Search for Life

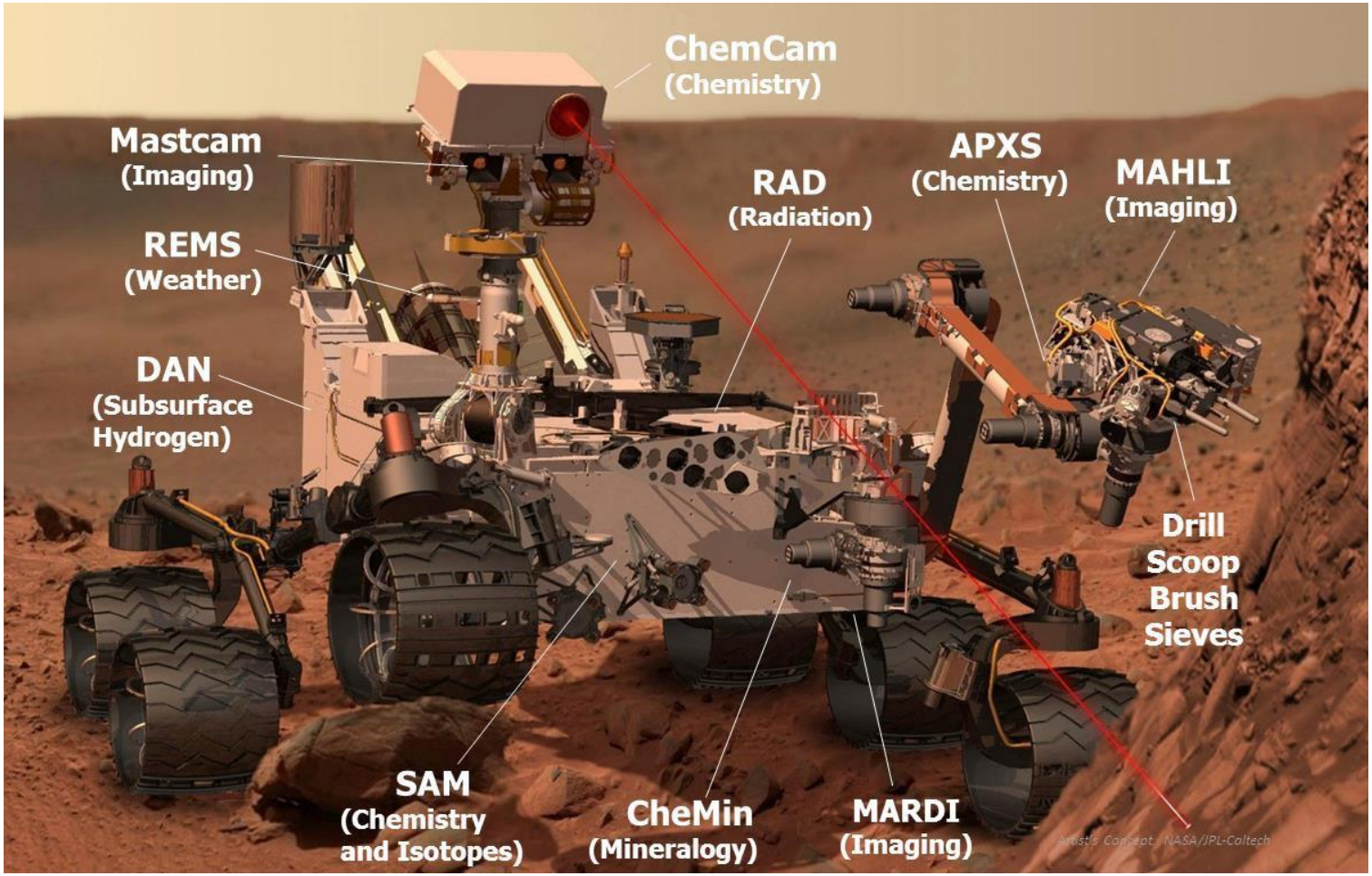
- 1st find water

Phoenix found water in 2008

Search for life

- 2nd look for organic molecules
- Definition of organic molecules
- contains C and H
- Examples
  - sugars,
  - fats,
  - proteins,
  - nucleic acids

Curiosity Rover landed in 2012



Curiosity lands on Gale Crater 2012

1. Evidence of an ancient streambed
2. Found CNHOPS
3. Found organic compounds in rocks
4. Evidence of methane production

Was there life on Mars

?

NOTES

Chemical Bonds
(Hold atoms together)

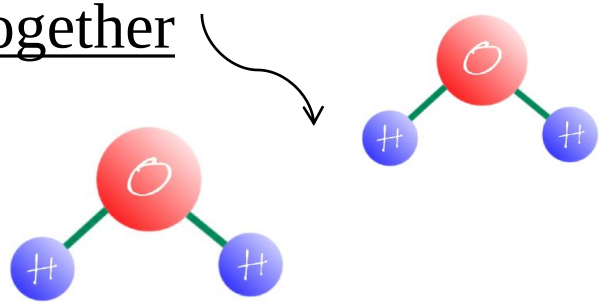
- <u>Chemical bonds contain energy</u>

- What happens when you break chemical bonds?

- What do you have to add to make big compounds?

3 types of chemical bonds

- Ionic = weak (hold salt together)
- Covalent = strong (holds organic molecules together)
- Hydrogen bonds = temporary
  - hold water molecules together



NOTES

Compounds

- 2 or more atoms chemically bound together
- 2 types
  - Organic = C and H (ex: sugars, fats, proteins, nucleic acids)
  - Inorganic (ex: H_2O, O_2, CO_2)
  - Living things are made up of both

http://members.aol.com/profchm/chmjugl2.gif

NOTES

4 types of Organic Compounds necessary for life

- Carbohydrates (sugars)
- Proteins
- Lipids (fats)
- Nucleic acids (DNA and RNA)

Organic compounds = stored energy

- Carbon containing molecules have a lot of chemical bonds
- Chemical bonds = energy
- Break down organic compounds → release energy
  - Ex: Combustion → releases energy
  - Ex: Chemical digestion and respiration → release energy

Post-assessment Quiz

- What are living things made of
  - Organic molecules
  - Inorganic molecules
  - Both Inorganic and inorganic molecules
-
- List the 4 types of organic molecules
- What is the difference between organic and inorganic molecules
- What happens when you break chemical bonds

Go over Regents Practice Questions

Raw materials = Nutrients

- Living things are made up of CHNOPS = 6 most important elements of life
- These nutrients must recycled → readily available to support life
- ROCK CYCLE AND PLATE TECTONICS IMPORTANT – Earth = only planet with plate tectonics

Decomposers

- Definition
- Organisms that recycle nutrients by consuming dead organisms
- Ex:
- Bacteria and fungi

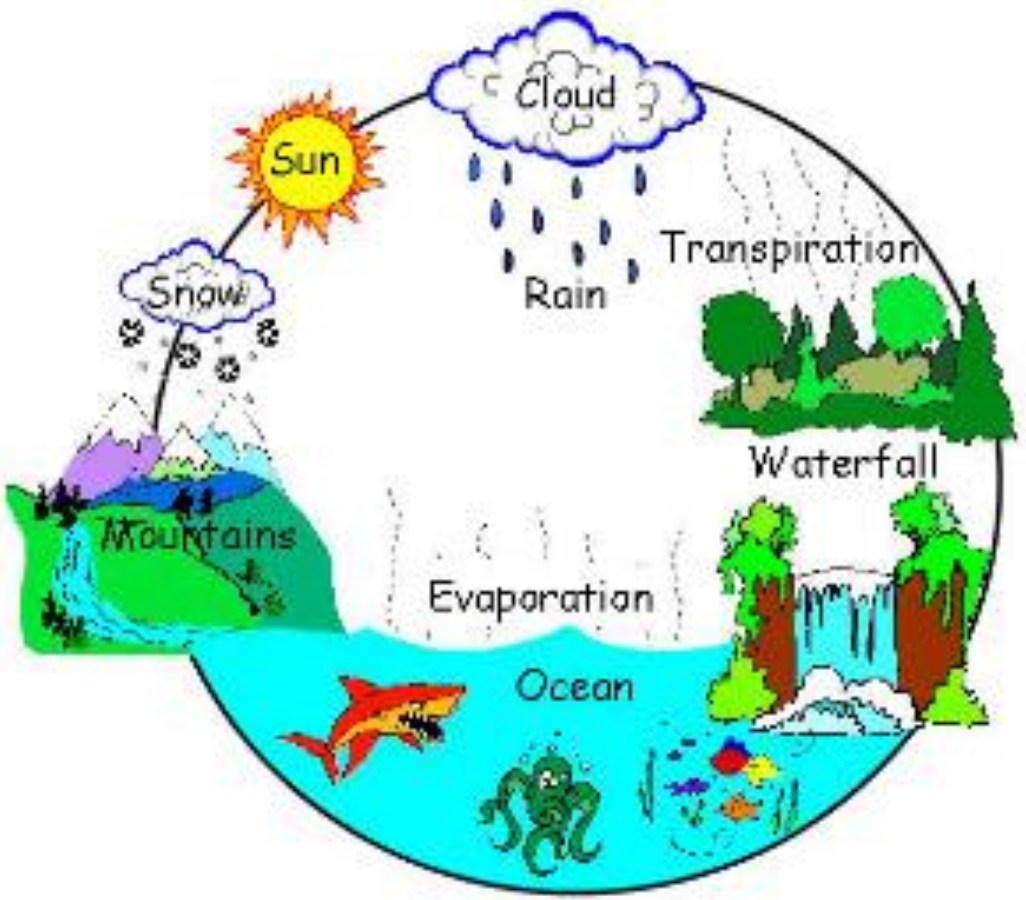
NOTES

Water and Nutrient cycling

Why is Earth the only planet filled with life?

- Liquid water
- Atmosphere → right amount of solar energy (not too much and not too little)
- Plate tectonics → nutrient cycling

Water cycle activity in your notes



http://water.tamu.edu/watercycle.html

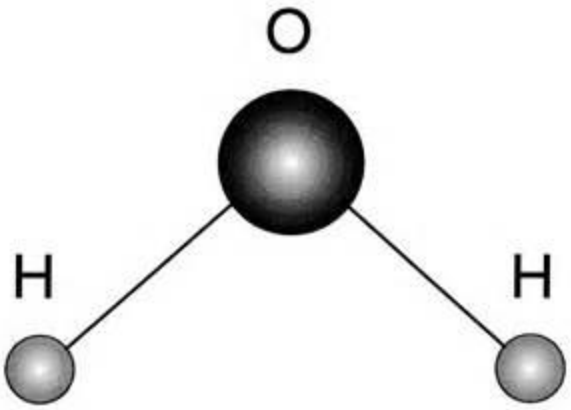
Things that put water into the atmosphere

- Evaporation = sun → liquid water → water vapor (gas)
- Sublimation = Sun → ice → water vapor (gas)
- Transpiration = sun → leaves → water leaves trees as a gas
- Respiration = living things breath out CO_2 and H_2O

Processes that bring water down to the surface of the earth

- Condensation = water vapor (gas) → liquid water
- Precipitation = water falls from the sky (rain, snow, sleet…)
- Runoff = water flows on land into lakes, rivers and streams

Draw a picture of a water molecule and state why it is so important to life



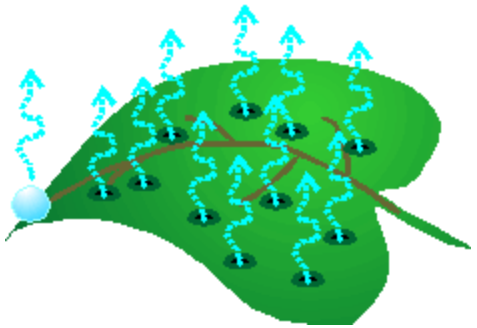
Draw a picture of the water cycle using all of the words from todays lesson

- Evaporation
- Transpiration
- Sublimation
- Condensation
- Precipitation
- Respiration
- Runoff

NOTES

Water cycle summary
Water → atmosphere

- Evaporation = sun → water vapor (gas)
- Transpiration = sun → water leaves plants as a gas
  - Stomates = openings in leaves
  - Guard cells control size of opening
    - → control water loss
    - Maintain homeostasis



Example of Feedback Mechanisms

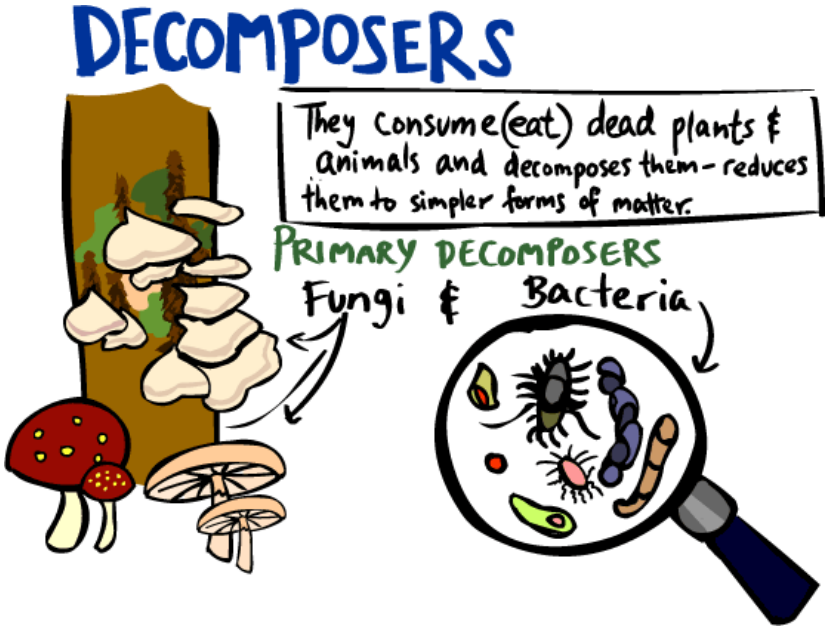
http://tsspesvt.over-blog.com/ext/http://www.snv.jussieu.fr/bmedia/mouvements/nasties-stomate.htm

Regents Practice Questions

NOTES

Elements must be recycled in ecosystems

- Decomposers recycle nutrients (C, N, P, S…)
  - Bacteria and Fungi
  - Release elements trapped in living tissues
  - Plants use the inorganic nutrients released by decomposers



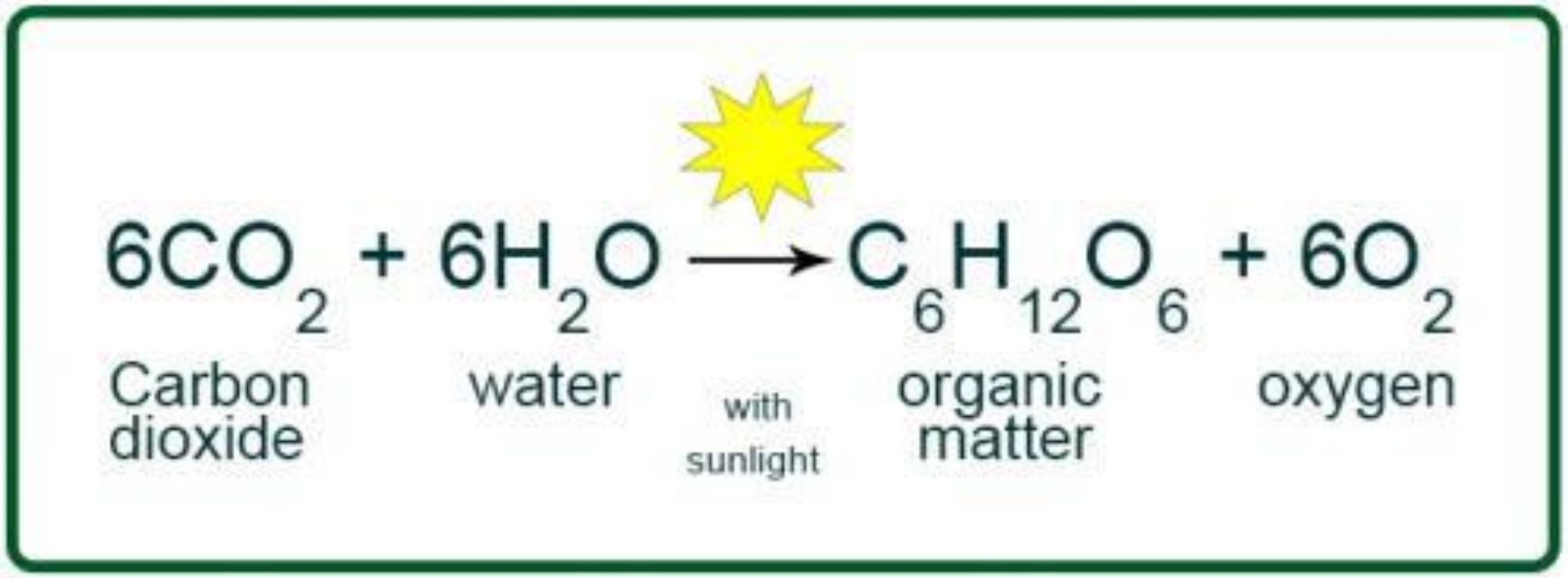
http://www.sheppardsoftware.com/content/animals/kidscorner/foodchain/decomposers.gif

The Carbon Cycle

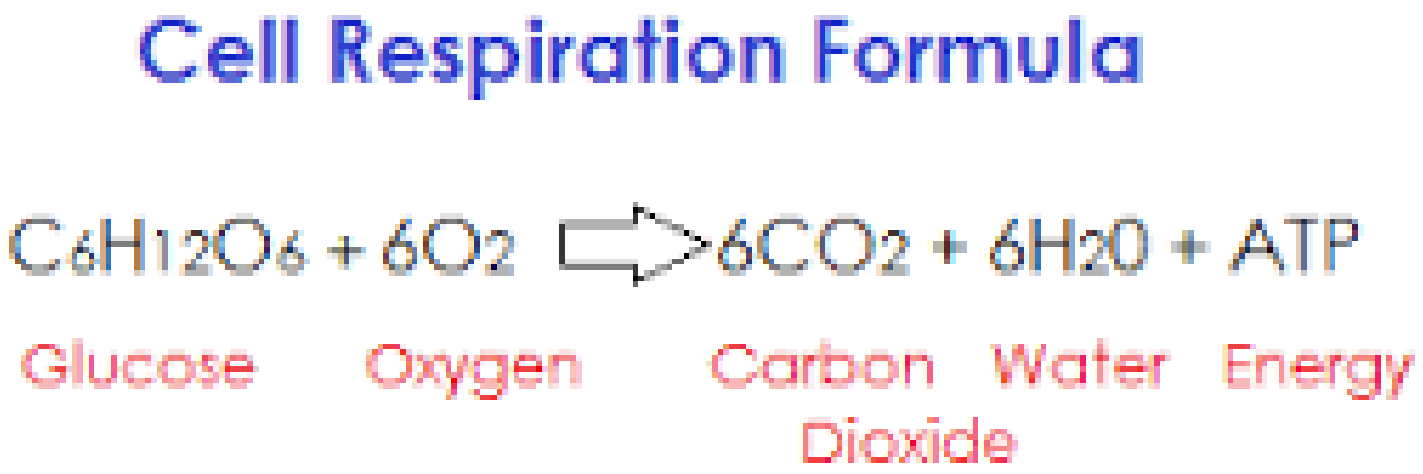
- 2 processes affecting the carbon cycle = Photosynthesis and Respiration

- Write the formula for each in your notes

Formula for photosynthesis (process that happens in plants)



Formula for respiration
(process plants and animals use to release energy)



NOTES

Carbon Cycle

- Carbon cycles between air, land and organisms
- All living things contain carbon
- **Fossil fuels** (coal, oil, gas)
  - come from remains of living organisms
  - All fossil fuels contain carbon

- **Photosynthesis →↓ CO_2 in air**

Processes that release C into the air

- **Aerobic Respiration** – organism use O_2 → ↑ CO_2 in air
- **Anaerobic respiration –** organisms without oxygen → ↑ methane in air (CH_4)
- **Decomposition** → ↑ CO_2 in air
- **Combustion (**burning) → ↑ CO_2 in air
- Volcanoes release carbon

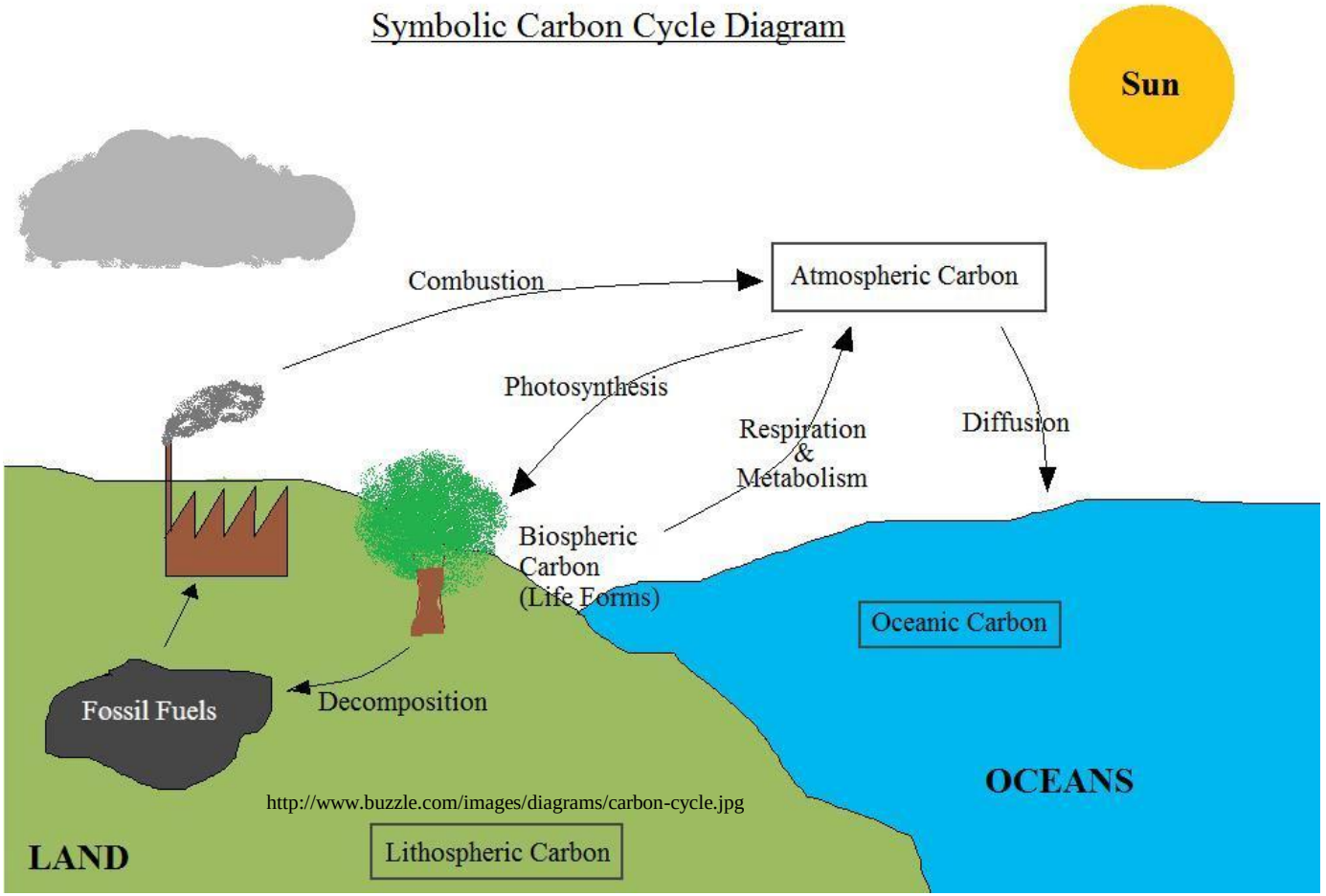
Note only 2 ways to take carbon out of air

- Photosynthesis = process that pulls carbon out of the air.
- Therefore - plants and forests = carbon sinks

- Air mixes with the ocean
- Therefore - the ocean = carbon sink
- when CO_2 enters the ocean it forms carbonic acid

Draw a picture of the carbon cycle

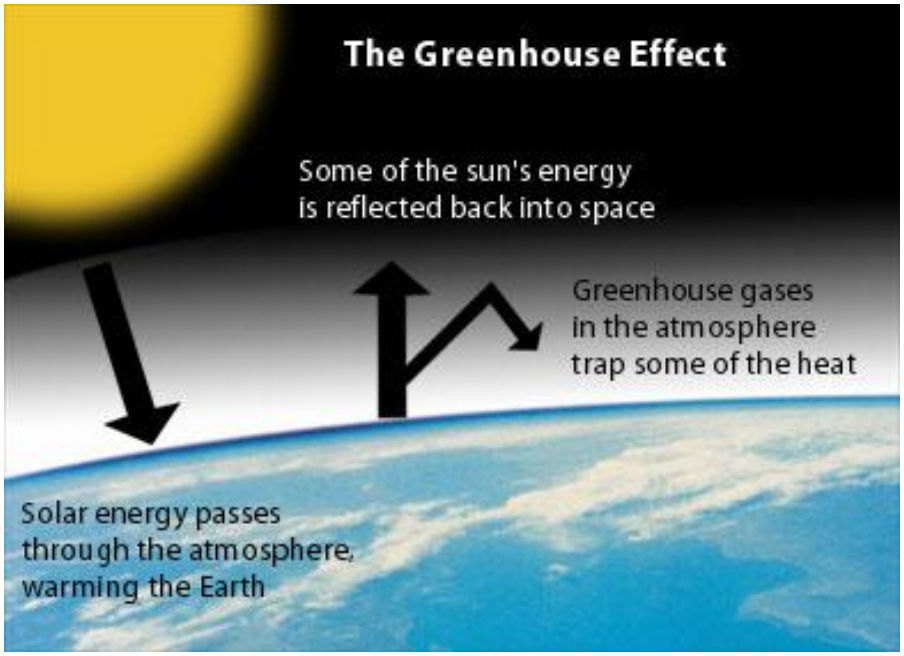
NOTES



Human impacts on the Carbon cycle

CO_2 CH_4, H_2O, NO_x= <u>greenhouse gases</u>

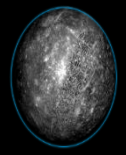
- Gases that <u>trap heat near surface of Earth</u>



IS THE GREENHOUSE EFFECT GOOD OR BAD???

Mercury

333° F



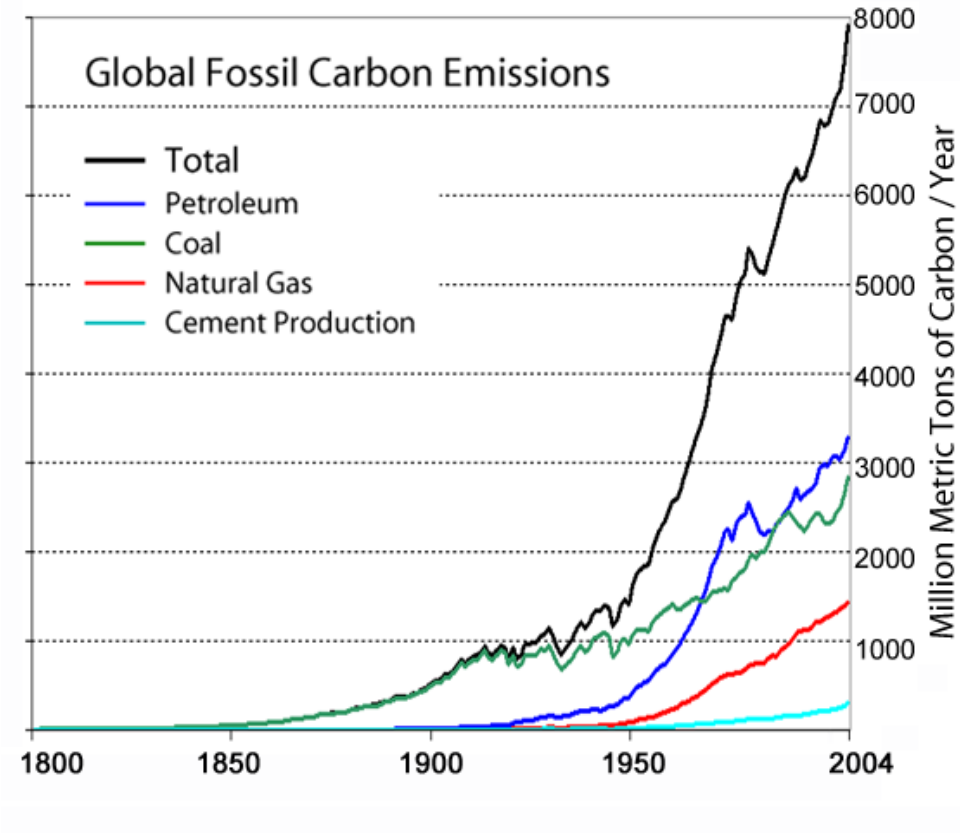
Venus

855° F

Earth

59° F

Atmospheric CO_2



Data analysis questions

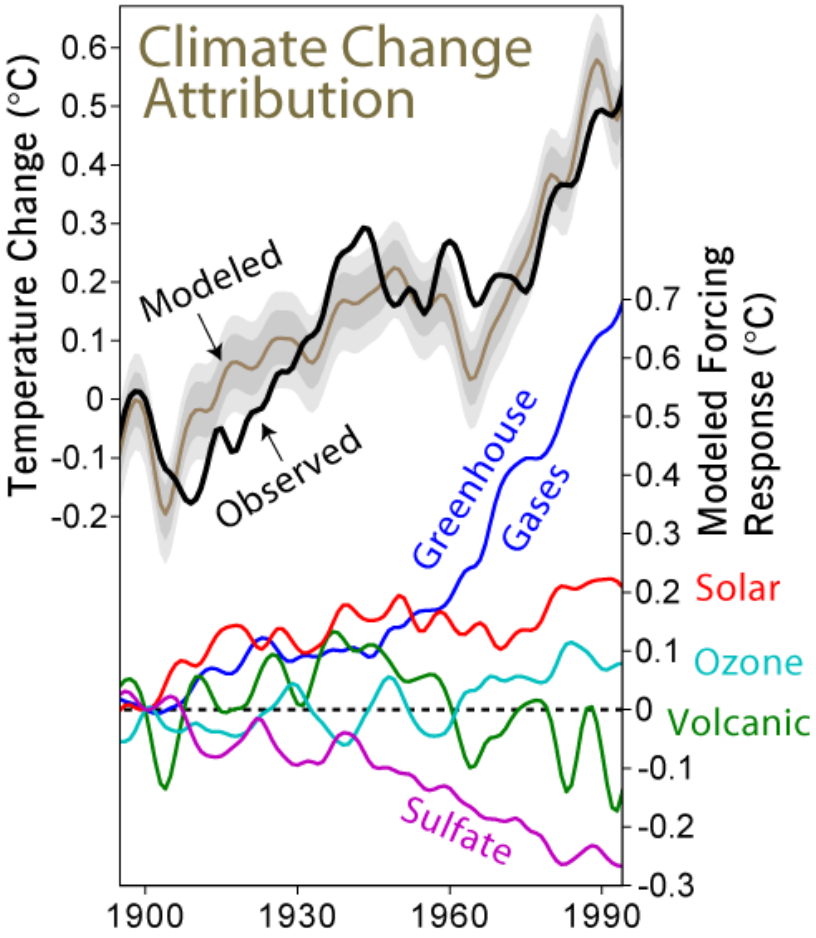
There are 2 time periods when the emissions rose

- When did atmospheric carbon emissions first begin to rise?
- 1850

- When did the rate of carbon emissions go up steeply
- 1950

- What was happening in the world during those times in history that might have caused the increase?
- 1850s = industrial revolution burning coal
- 1950s = oil → gasoline for cars → increased transportation

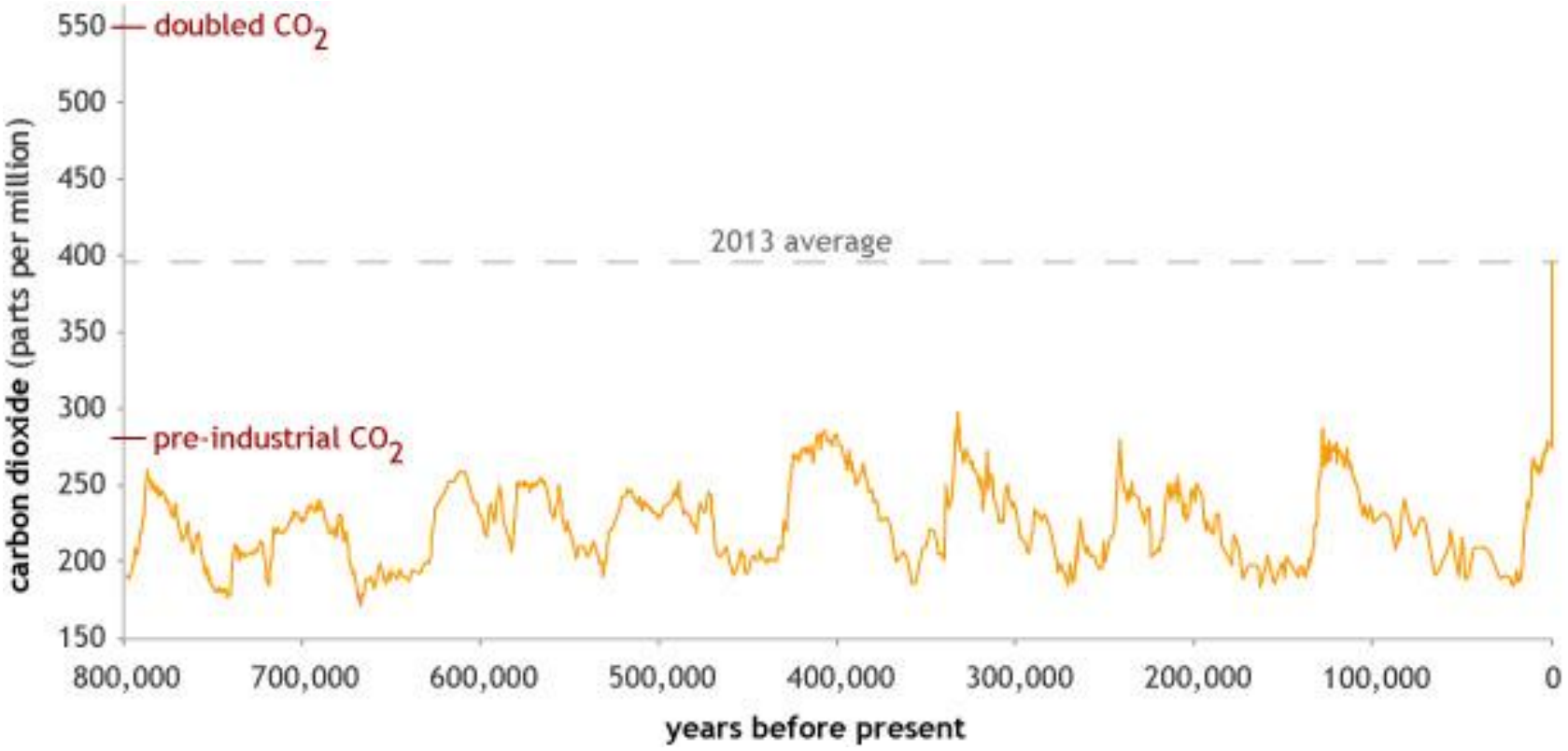
Climate Forcings (things that impact climates)



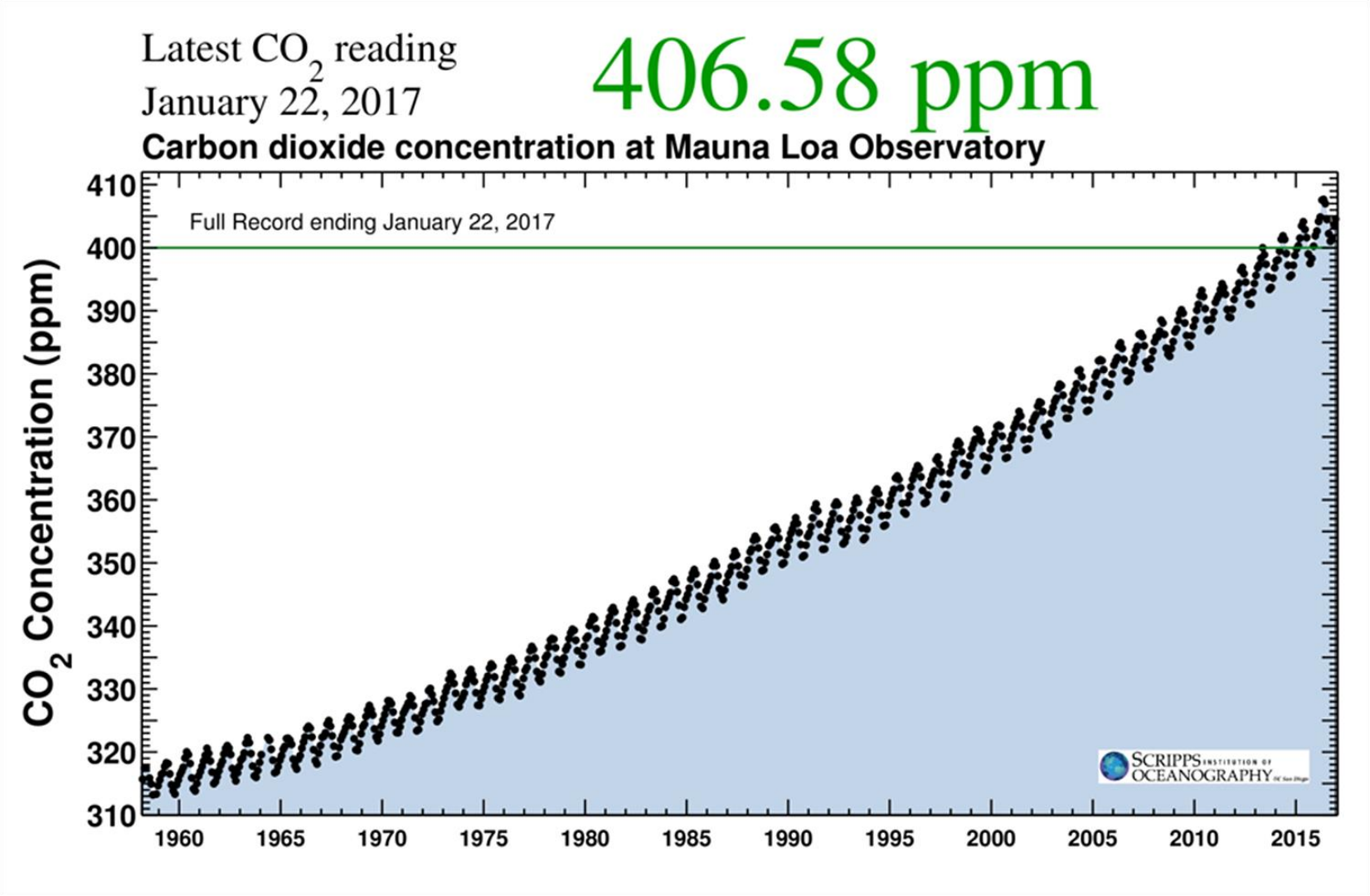
- How much as climate changed from 1900 – 1990?
- Increased about 0.5ºC
- What do sulfates and volcanos do to weather
- Decrease temperatures
- What do GHGs do to climate?
- Increase temperatures

Atmospheric CO_2 levels

- Pre-industrial =
- <u>280 ppm</u>



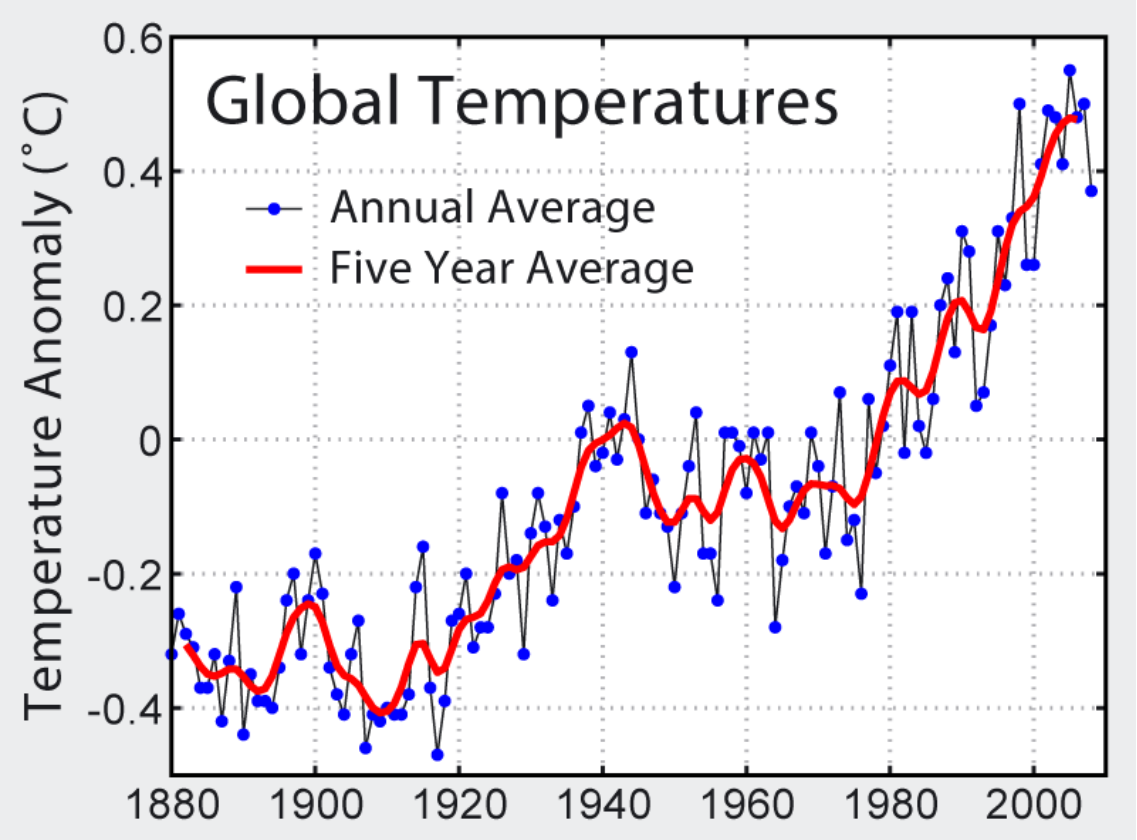
Atmospheric CO_2 levels today



Why??????

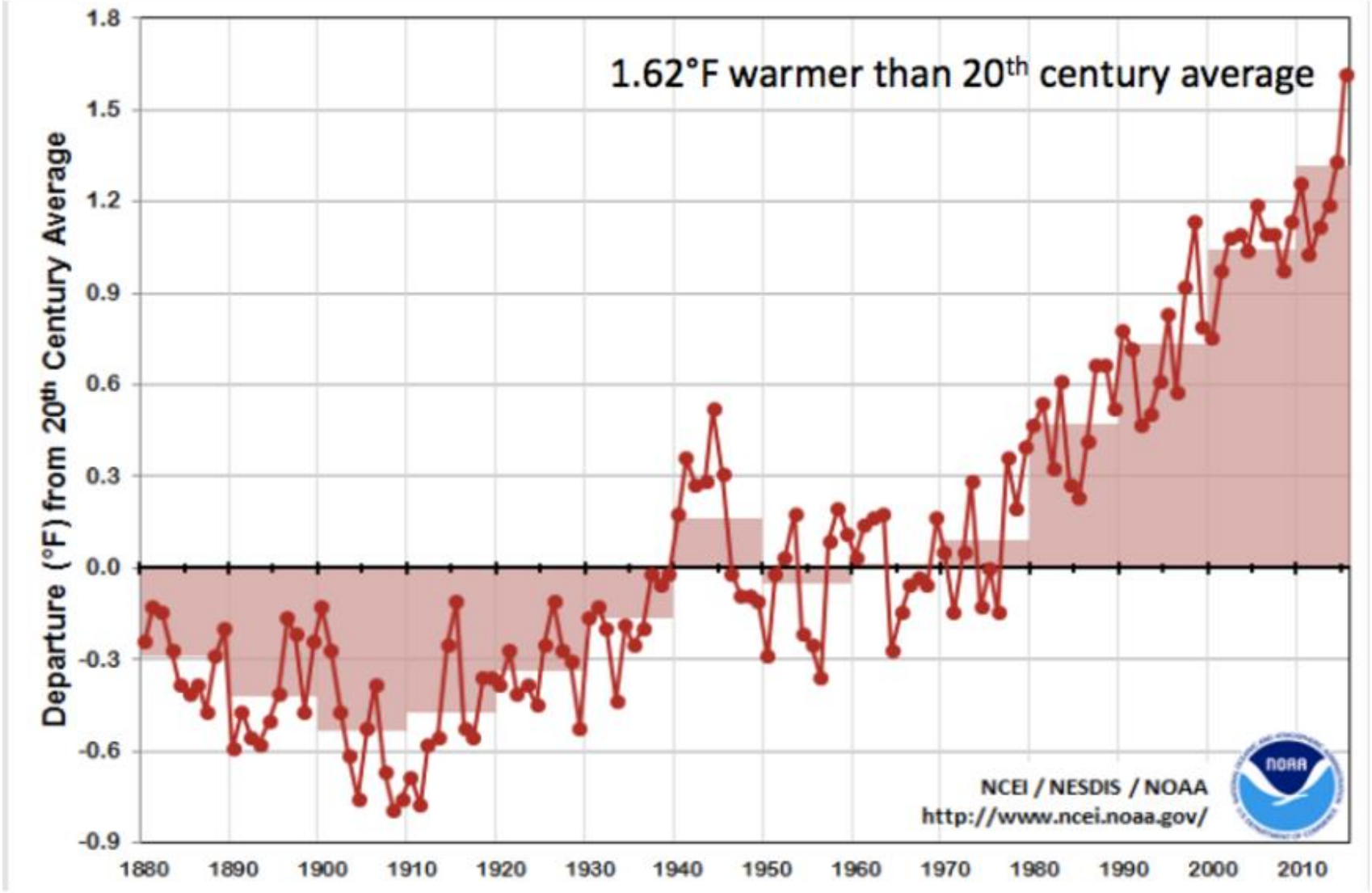
- Burning fossil fuels
- Deforestation

2007 IPCC Data indicates a 0.74ºC rise in global averages over the past century

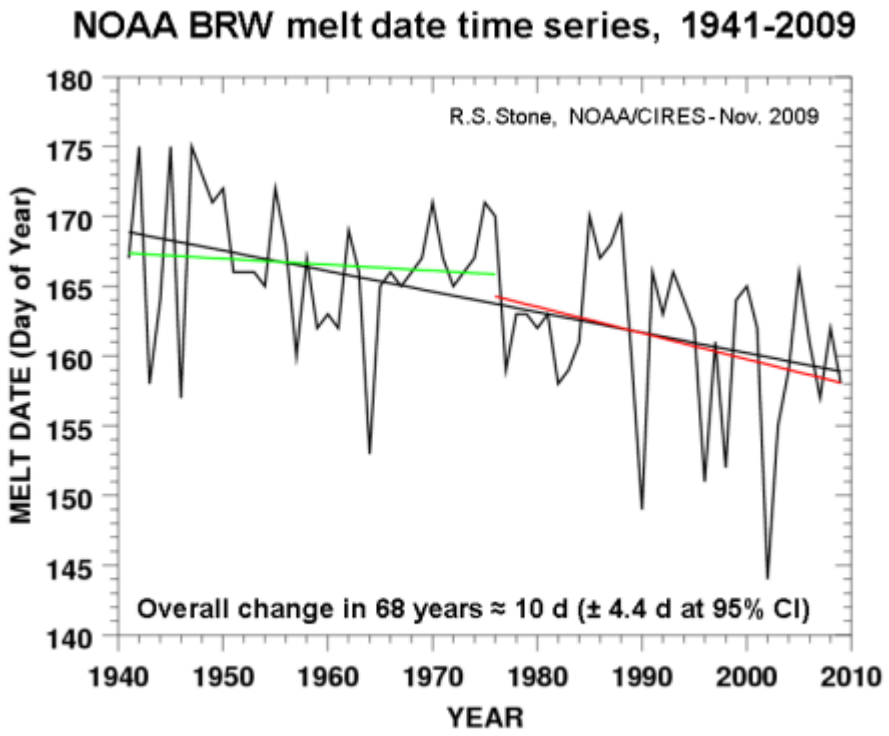


- This image shows the instrumental record of global average temperatures as compiled by the NASA's Goddard Institute for Space Studies. The data set used follows the methodology outlined by Hansen et al. (2006). Following the common practice of the Intergovernmental Panel on Climate Change, the zero on this figure is the mean temperature from 1961-1990.
- Image created by Robert A. Rohde.

Global Temperature Time Series

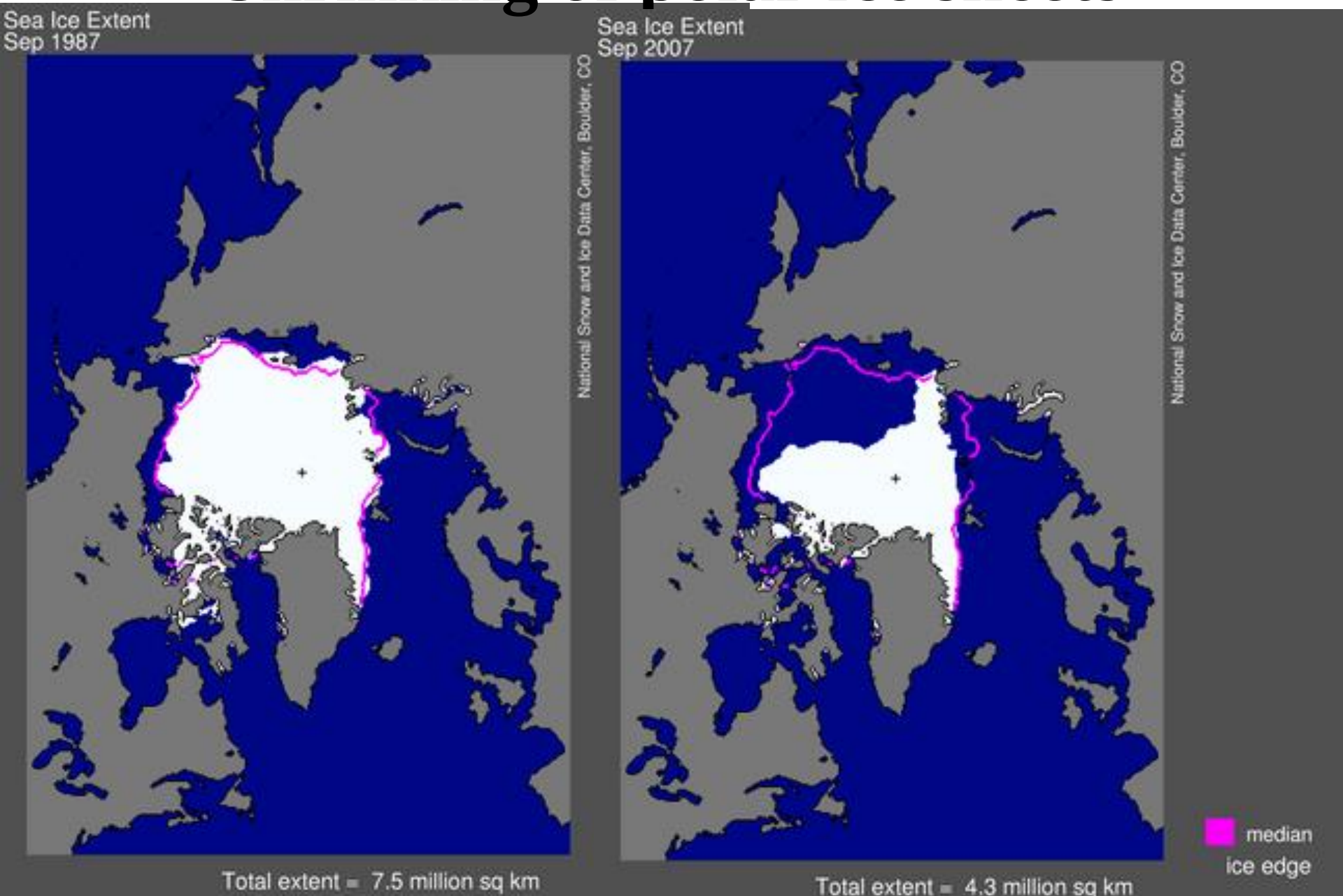


Earlier spring snow melt in Barrow, Alaska



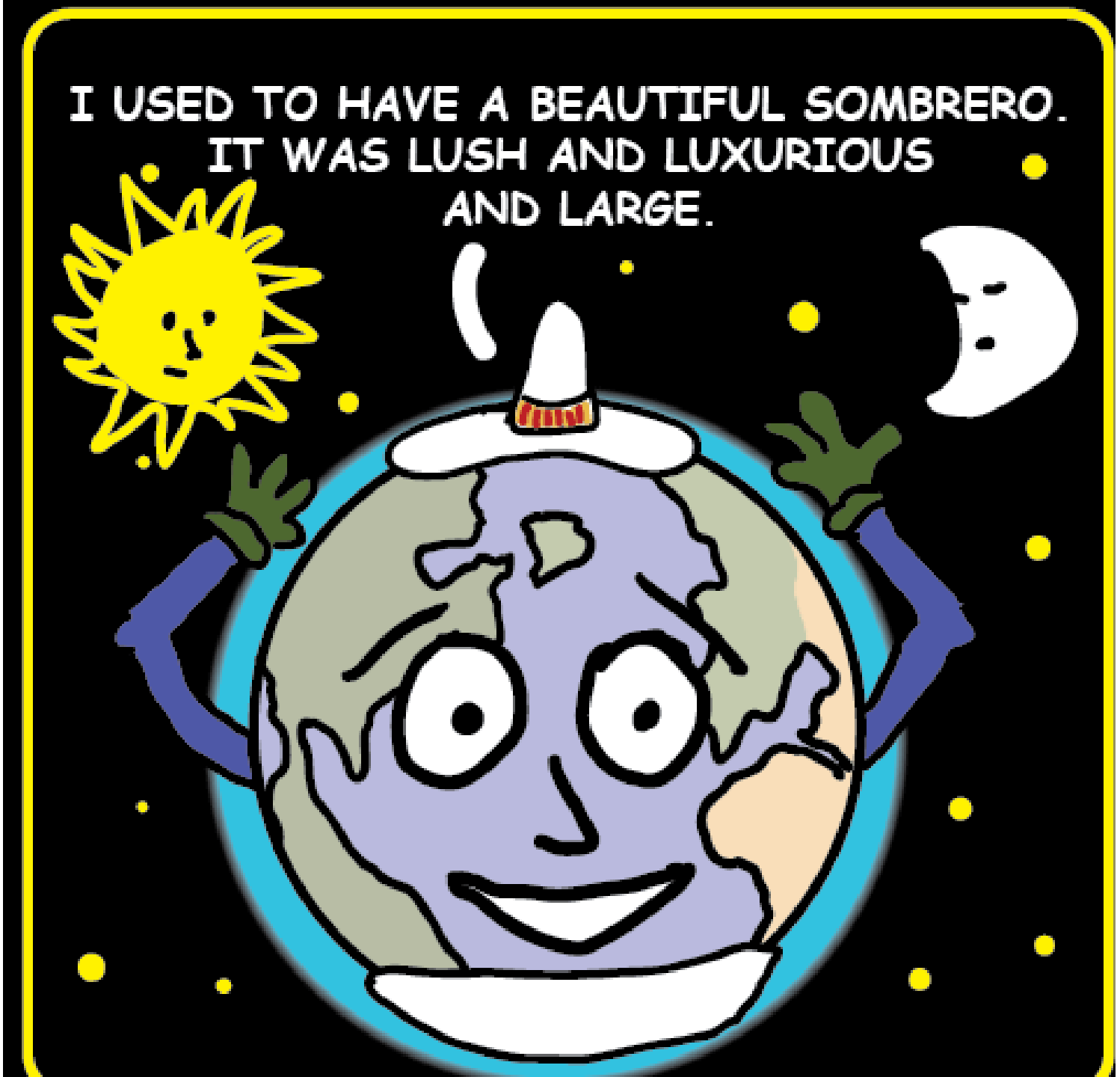
http://www.esrl.noaa.gov/gmd/grad/snomelt.html

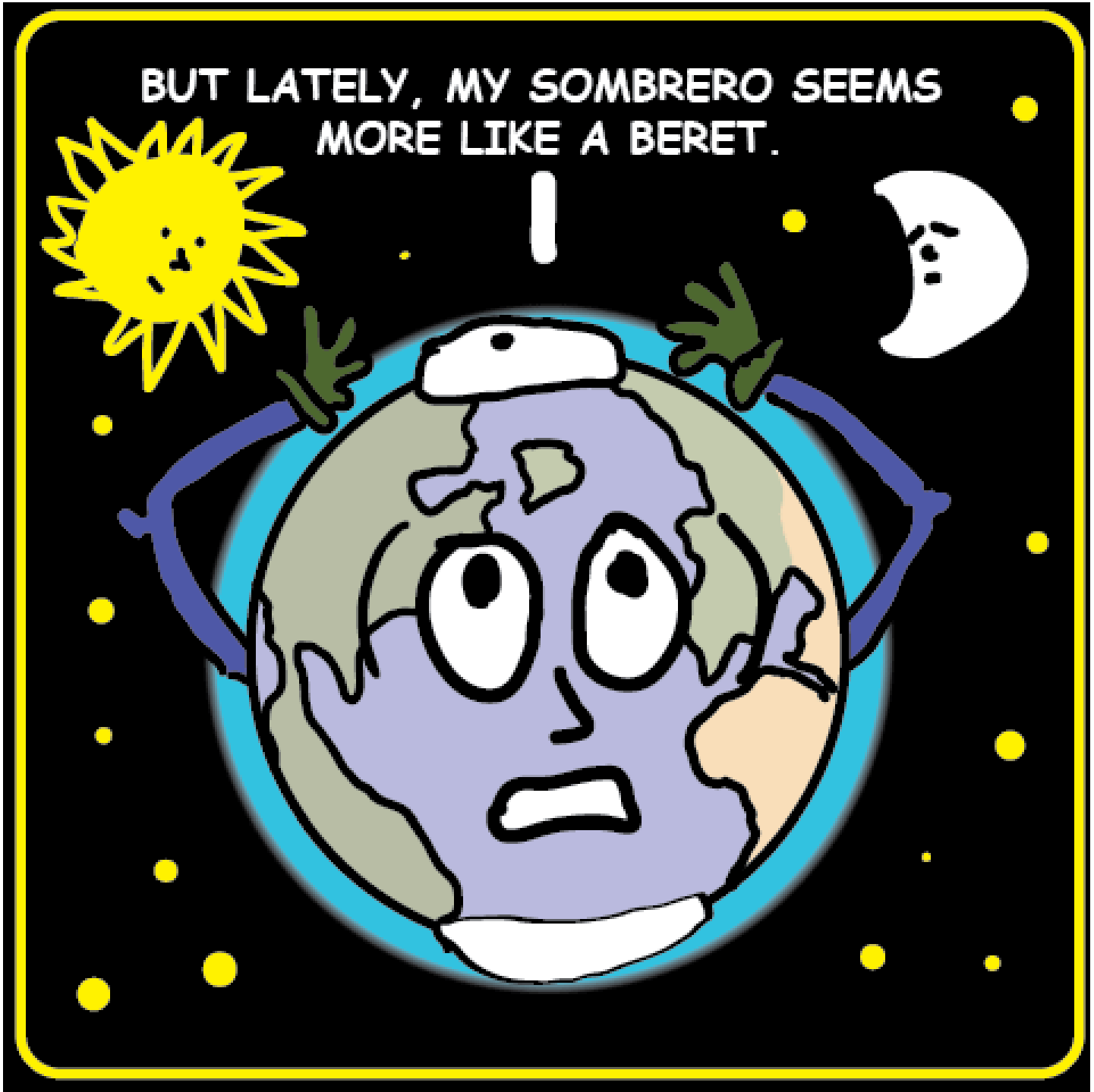
Shrinking of polar ice sheets

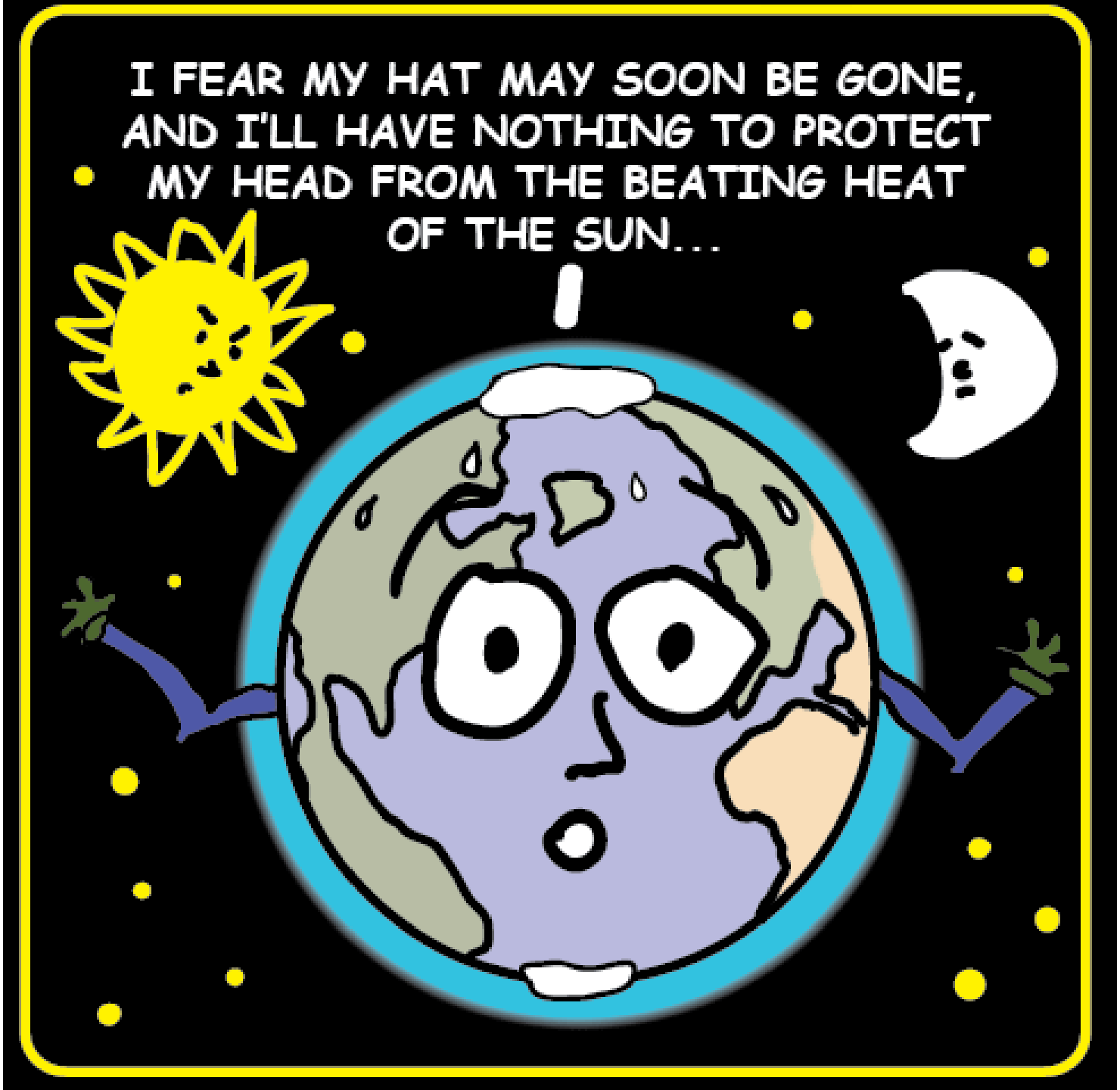


- If the total sea ice extent in 1987 was 7.5 million square km and the 2007 value was 4.3 million square km, how much sea ice has been lost within this time period? (show your math)

- 7.5 million = 7.5×10^6
- 4.3 million = 4.3×10^6
- Difference = 3.2×10^6 km^2


I USED TO HAVE A BEAUTIFUL SOMBRERO.
IT WAS LUSH AND LUXURIOUS
AND LARGE.


BUT LATELY, MY SOMBRERO SEEMS MORE LIKE A BERET.


I FEAR MY HAT MAY SOON BE GONE, AND I'LL HAVE NOTHING TO PROTECT MY HEAD FROM THE BEATING HEAT OF THE SUN...


...AND BESIDES...I DON'T WANT ANYONE TO KNOW I'M BALD...


HEY, BUDDY, YOUR UNDERWEAR'S GONE !!!
OH, MY!
Hey, guys! WE don't think that's so funny!
www.hurryupplease!tstime.com

Why??????

- Burning fossil fuels
- Deforestation

Humans have a greater impact on ecosystems than any other organism due to their **ability to alter their environment**