

**Freezing out the bigger picture:
Arctic blasts tied to climate change**

**Climate change threatens
food security in S Asia**

**UN chief 'alarmed' at
Arctic glacier melt**

The Earth is changing already

**'Greenhouse effect'
could destroy all life**


**Nasa scientist accuses Washington
of hiding global warming evidence**



2015
STATE
OF THE
UNION
#SOTU

Our current President...



Donald J. Trump 

@realDonaldTrump

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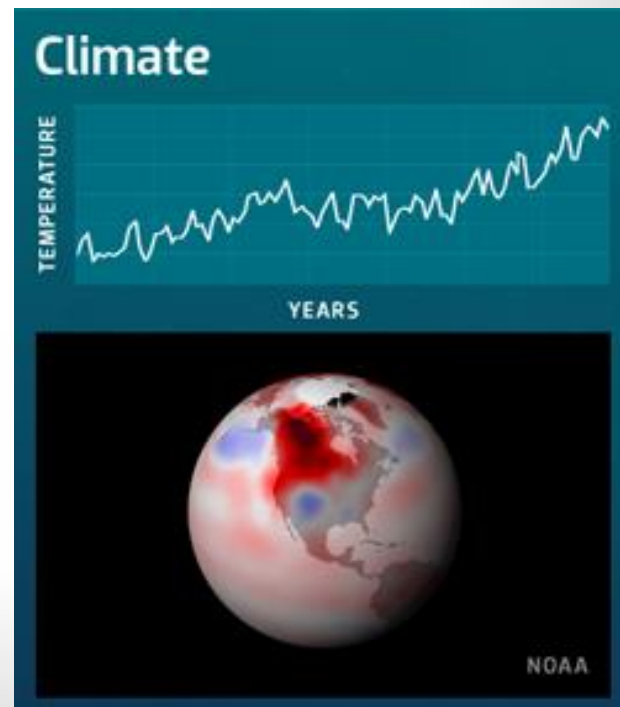


In the beautiful Midwest, windchill temperatures are reaching minus 60 degrees, the coldest ever recorded. In coming days, expected to get even colder. People can't last outside even for minutes. What the hell is going on with Global Waming? Please come back fast, we need you!

6:28 PM - 28 Jan 2019

Weather vs. Climate

- **Weather** = a specific event; happens over a short period.
- **Climate** = average weather over many years.



Global Climate Change

1. Greenhouse effect
2. Evidence of climate change
3. Implications
4. What you can do

The Greenhouse Effect

- Based on distance from sun...
 - Earth should have ave. temp. = -18°C (0°F)
 - Oceans frozen all year long
- But atmospheric gases trap heat
 - Actual, ave. temp. = 15°C (59°F)

The Greenhouse Effect

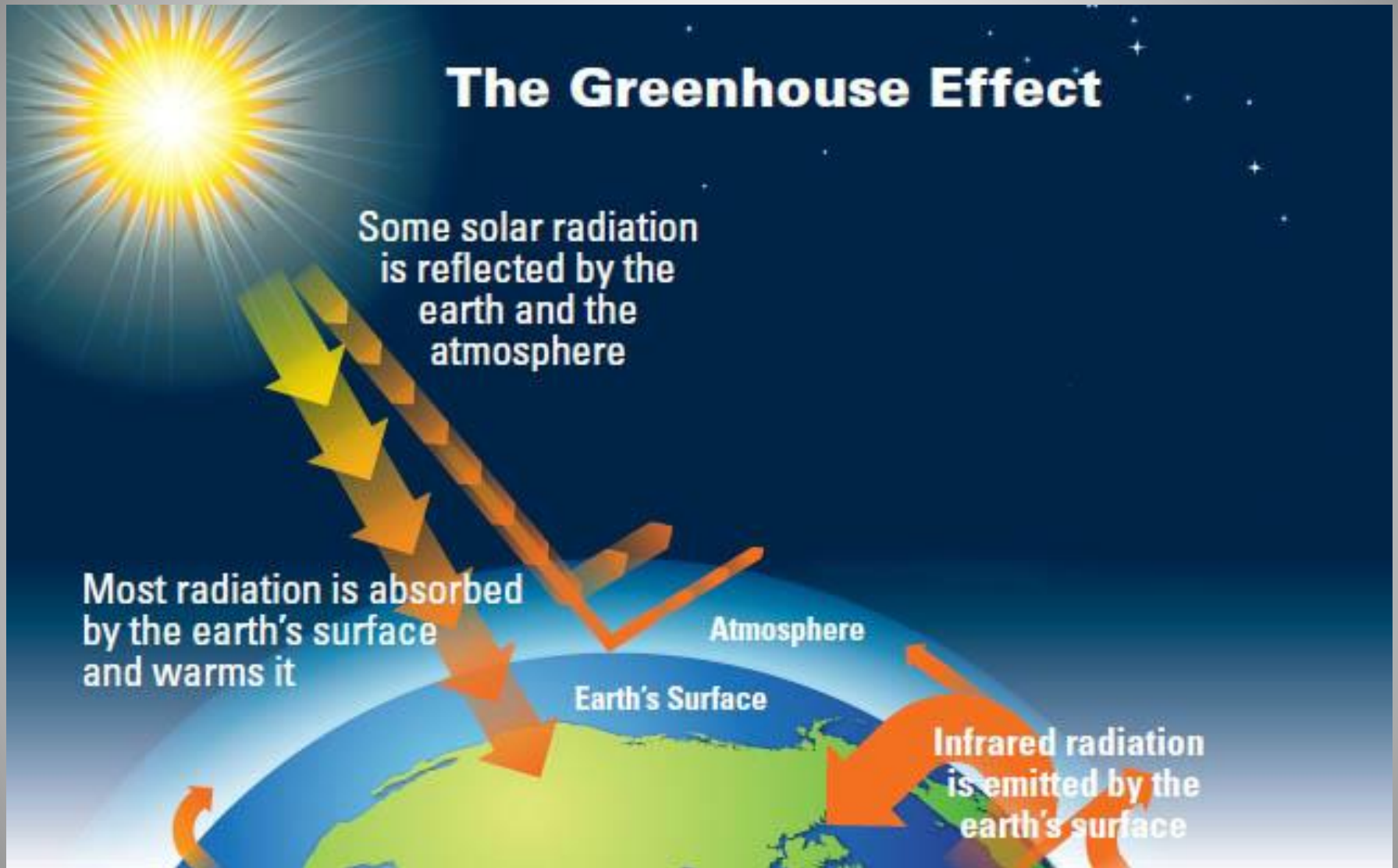
Some solar radiation
is reflected by the
earth and the
atmosphere

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

Atmosphere

Earth's Surface

Infrared radiation
is emitted by the
earth's surface



Greenhouse gases and IR absorption:

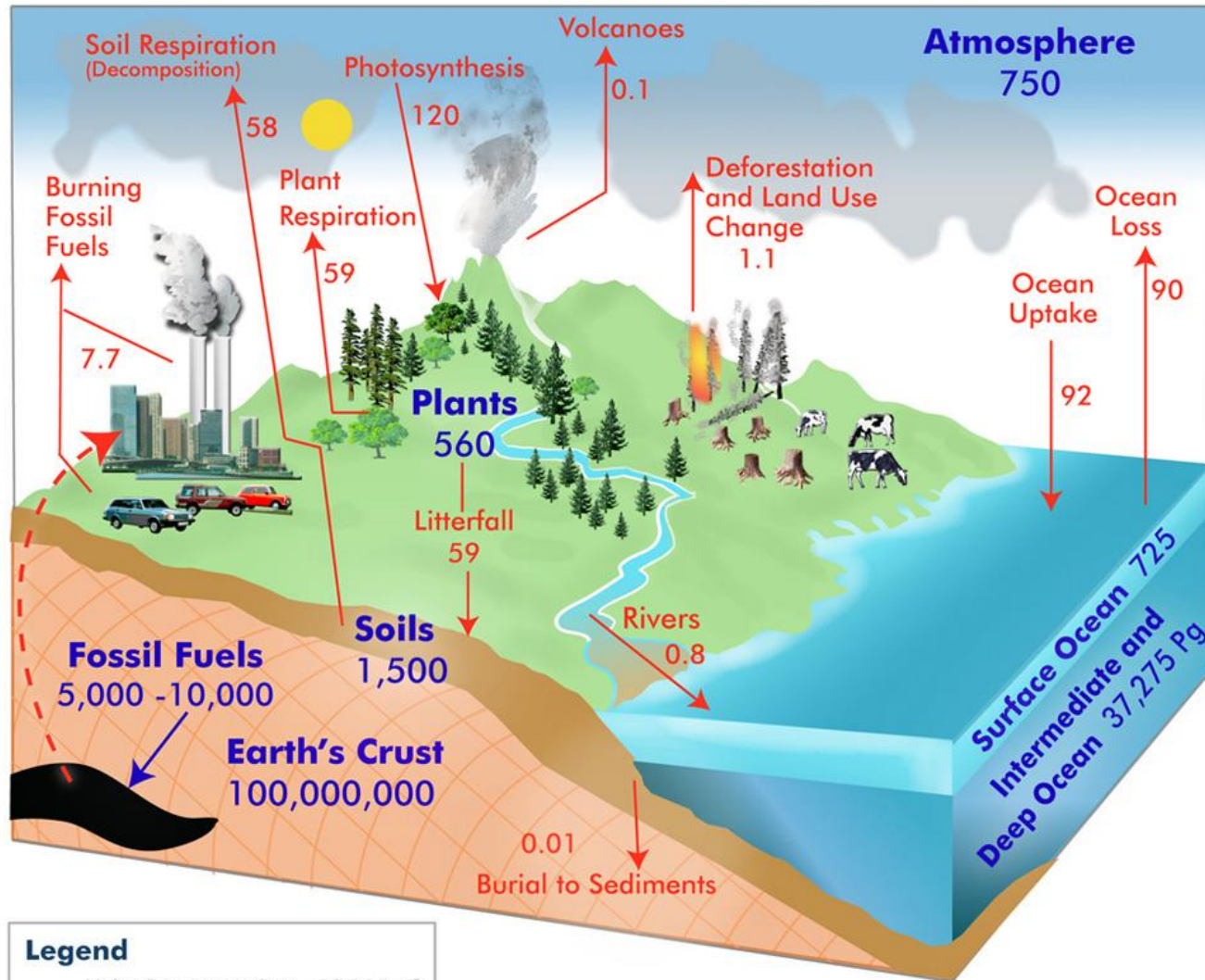
carbon dioxide vibrations



Other greenhouse gases: H_2O and CH_4

Not: N_2 and O_2

Global Carbon Cycle



CO₂ in Recent Times

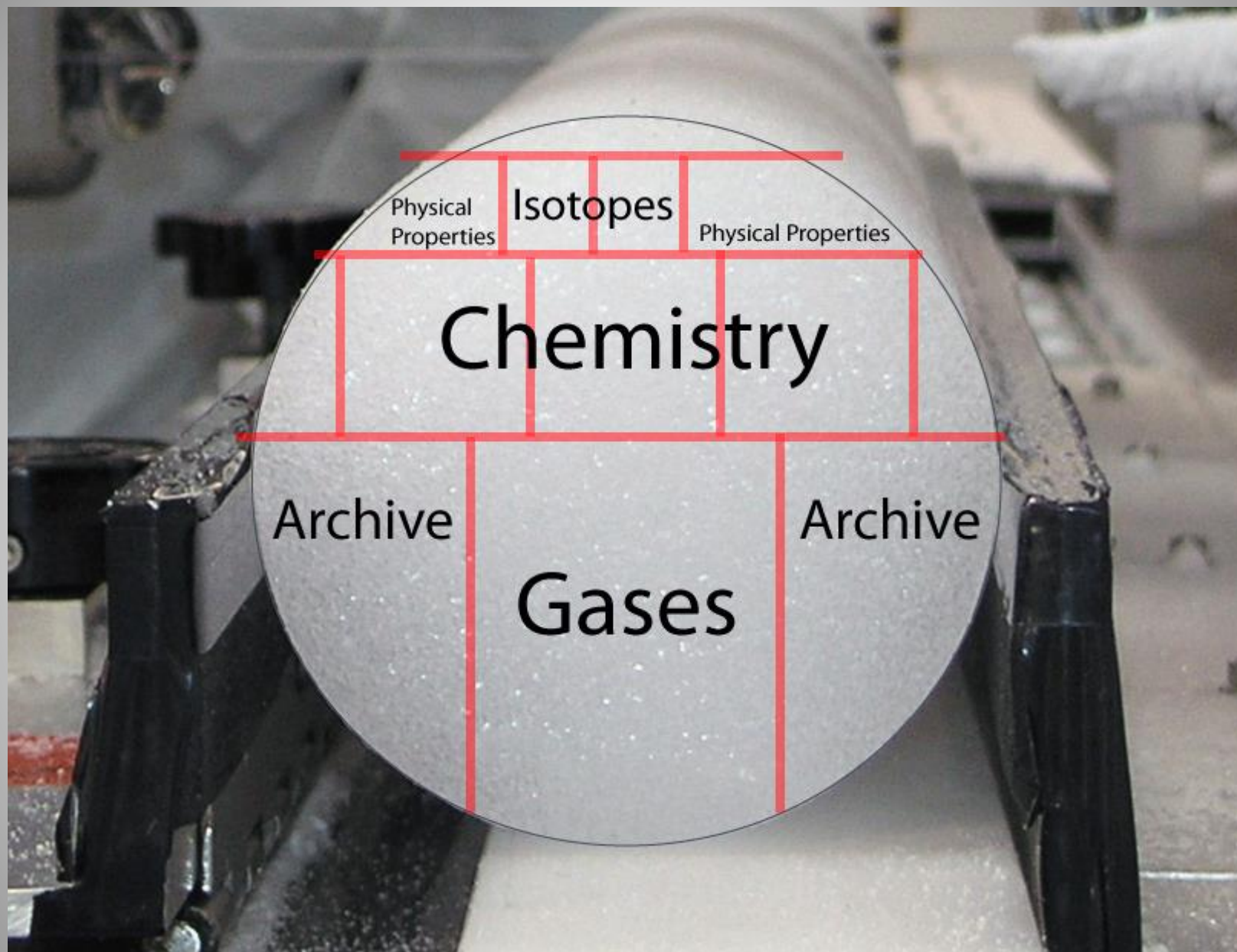
- Burning fossil fuels releases CO₂



- Fuels are used in electrical generation plants, automobiles, home heating, etc....
- CO₂ levels ↑ 30% since late 1700's
- How do we know?
 - 800,000 years of temp. and CO₂ data!
 - Ice cores, tree rings, coral, ocean sediment...

Ice Core Drilling

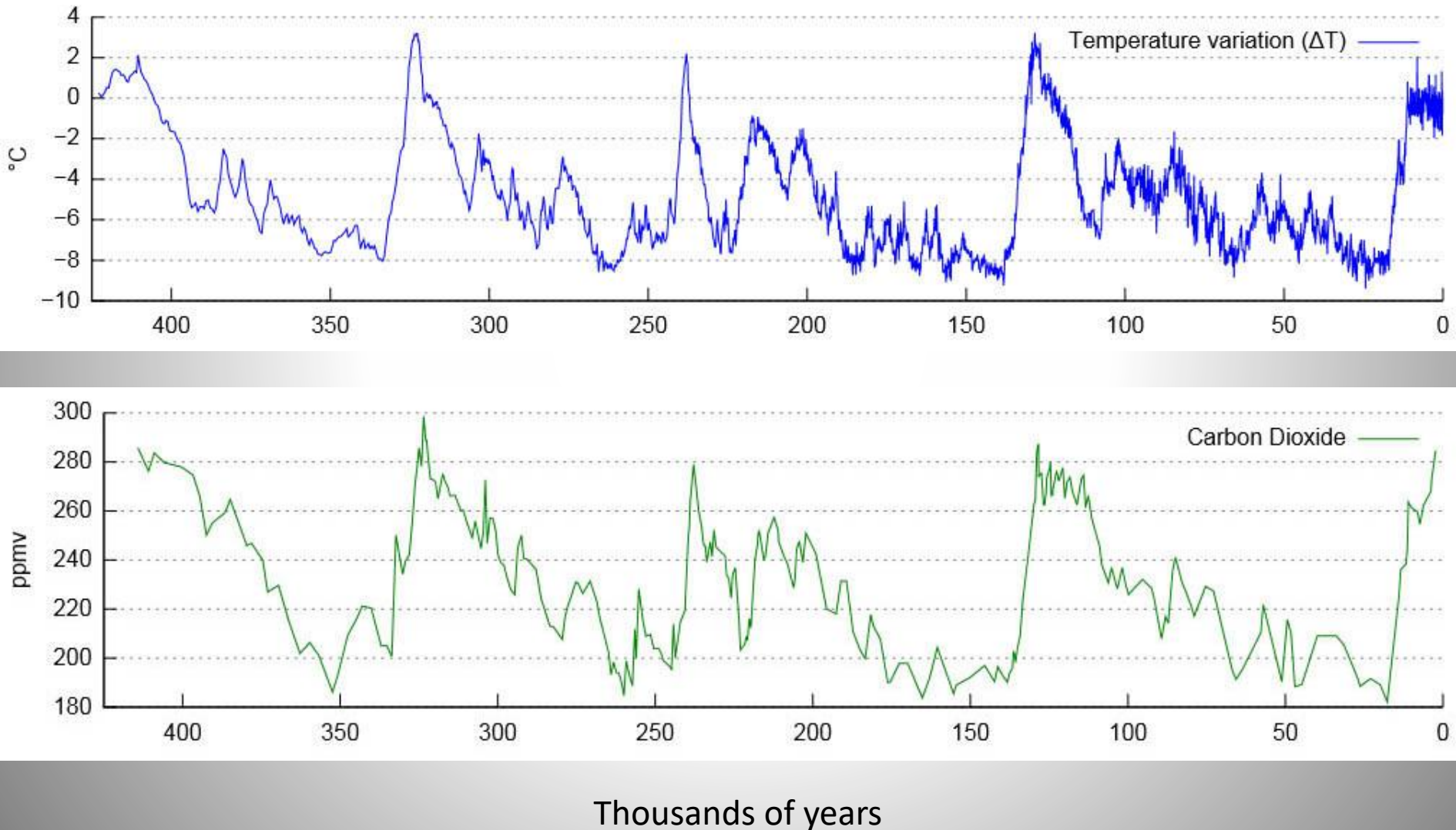




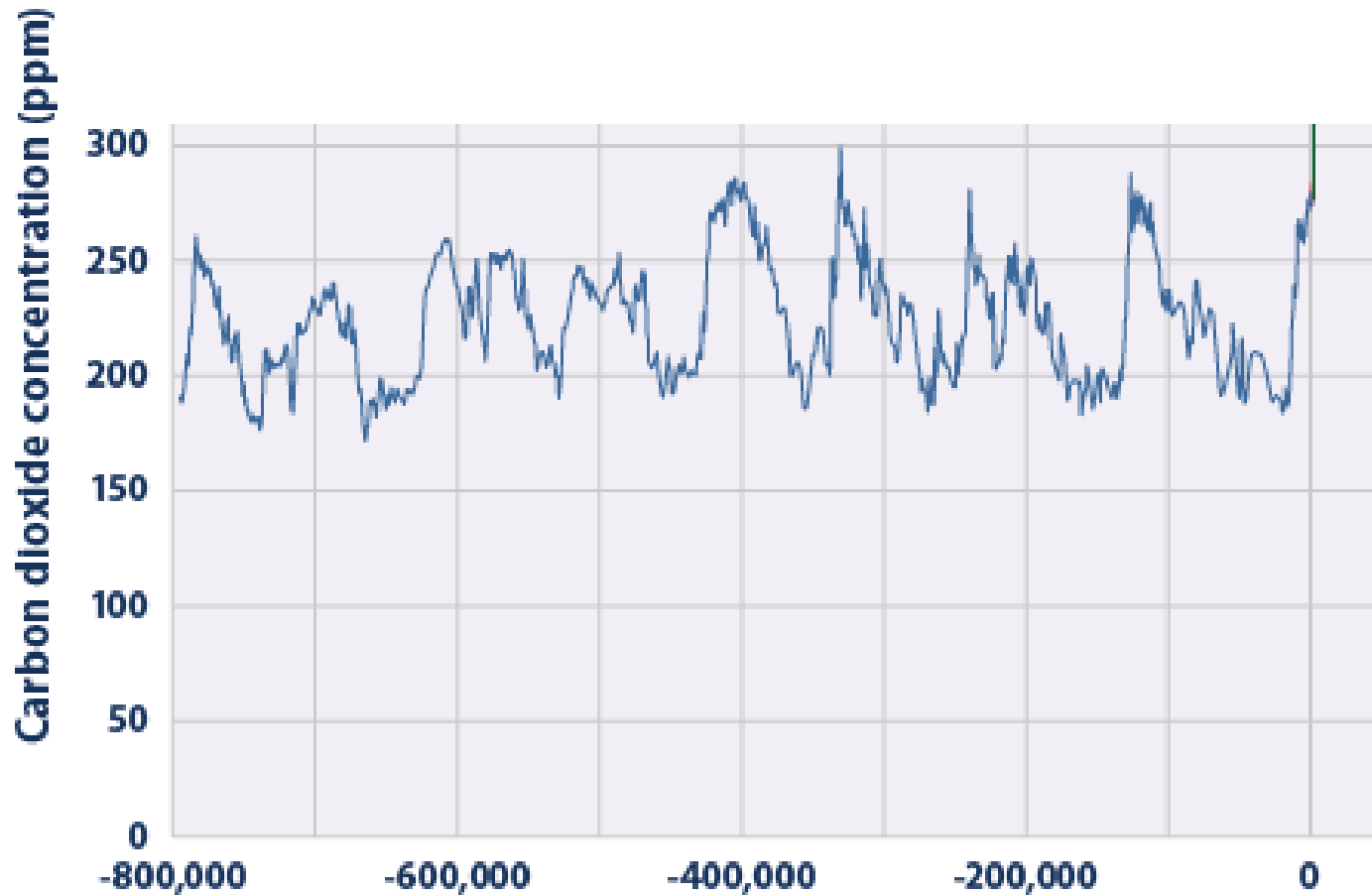
Understanding Ice Core Data



The Evidence: Vostok Ice Core Data



Concentrations of Carbon Dioxide in the Atmosphere from 800,000 Years Ago to Present Day



The Implications

- Ocean acidification
- Threatened water resources
- Impacted agriculture
- Human health
- Species extinction
- Rising temperatures
- Rising sea levels
- Increase in severe weather events

Rising Ave Global Temperature



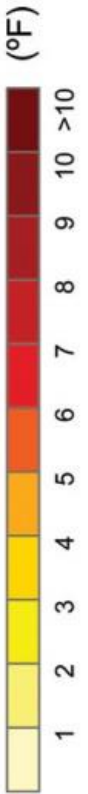
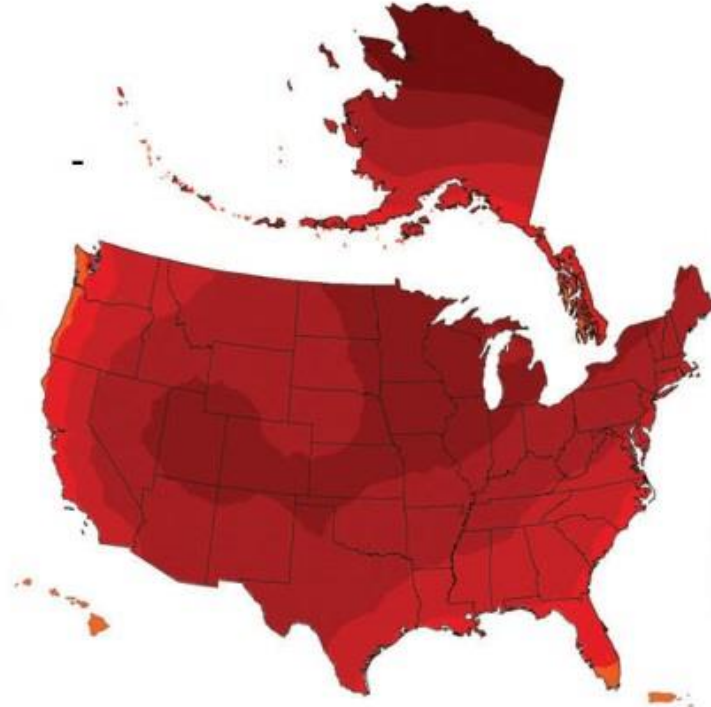
Higher Average Local Temps

Higher Emissions Scenario - Projected Temperature Change (°F)
From 1961-1979 Baseline

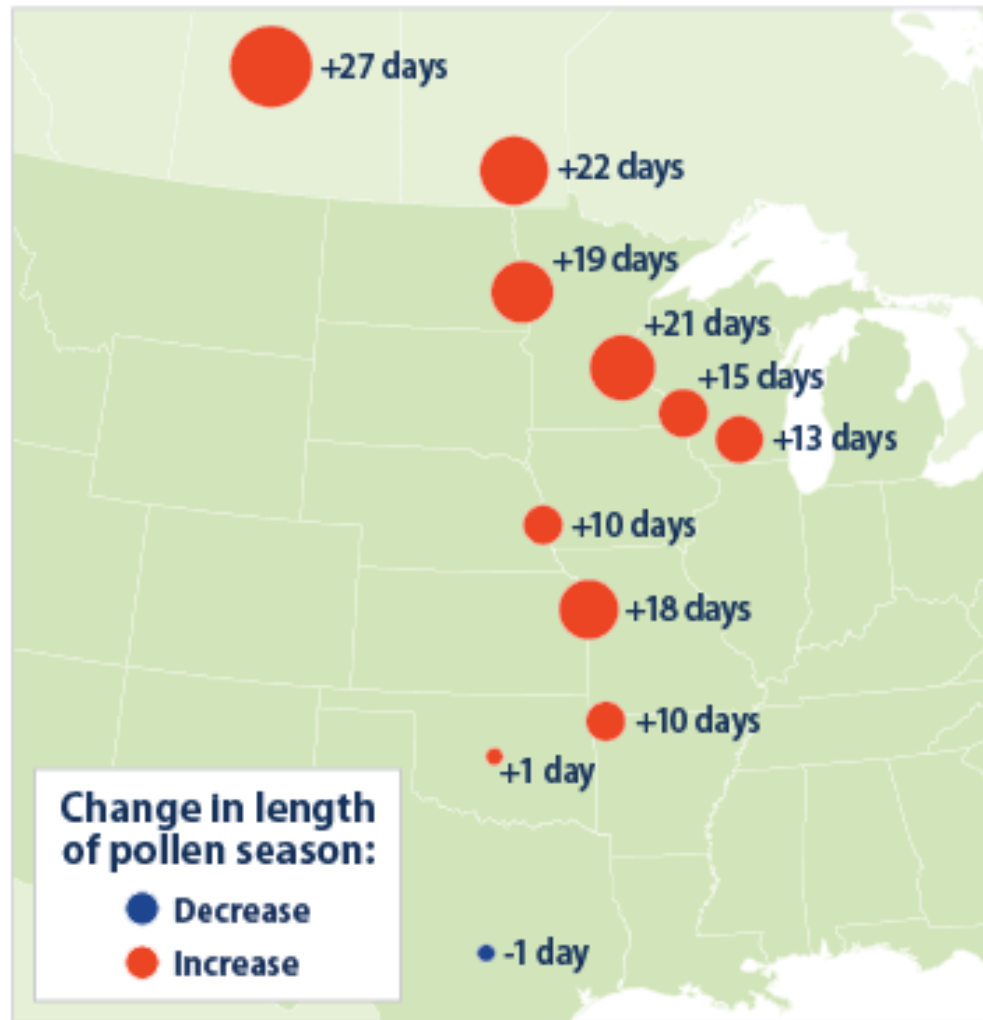
Mid-Century (2040-2059 average)



End-of-Century (2080-2099 average)



Change in Length of Ragweed Pollen Season, 1995–2013

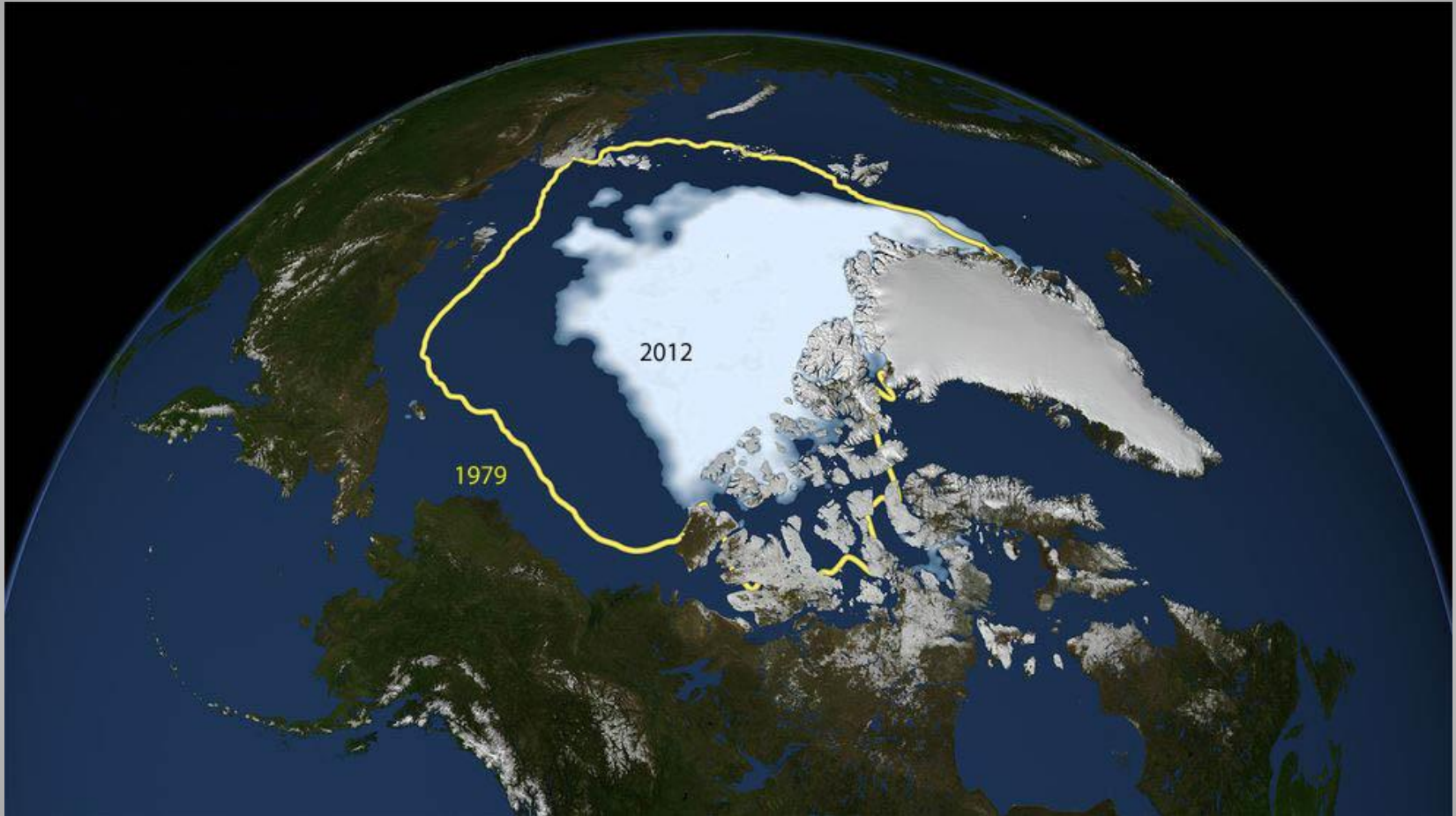


Data source: Ziska et al., 2014

Increases in:

- Allergies
- Asthma
- Lyme disease
- Heat stroke and weather-related deaths

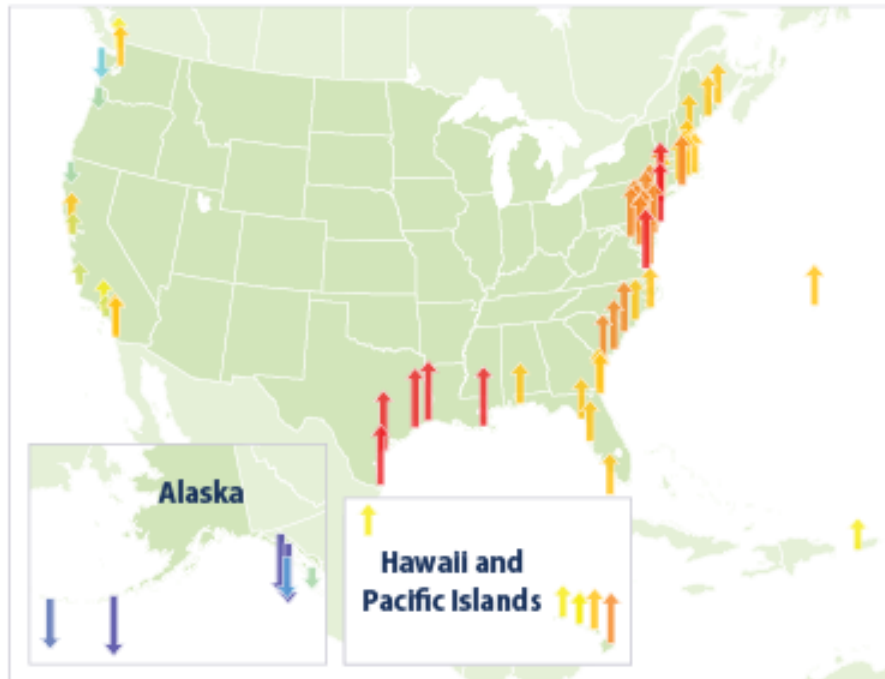
Melting Ice Caps



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

Rising Sea Levels

Change in Sea Level Relative to the Land, 1960–2013



Data source: NOAA, 2014

- Since 1870, global sea level $\uparrow \sim 8''$
- $\uparrow \sim 1/8$ inch a year
- $\sim 2x$ faster than a few decades ago
- 2' rise by 2100



Severe Weather: Hurricanes



(Andrew Burton/Getty Images/AFP)

CA Wildfires



Things you can do:

- Keep learning: [NASA](#)
- Calculate your carbon footprint
- Reduce/Reuse/Recycle
- Plant a tree
- Talk to friends and family
- Get involved on campus: ASI Green Team, Sac State Sustainability, and Environmental Student Organization
- Vote & hold elected officials accountable
 - [Take to the street](#) (5 pt bonus)
 - Letter writing activity (10 pt bonus)



