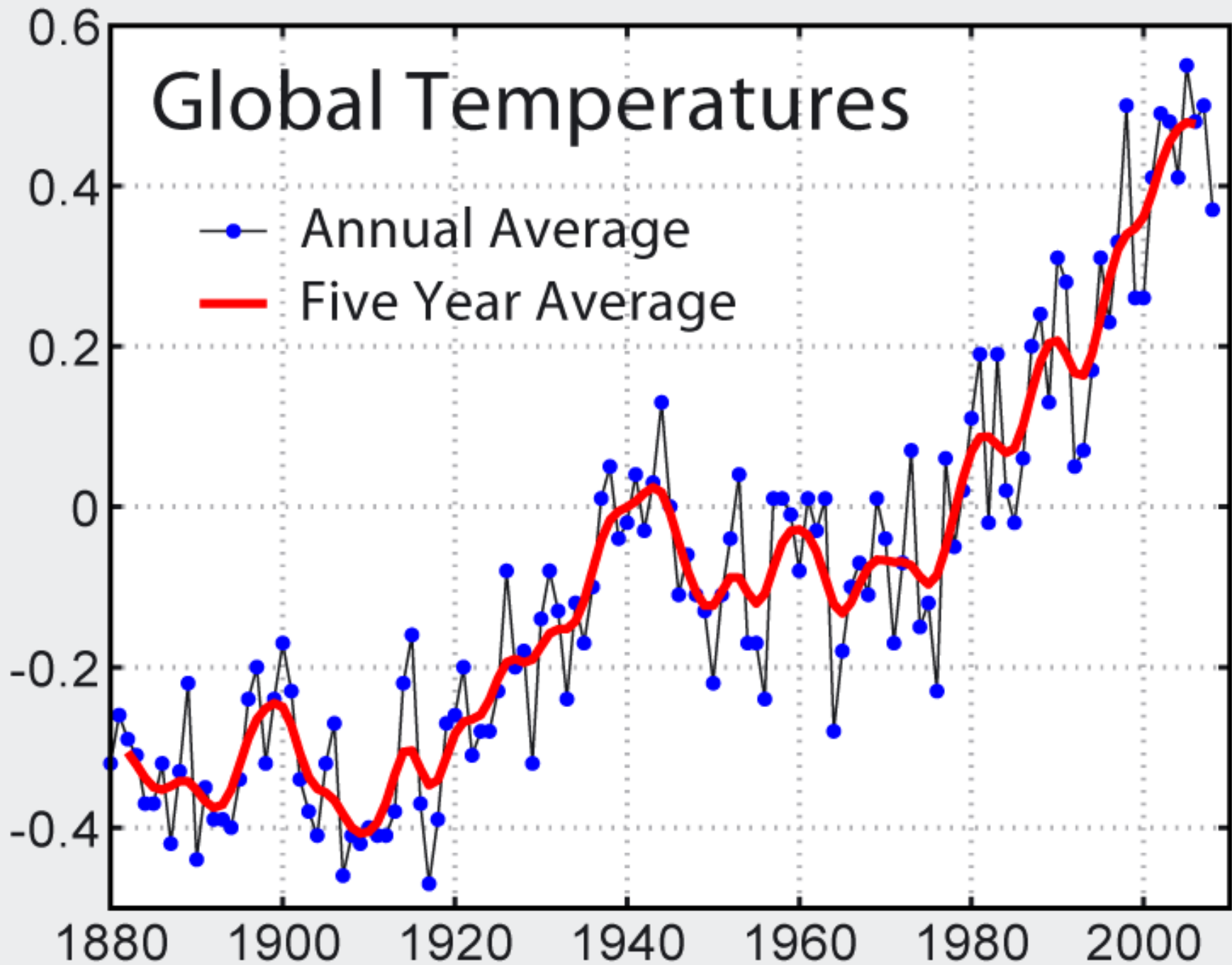
# Is the World Getting Warmer?

- Earth has warmed  $\sim 0.74$  C in the past 100 years
- The 2000s was the warmest decade on record, and the 1990s was the second warmest
  - Detailed temperature records have been taken since the mid-1800s
  - Earlier historical temperatures are less accurate
    - Based upon tree rings, ice-core samples

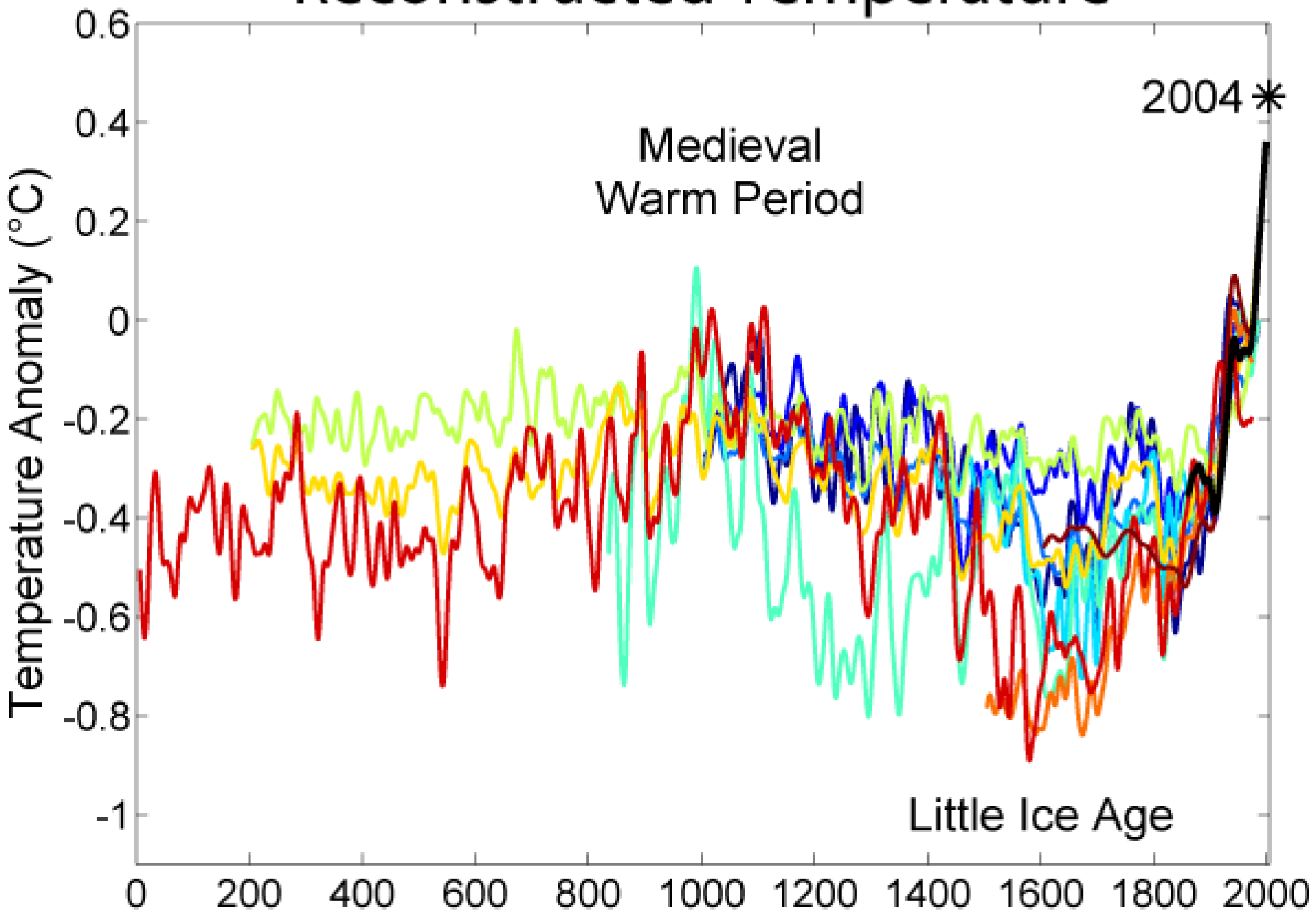
# Global Temperatures

Temperature Anomaly ( $^{\circ}\text{C}$ )

- Annual Average
- Five Year Average



# Reconstructed Temperature





# What Causes Global Warming?

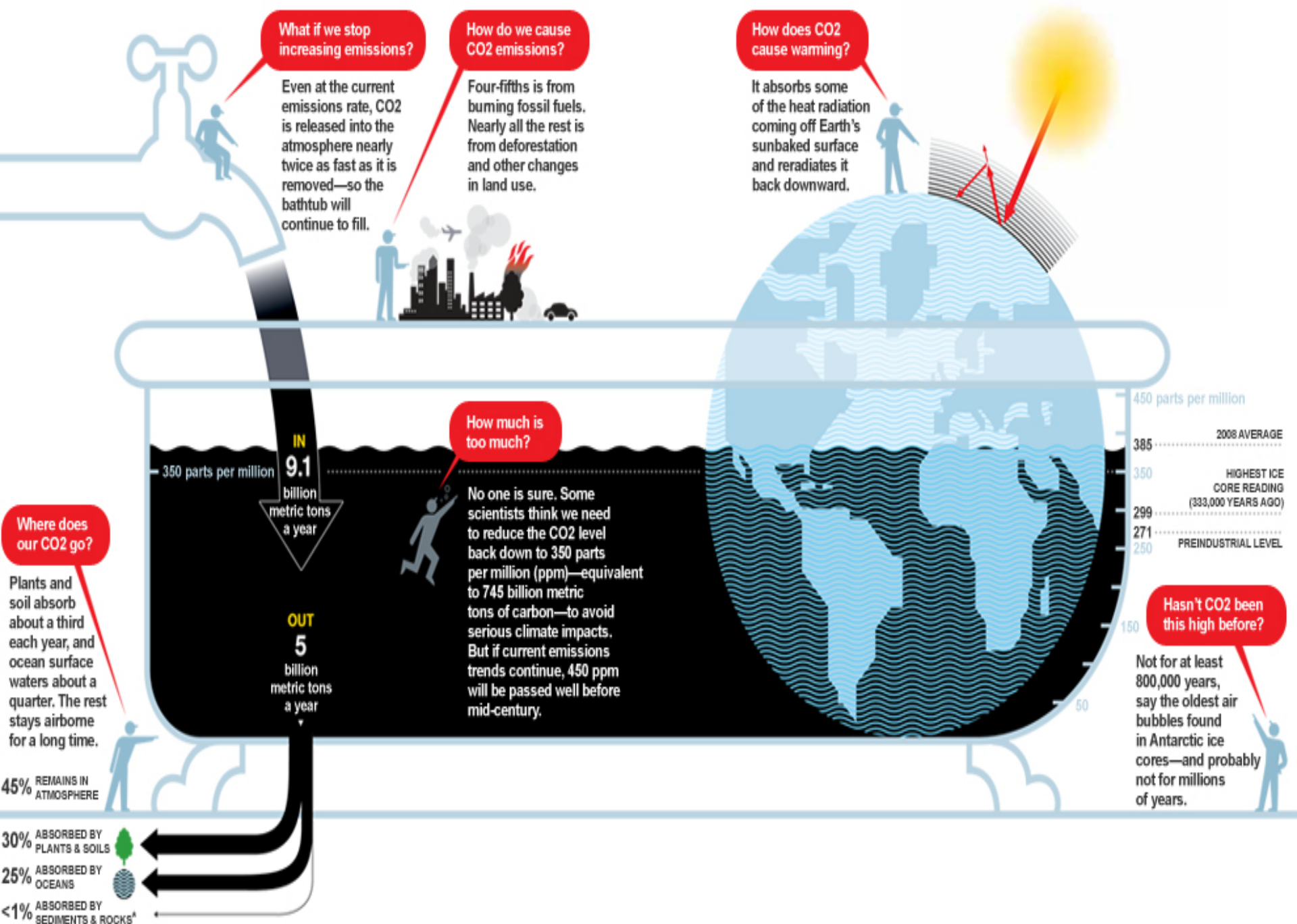
- Some debate over this question
- The Greenhouse Effect is generally accepted as the major cause of global warming
  - p. 439 and CD Animation
  - Greenhouse gases: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O)
  - Greenhouse gas levels in the atmosphere have increased dramatically since the Industrial Revolution
    - CO<sub>2</sub>: 271 ppm (pre-industrial average) – 385 ppm (2008)



# Where Do GHG Come From?

- Some are naturally occurring
- Carbon dioxide: the burning of fossil fuels (oil, coal, natural gas), fewer trees to absorb CO<sub>2</sub>
  - Transportation, factories, electrical production, etc
  - Developed nations emit the most CO<sub>2</sub> per capita
- Methane: landfills and agriculture (er...cows)
- Nitrous oxide: fertilizers
- Methane and N<sub>2</sub>O are more powerful heat-trappers, but there is far more CO<sub>2</sub> produced, so it has a larger effect on climate change





\* PERCENTAGES DO NOT ADD UP TO 100 BECAUSE OF ROUNDING.





# What Are the Effects of GW?

- Melting Ice: rising temperatures melt glaciers and ice sheets, leads to rising sea levels
- Extreme Weather: more frequent and severe heat waves, droughts, wildfires/forest fires, floods, hurricanes and storms
- Ecosystems: transformation and reduction of sensitive ecosystems, affects animal and plant life, leads to possible extinctions
- P. 442



# What Are the Effects of GW?

- Canada
  - CD animation



- <http://environment.nationalgeographic.com/environment/global-warming/quiz-global-warming/>