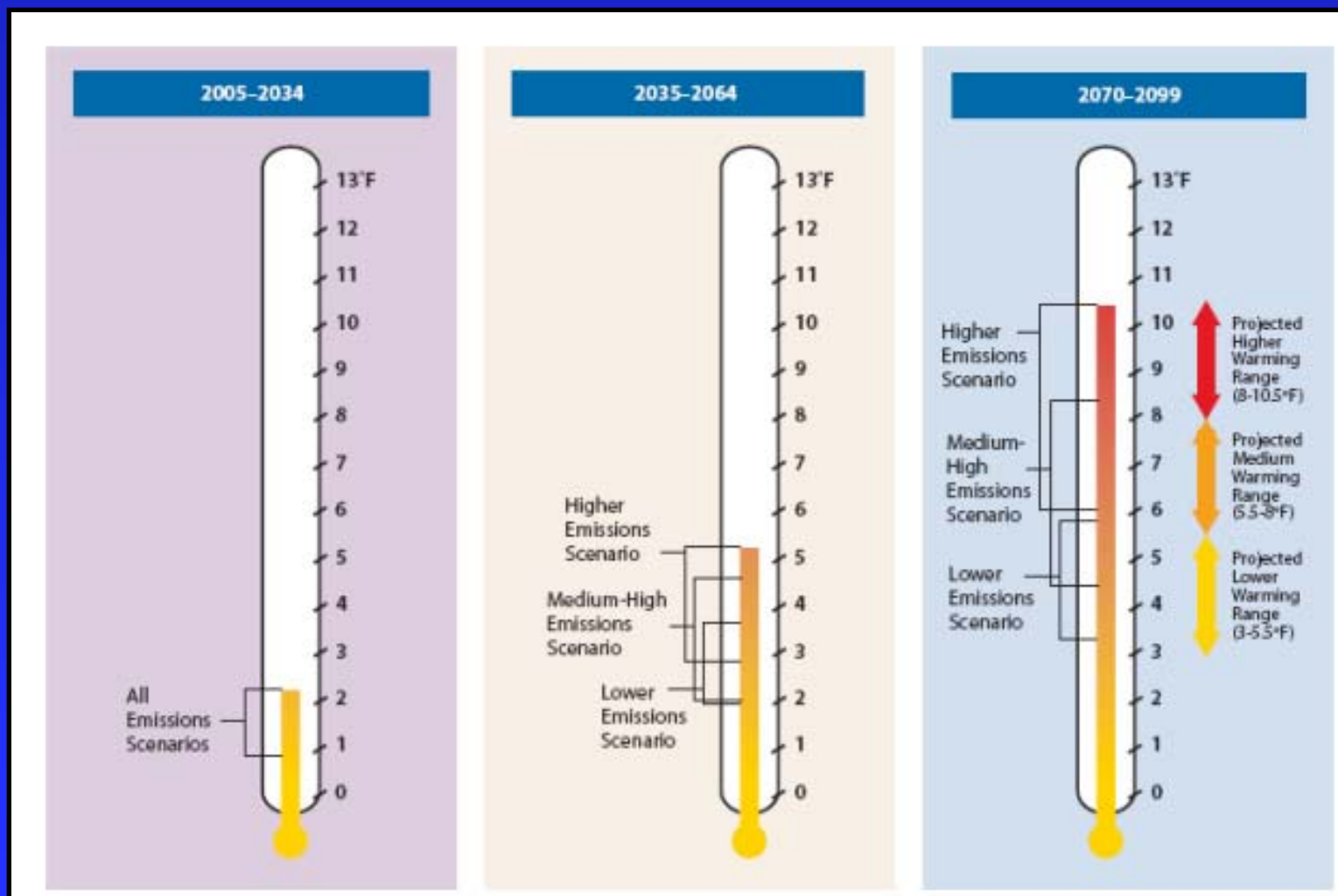
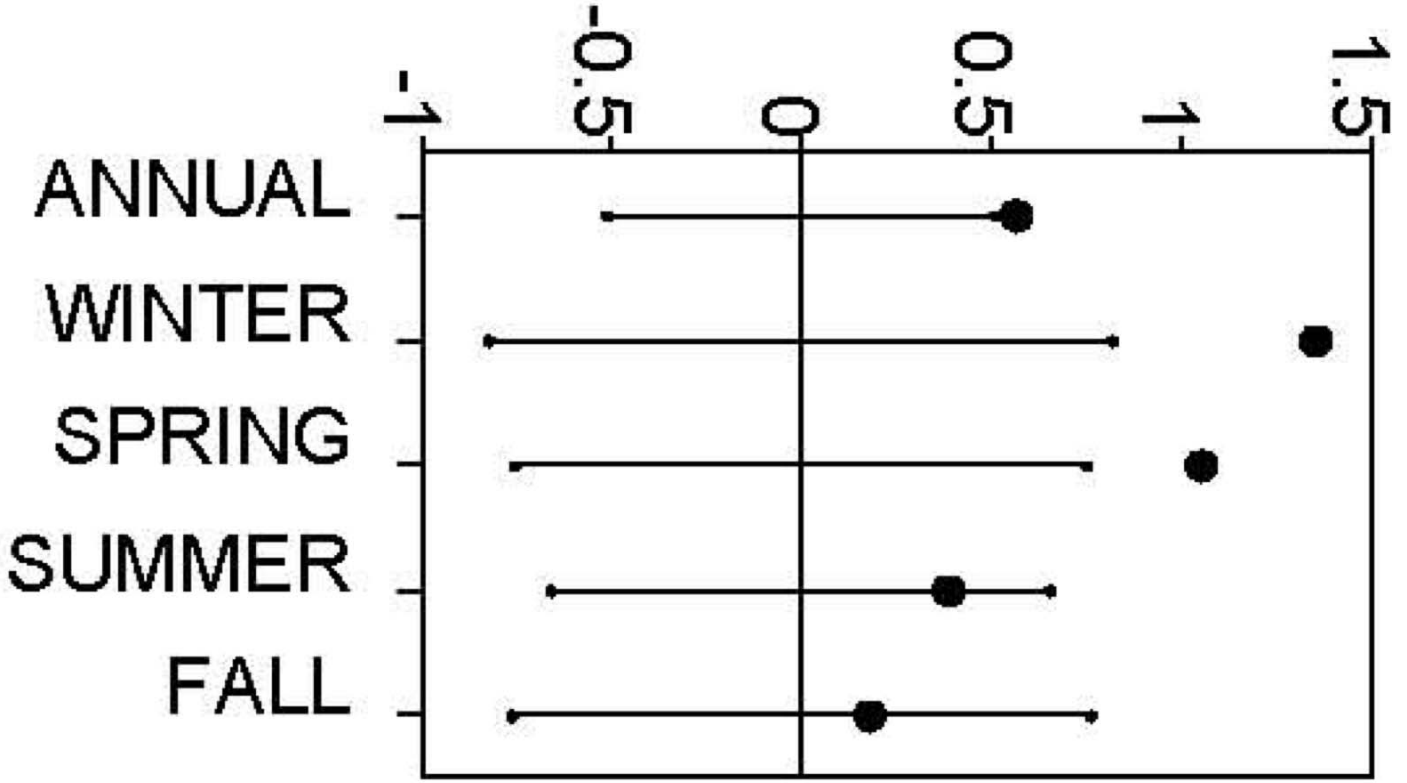

Artell
"Well OF COURSE there are greenhouse gasses
in here. It's a freakin' GREENHOUSE!"

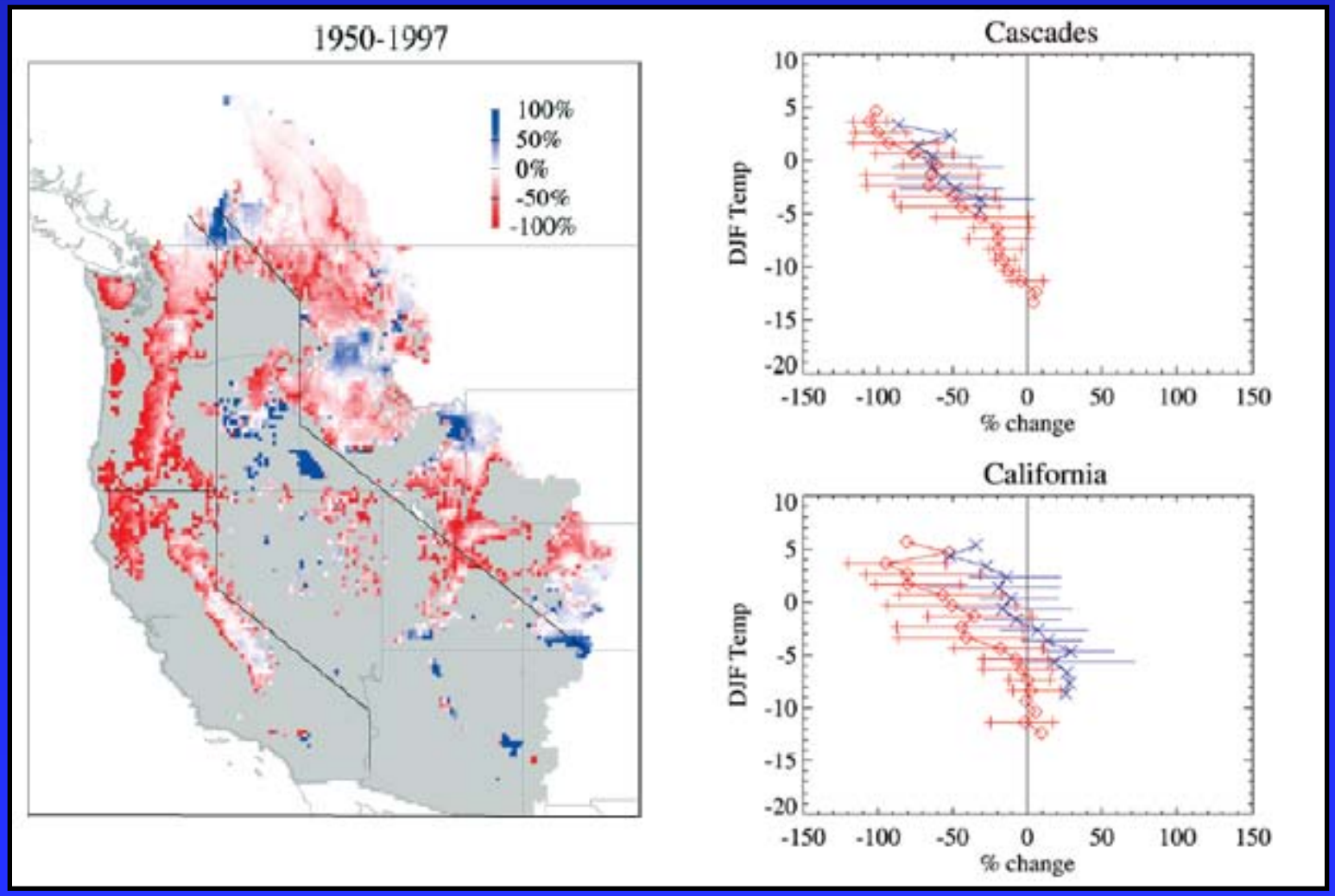
# Changes in Temperature
# 2 to 5° F by 2050



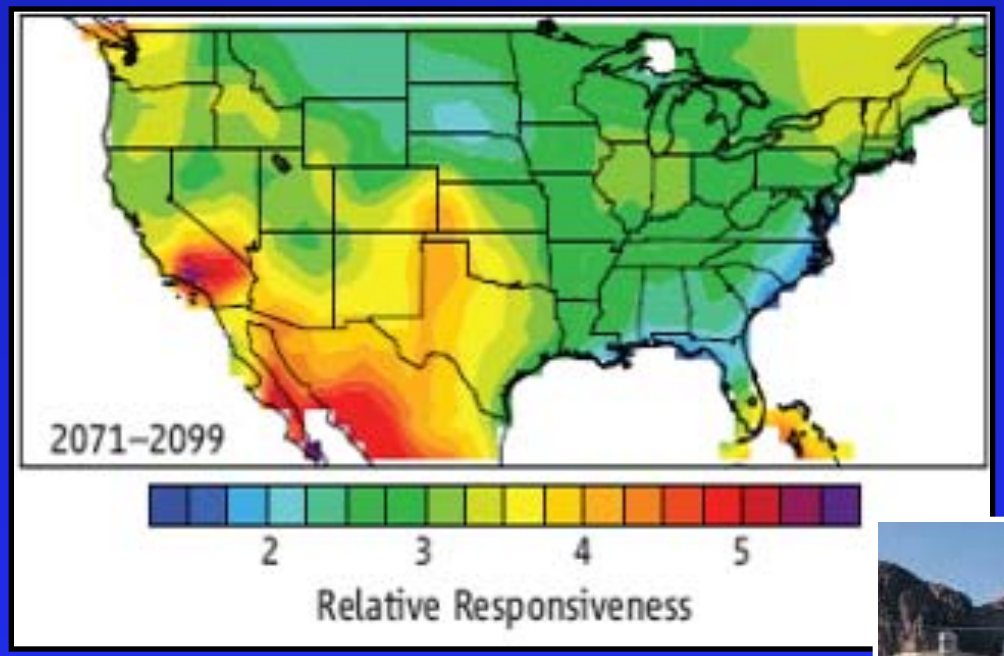
# Changes in Seasonality
# Warmer winters earlier springs



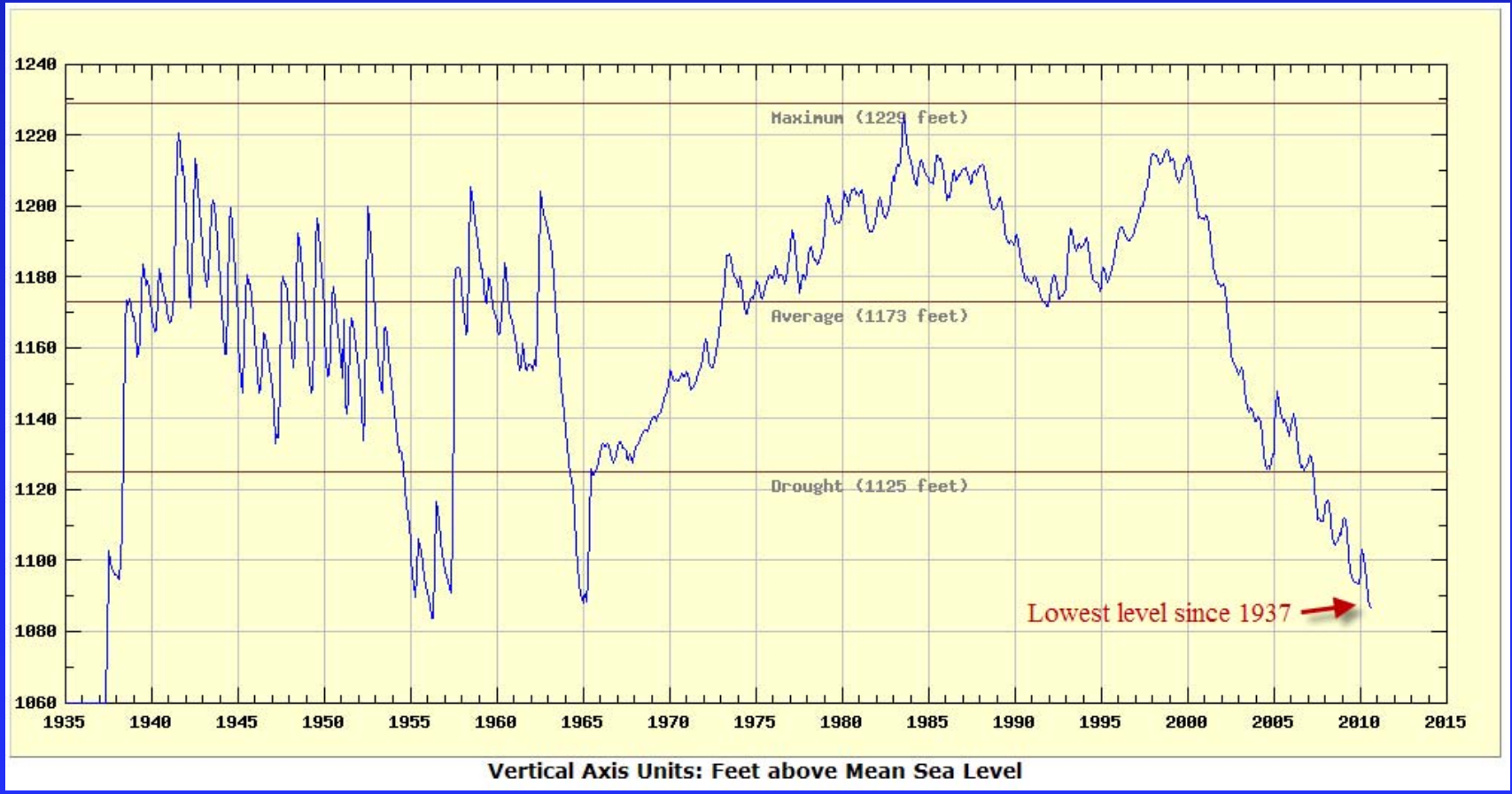
# Snowpack
# Reduced levels at low elevations



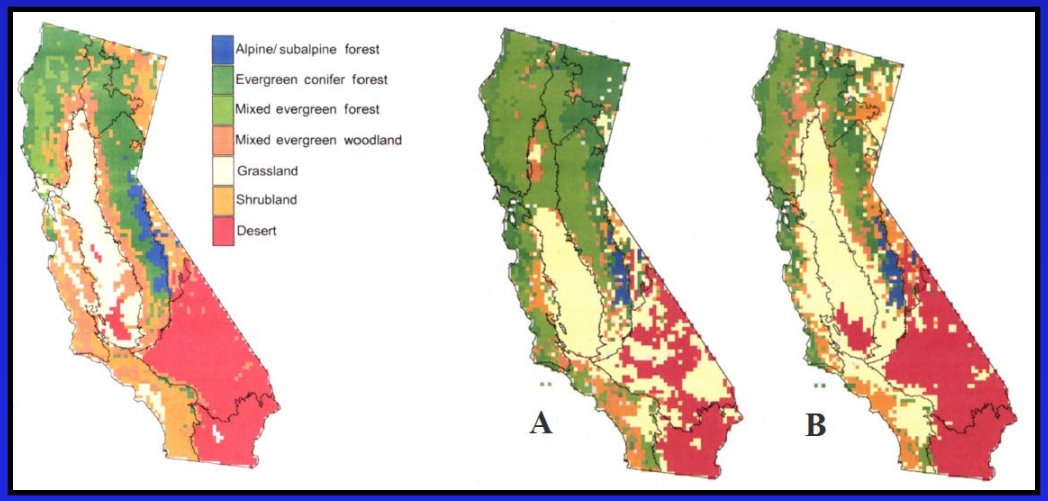
# Extra-local Water Influences

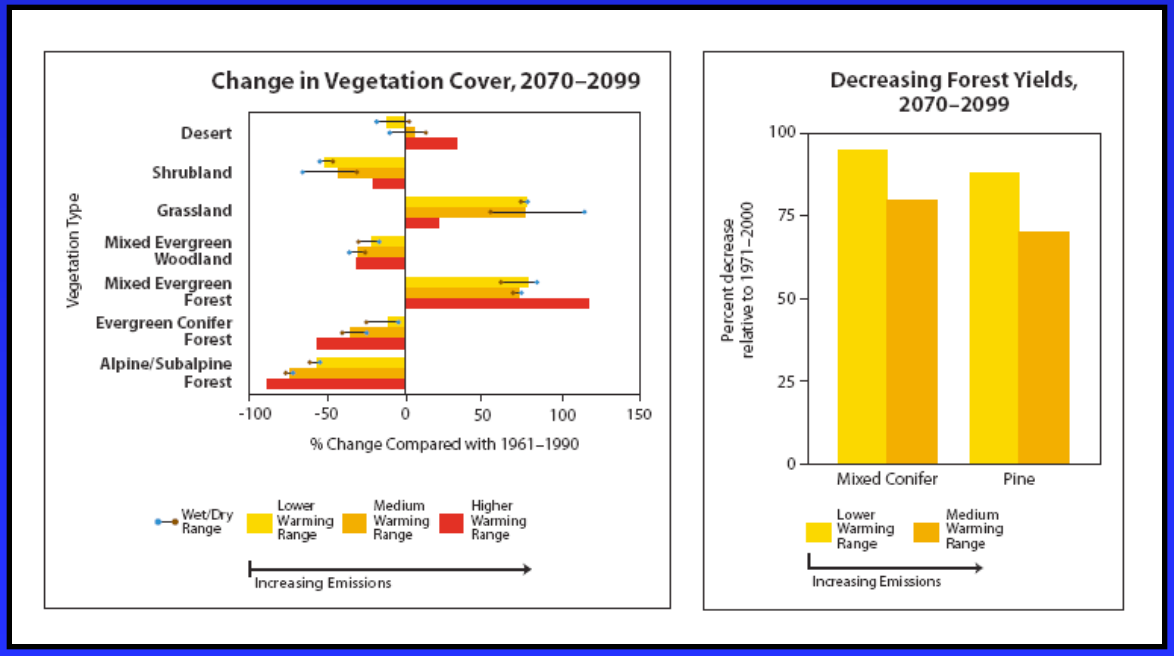



# Lake Mead Water Level

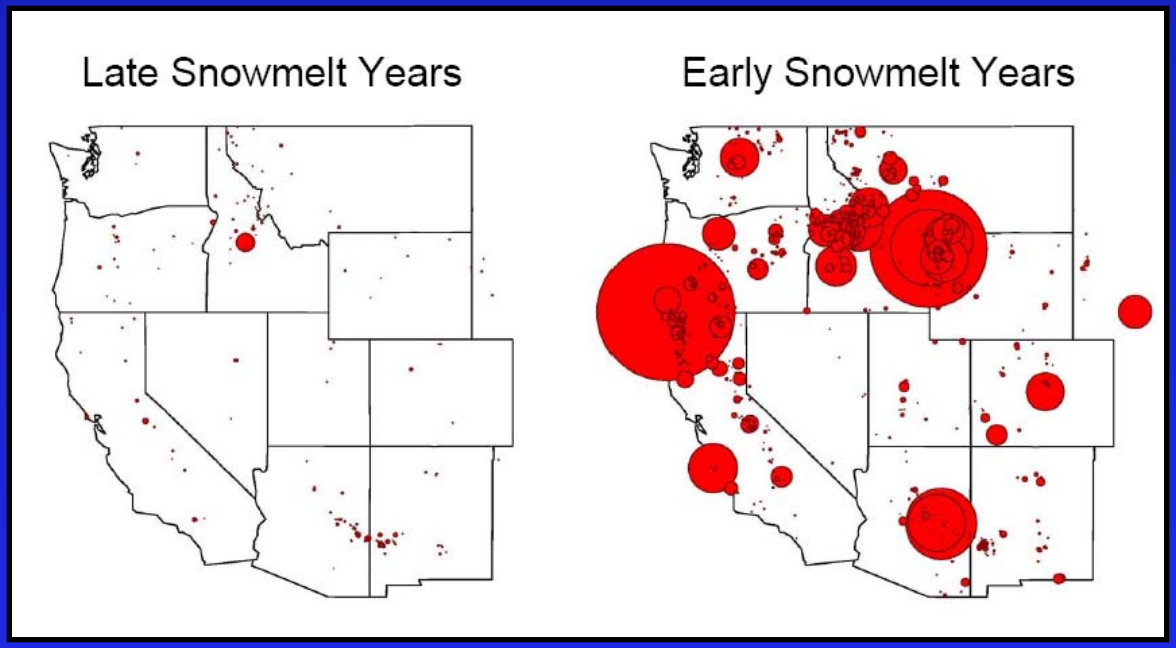


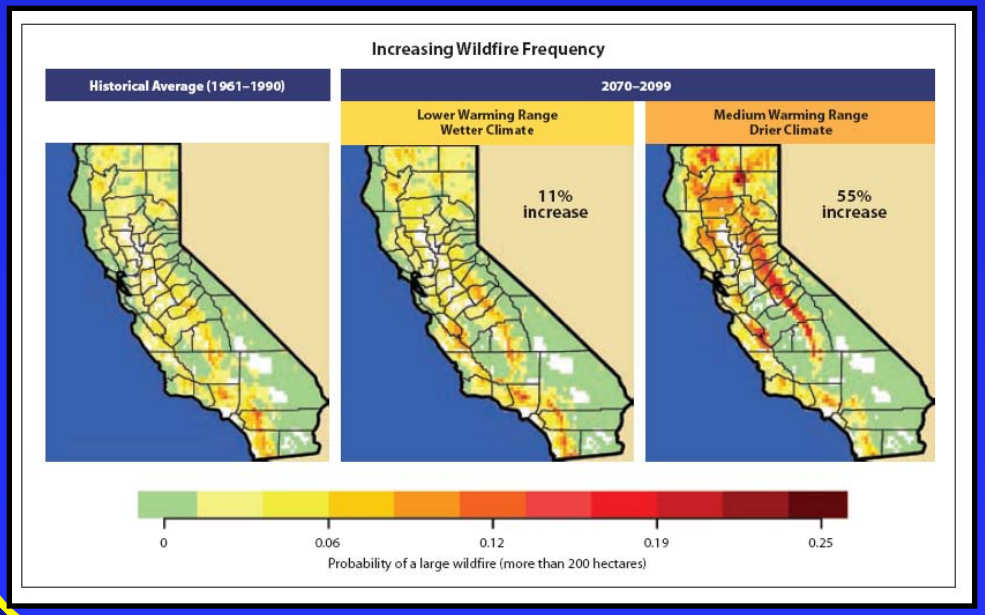
# Changes in Natural Vegetation

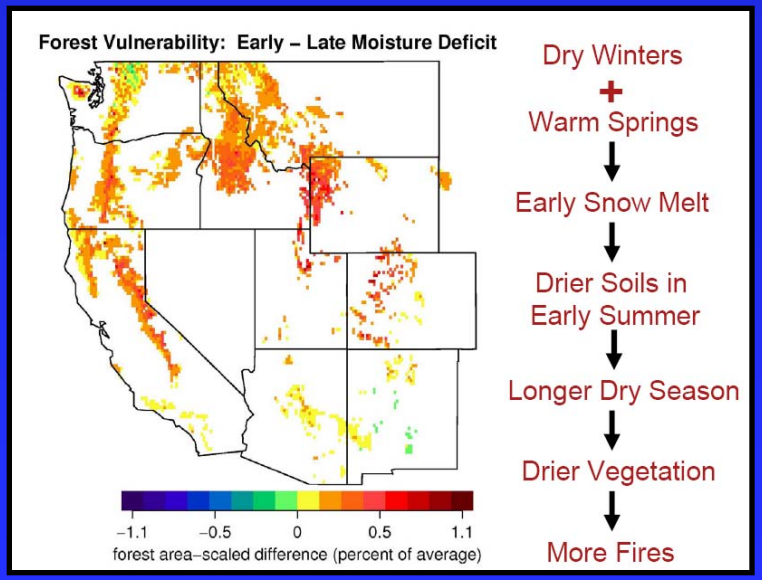


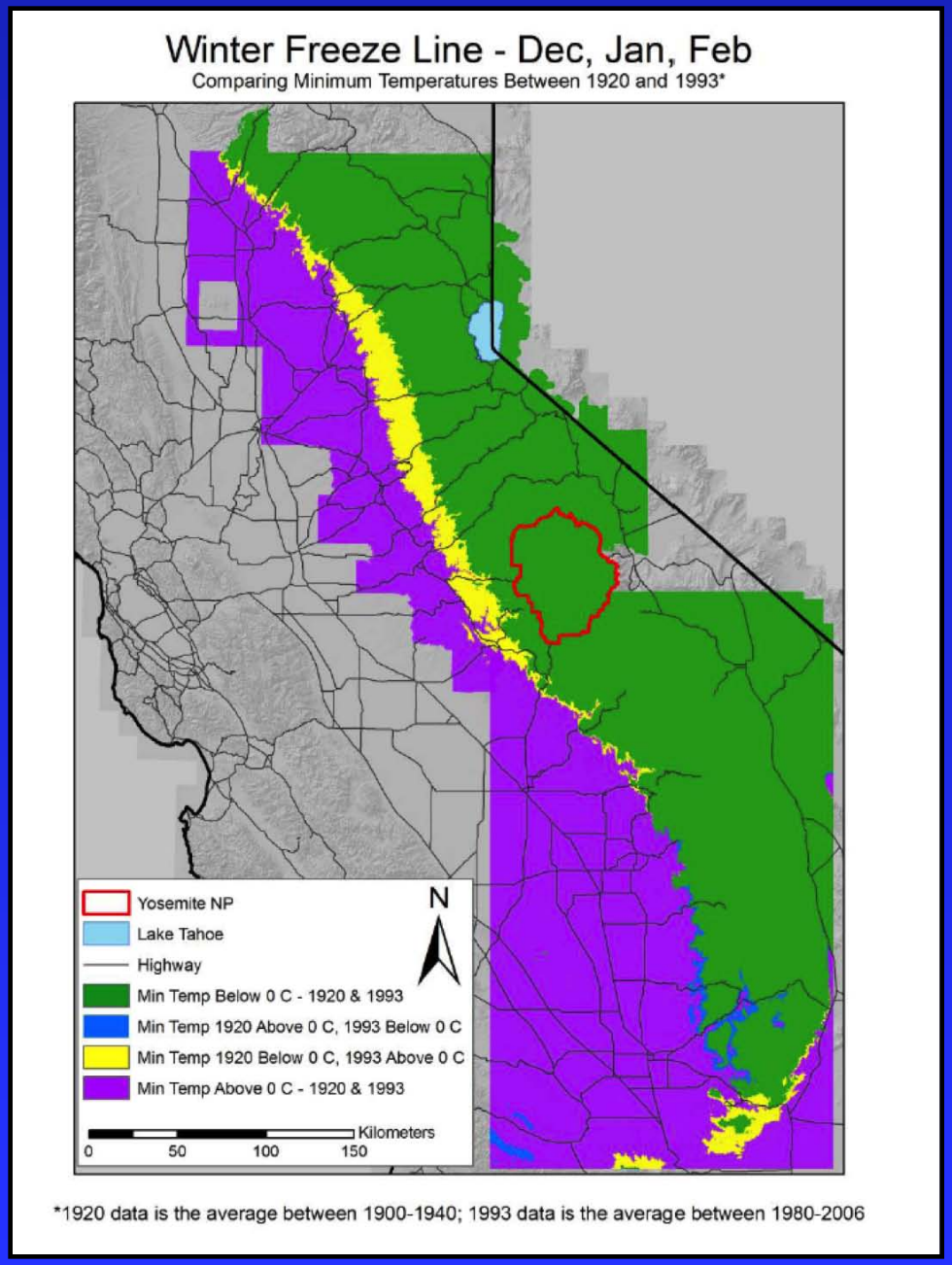
# Increased Wild Fires



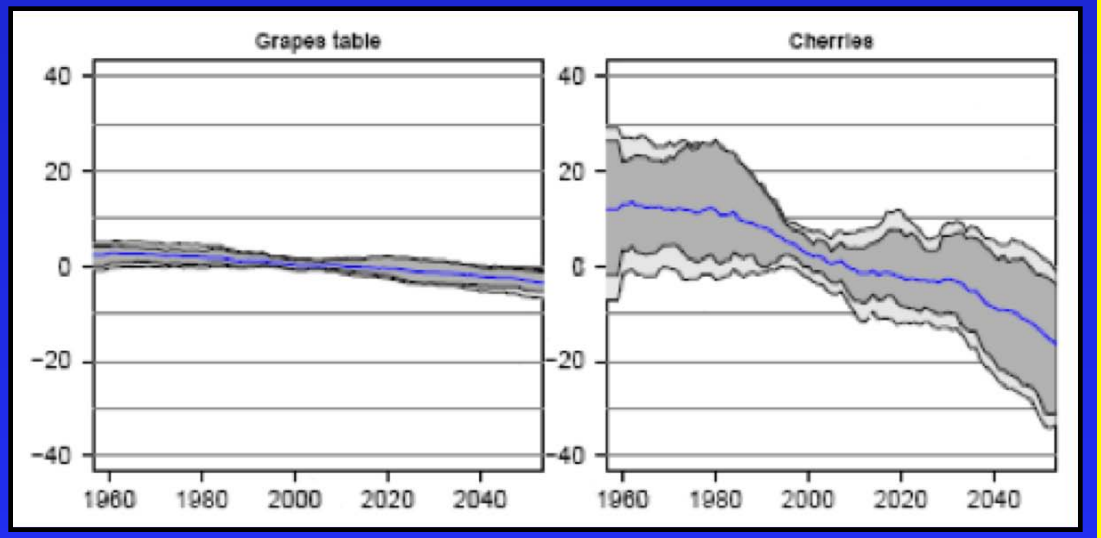



# Frost Days

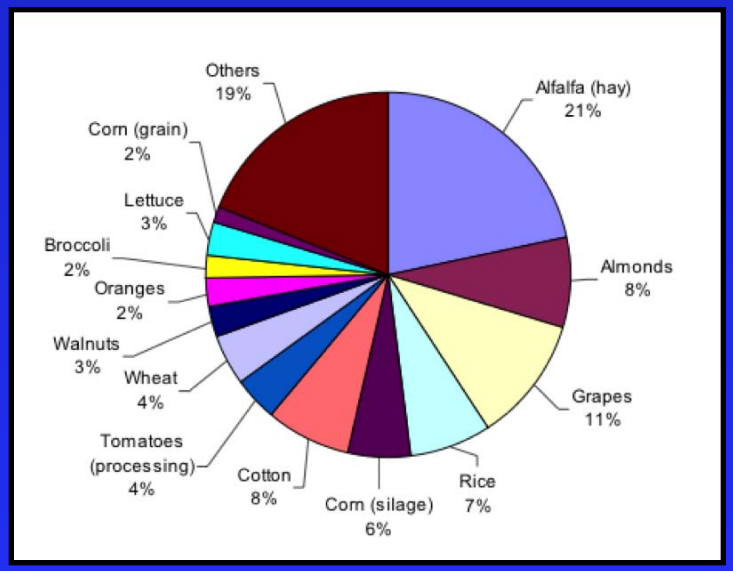

Winter Freeze Line - Dec, Jan, Feb
Comparing Minimum Temperatures Between 1920 and 1993*
Yosemite NP
Lake Tahoe
Highway
Min Temp Below 0 C - 1920 & 1993
Min Temp 1920 Above 0 C, 1993 Below 0 C
Min Temp 1920 Below 0 C, 1993 Above 0 C
Min Temp Above 0 C - 1920 & 1993
N
Kilometers
0
50
100
150
*1920 data is the average between 1900-1940; 1993 data is the average between 1980-2006

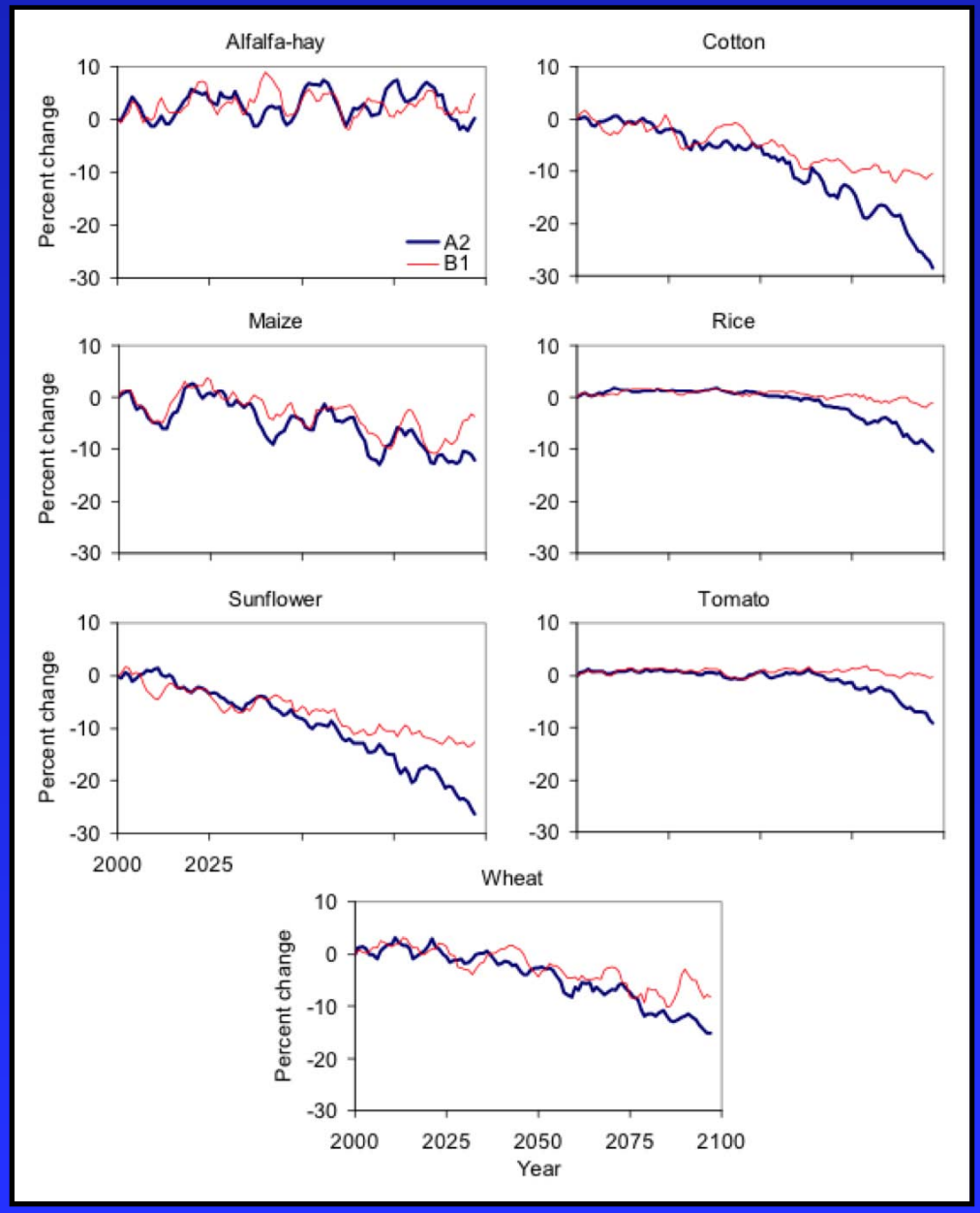
# Agriculture in the San Joaquin Valley

## Simulated Change in Crop Yields



# Relative surface area of crops in California for 2006



# Heat Deaths Increasing

The New York Times

**U.S.**

## For Californians, Deadly Heat Cut a Broad Swath

FOXNEWS.COM HOME > U.S.

## California Heat Wave Causes Power Shortages, Extreme Weather Grips State

Monday, September 03, 2007

AP

Aug. 3: Andrew Mann, a grid resource coordinator at the California Independent System Operator, monitors power use at the ISO control room in Folsom.

**LOS ANGELES — With temperatures expected to be well above 100 degrees again Sunday, California officials were appealing to residents to turn down their air conditioners and hold off on using major appliances until after dark.**

The blistering heat wave blanketing California continued to place tremendous strain on the power grid, as some 2,600 homes and businesses in Los Angeles remained without power Saturday after overloaded circuits knocked out power to thousands last week.

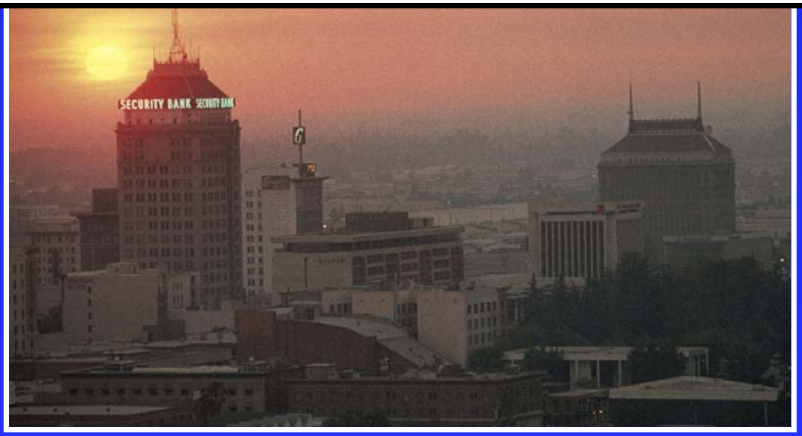
Around the state, dozens of cooling centers have been opened in parks, libraries, senior centers and county fairgrounds.

The heat wave wasn't the only extreme weather causing havoc in the state. The misery was being compounded by humidity as moisture moves in from the south, causing concerns about sudden thunderstorms. Flash-flood warnings have been issued for many valley, mountain and desert areas. A funnel cloud touched down in the Antelope Valley desert, but no one was hurt.

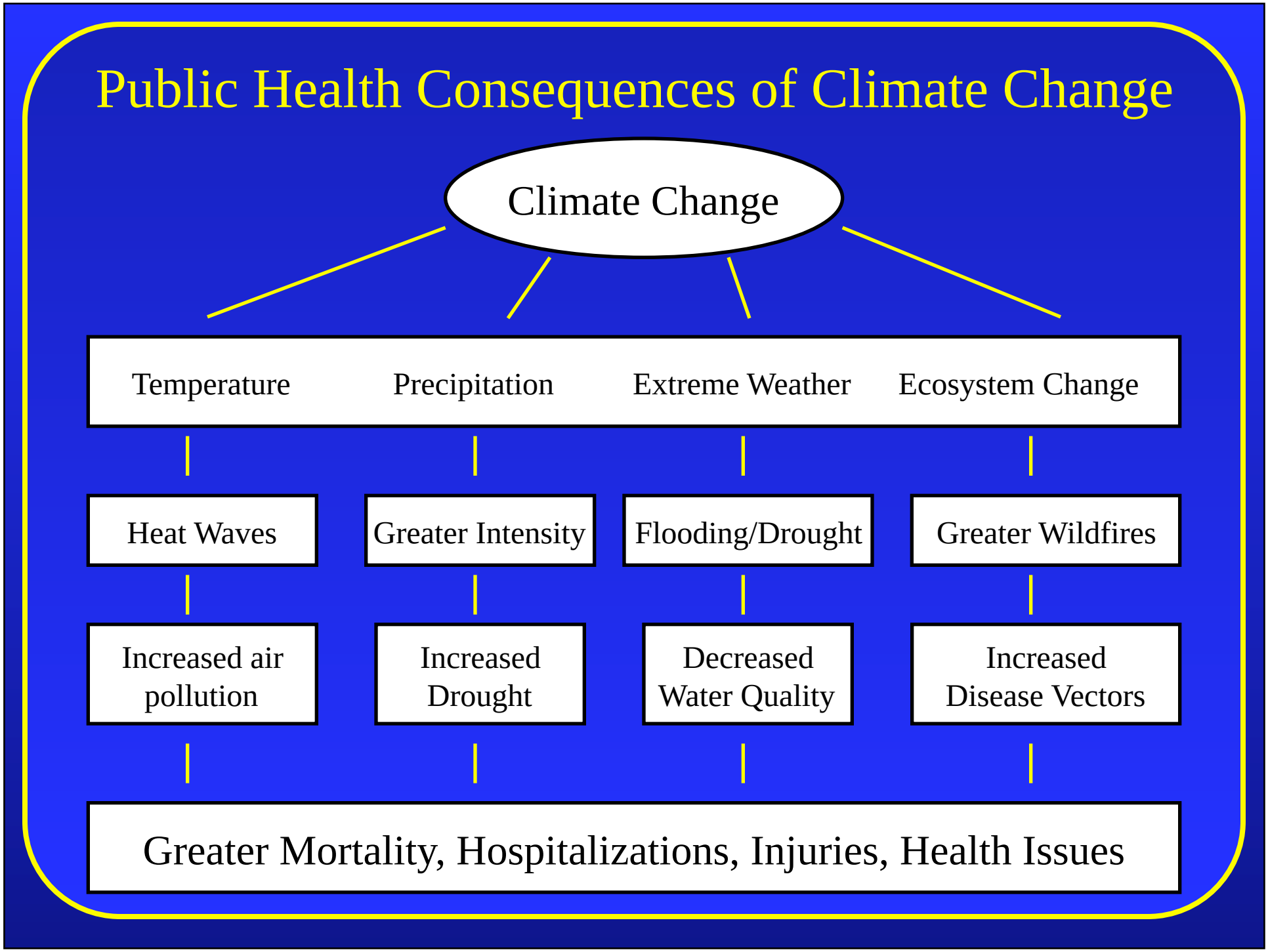
# Heat Waves

| | | 2020-2049 | | | |
|---|---|---|---|---|---|
| | | PCM | | HadCM3 | |
| | 1961-1990 | B1 | A1fi | B1 | A1fi |
| Heat-wave Days | | | | | |
| Los Angeles | 12 | 28 | 35 | 24 | 36 |
| Sacramento | 58 | 91 | 101 | 93 | 104 |
| El Centro | 162 | 185 | 185 | 176 | 180 |
| Fresno | 92 | 113 | 120 | 111 | 116 |
| Mortality Projections | Average Deaths/Year | | | | |
| Fresno | 13 | 19/5 | 26/6 | 14/4 | 42/10 |

Data from (Dreschler et al., 2005)



# Public Health Consequences of Climate Change



# Public Health Effects of Climate Change

**Heat**

↓

Heat Stroke
Cardiovascular failure

**Severe Weather**

↓

Injuries, Fatalities

**Air Pollution**

↓

Asthma, Cardiovascular disease

**Allergies**

↓

Poison Ivy
Respiratory Allergies

**Disease Vectors**

↓

Malaria, Dengue, Encephalitis, Hantavirus, Nile Valley Fever
Cholera, Criptosporidiosis

**Water-Borne Diseases**

↓

Campylobacter
Leptospirosis

**Water-Food Supply**

↓

Heat Stroke
Cardiovascular failure

**Mental Health**

↓

Anxiety, Despair, Depression,
Post-traumatic Stress

**Environmental Refugees**

↓

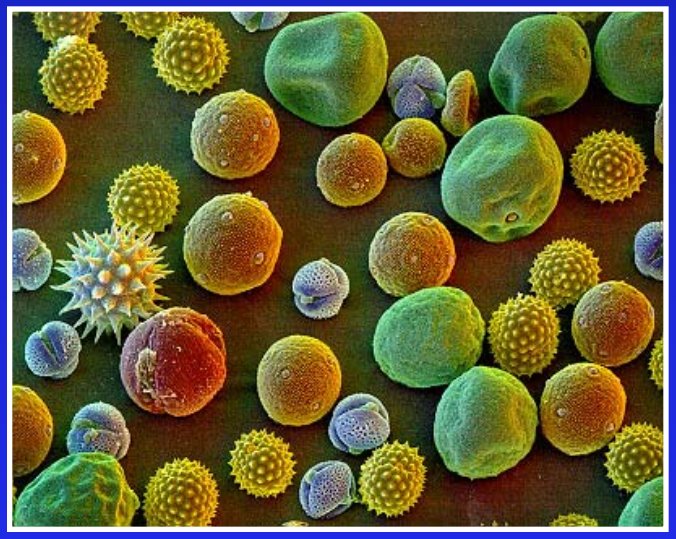
Forced Migration
Civil Unrest

# Air Quality

## Bad and probably getting worse

# Allergies and Disease

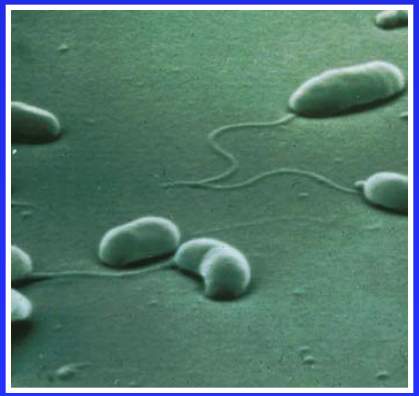
## Increasing pollen numbers and allergy



## Spread of new diseases

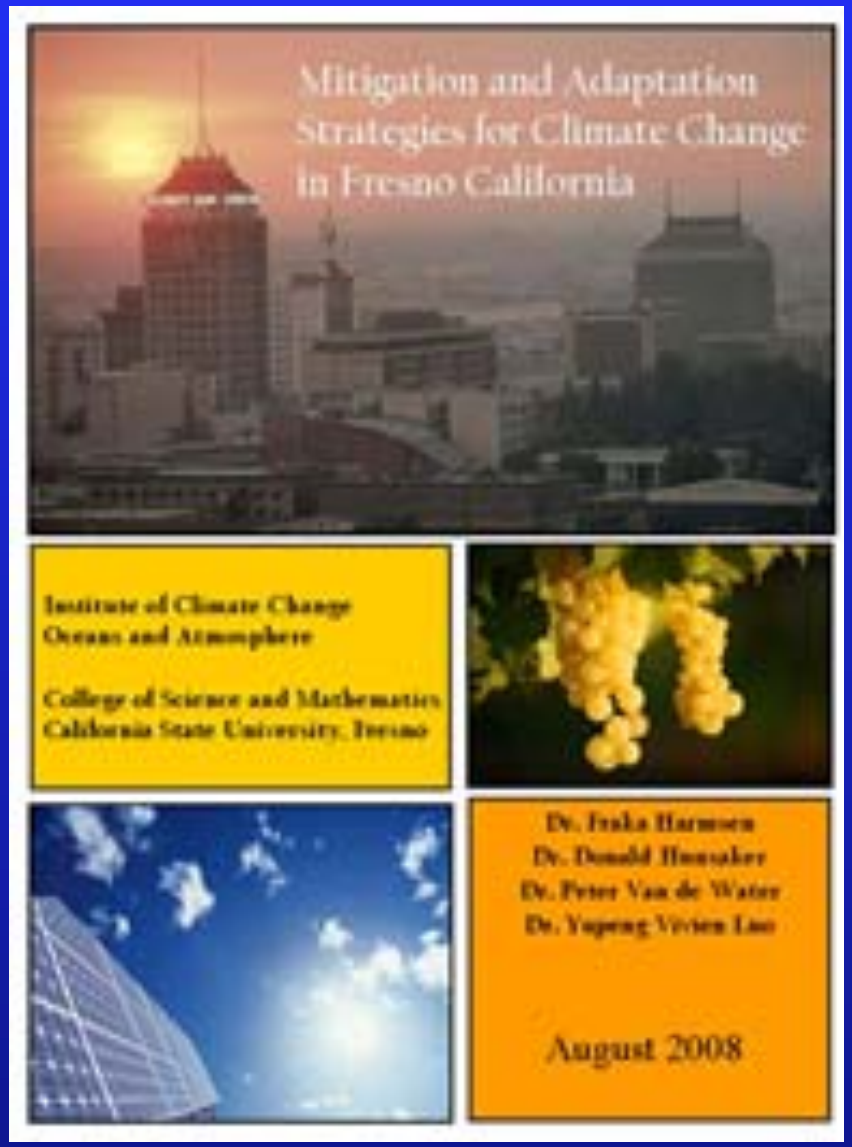
Mosquito-Borne

Rodent-Borne

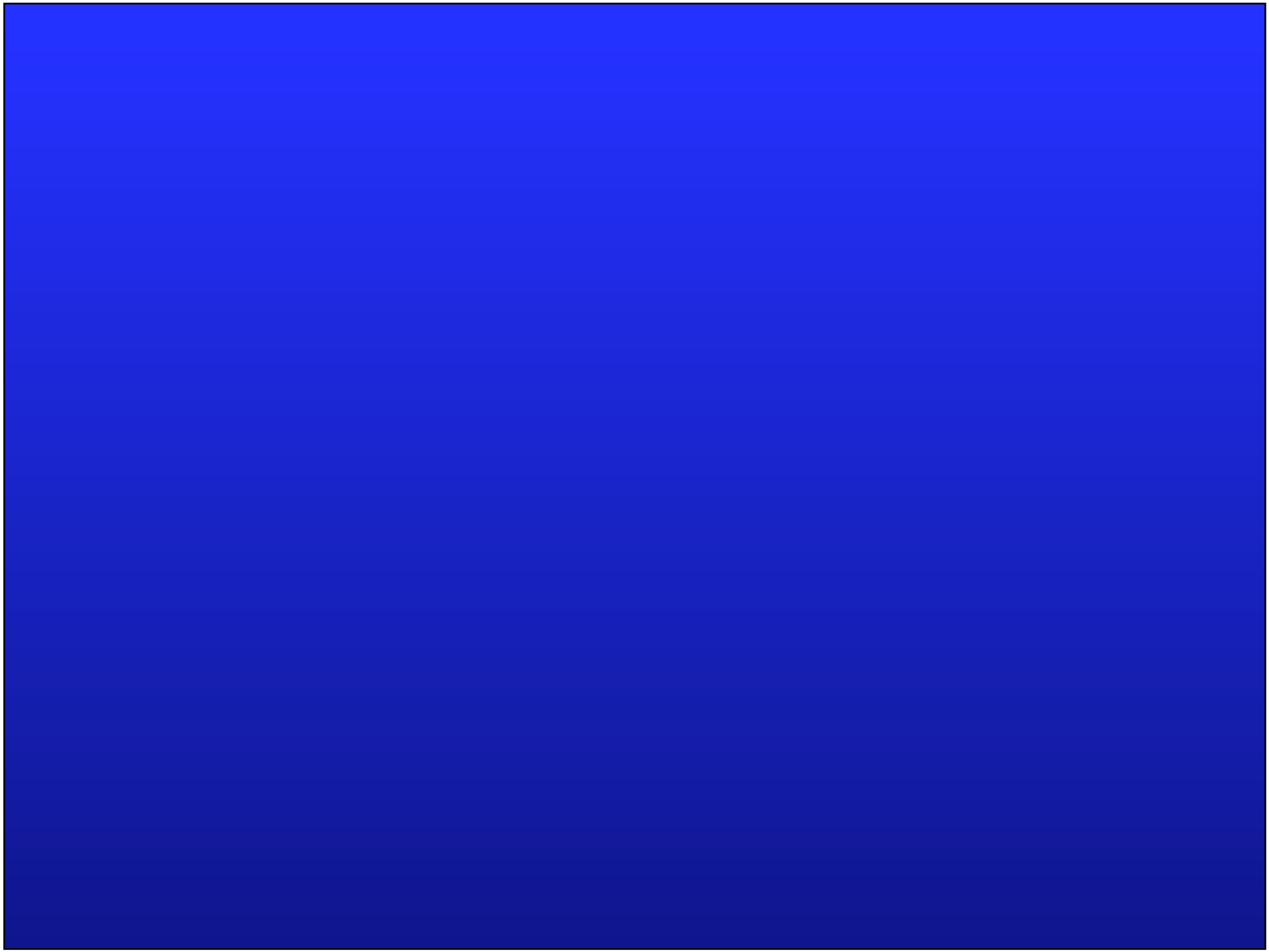


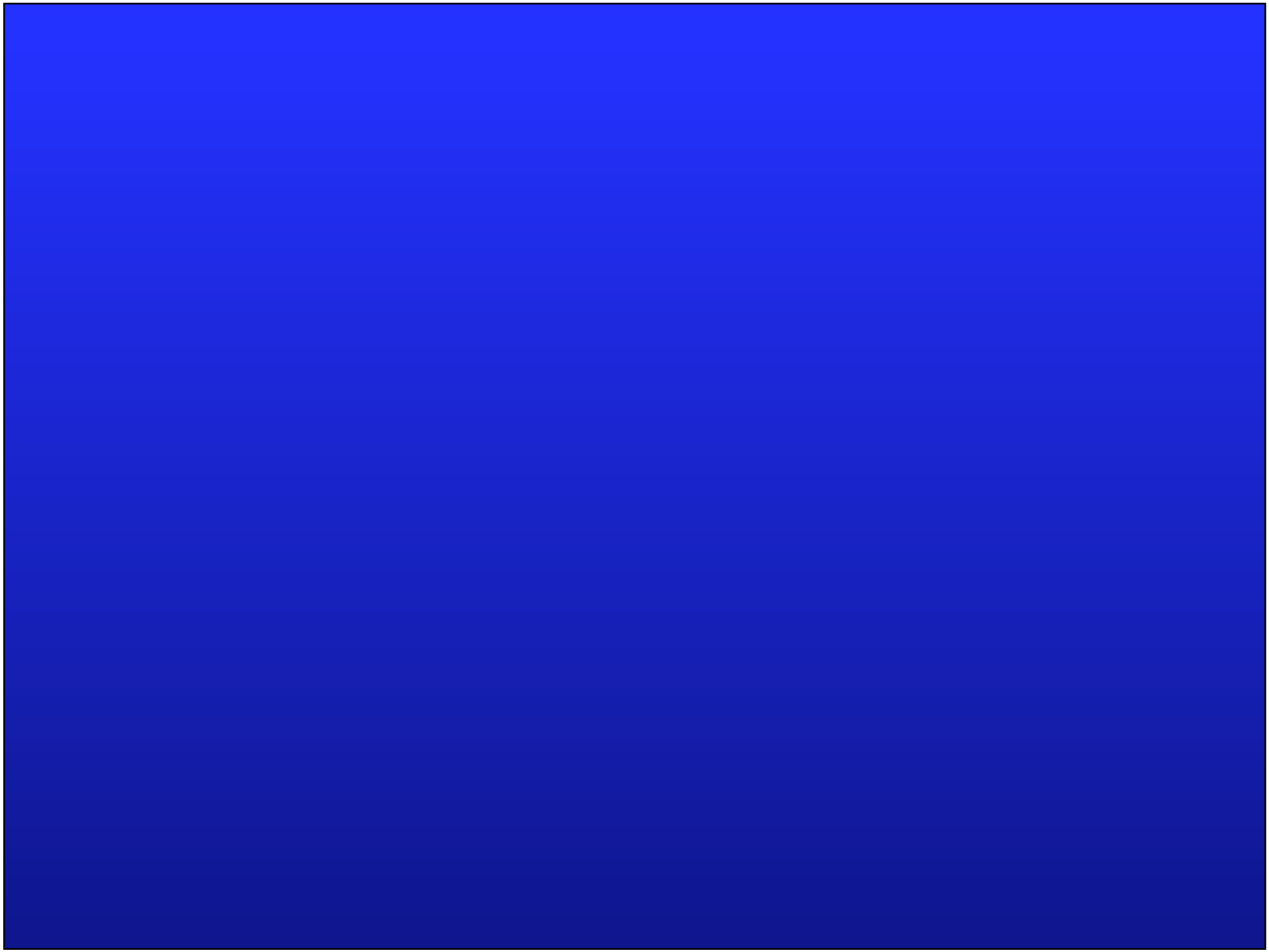
Water-Borne

www.csufresno.edu/icoa/projects/fresnoclimate




Available as a PDF

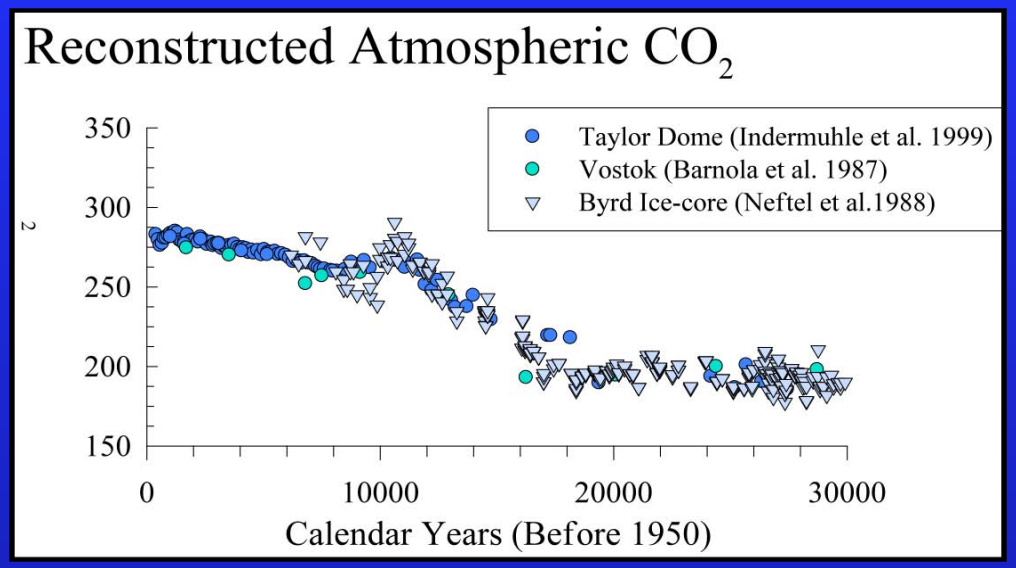


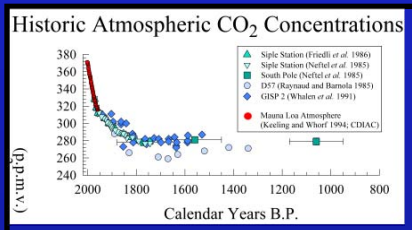


# Ashland Oregon, fire destroys 11 homes

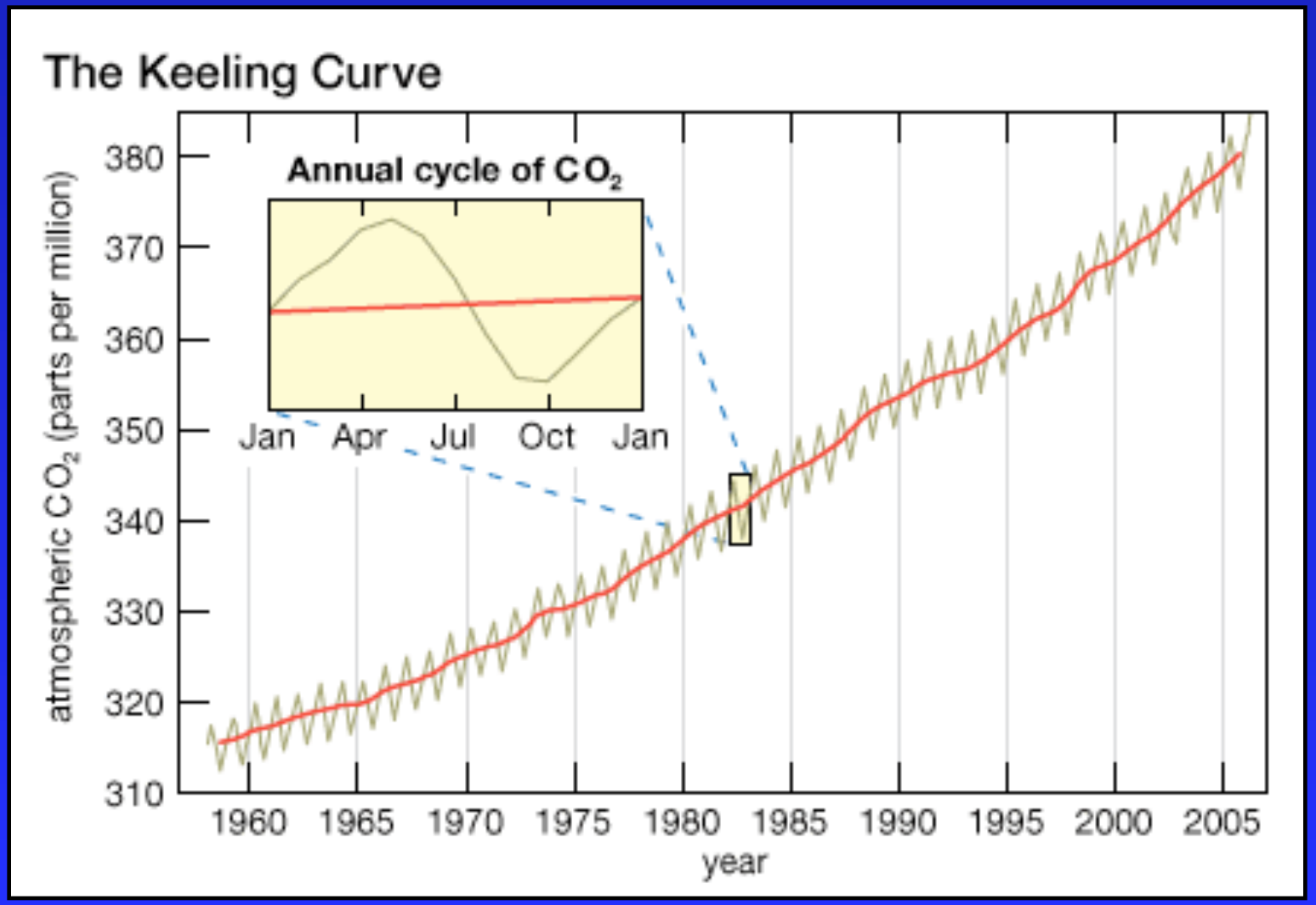
Chambers said the fire's behavior was the result of low humidity, a temperature that topped out at 103 degrees, and a fire-induced wind from the Northwest. **Residents said that because of water restrictions and the cost of city water, many had stopped watering their lawns.**

# Carbon Dioxide ($CO_2$)

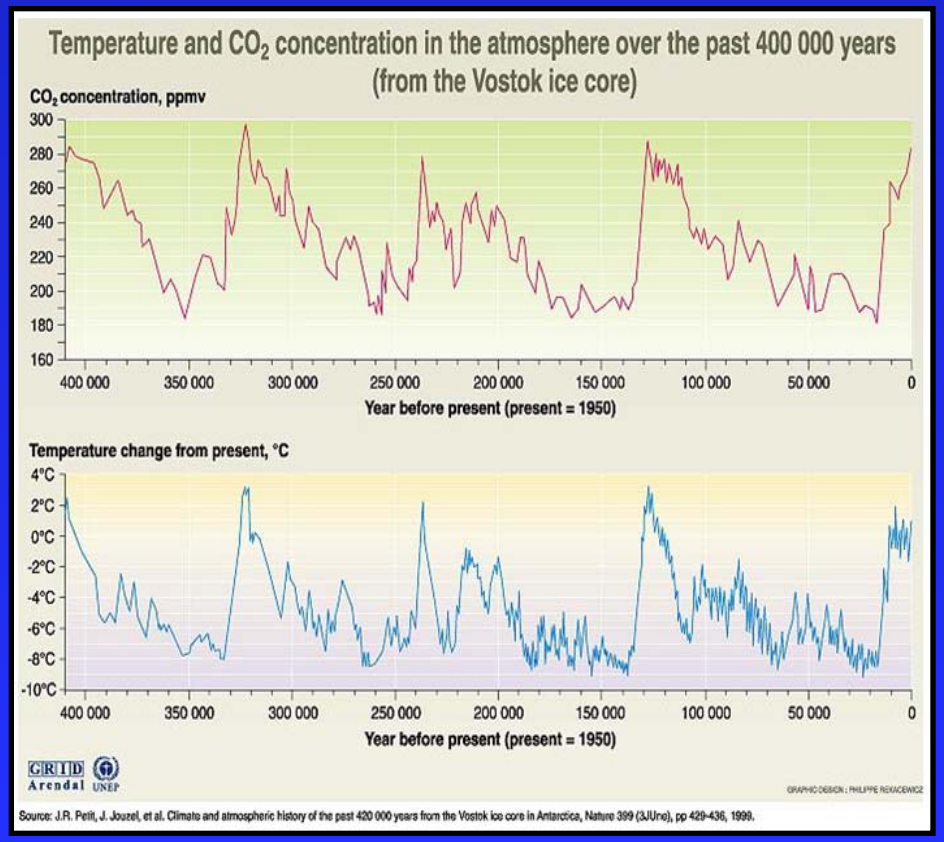


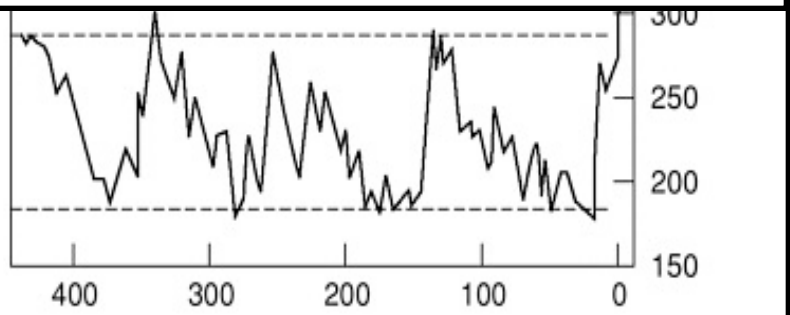




# Recent $CO_2$ Changes

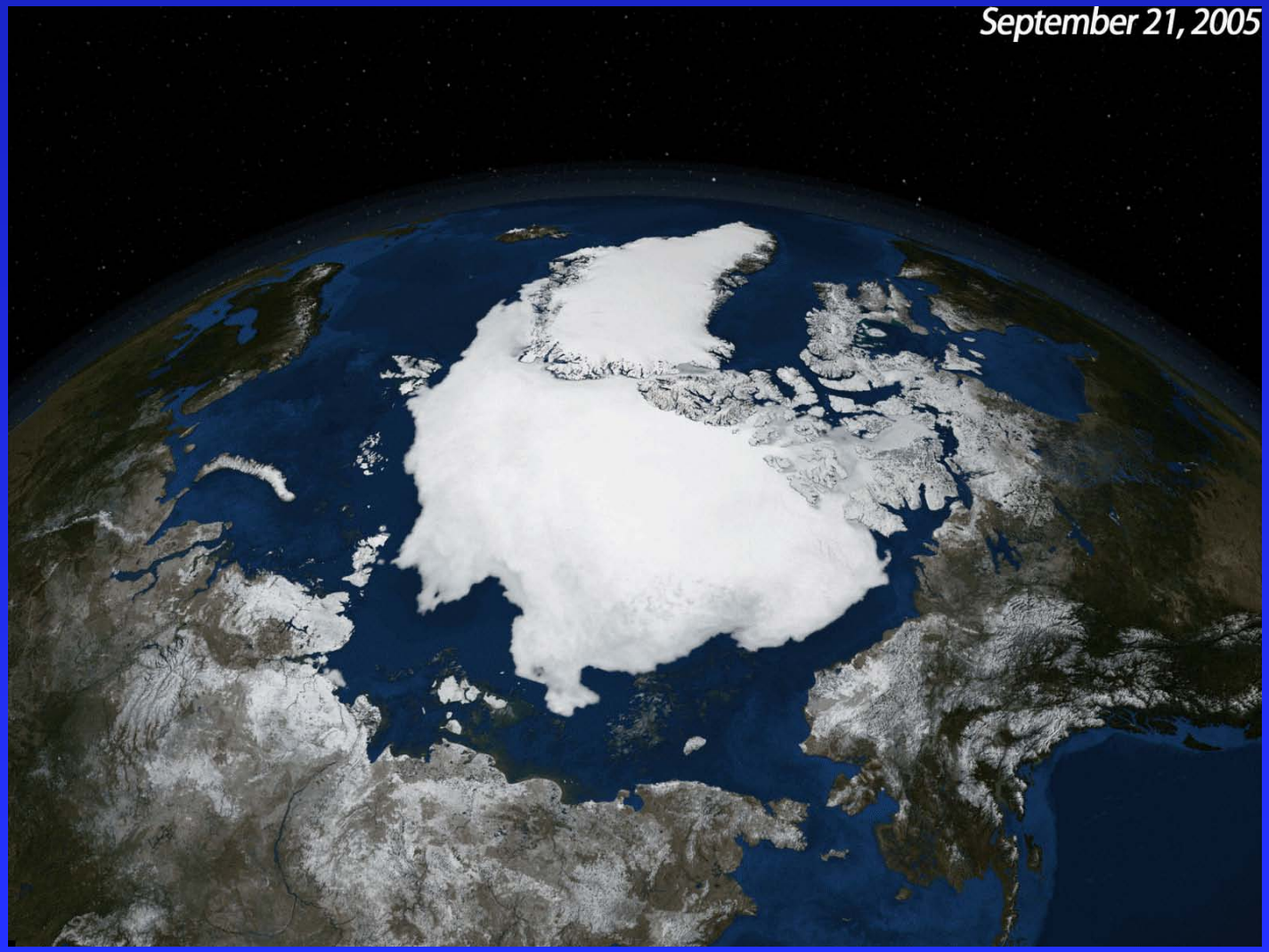


# Carbon Dioxide

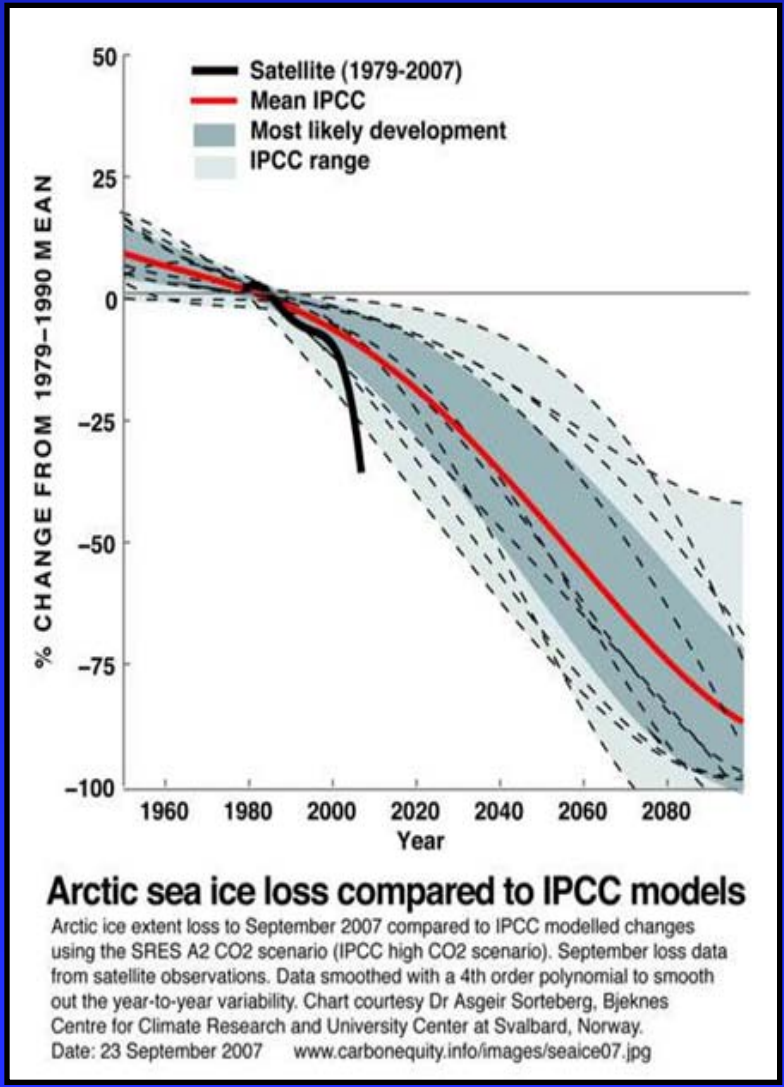


# Differential Change across the Globe



# Arctic Sea Ice




**Arctic sea ice loss compared to IPCC models**

Arctic ice extent loss to September 2007 compared to IPCC modelled changes using the SRES A2 CO2 scenario (IPCC high CO2 scenario). September loss data from satellite observations. Data smoothed with a 4th order polynomial to smooth out the year-to-year variability. Chart courtesy Dr Asgeir Sorteberg, Bjeknes Centre for Climate Research and University Center at Svalbard, Norway.
Date: 23 September 2007 www.carbonequity.info/images/seaice07.jpg