

Climate change: It's about the data not the politics



Conference on World Affairs, CU, 7-11 April 2014



Conference on World Affairs, CU, 7-11 April 2014

First rule of management

"You can't manage what you can't measure"



"You are entitled to your own opinion but not your own facts."

Patrick Daniel Moynahan

We have many facts
and physical understanding.

The facts are not enough...

The role of scientists is to lay out the
facts and the prospects and consequences,
but the decision on what to do is not ours:
that involves politics.

Climate change is happening: It is due to humans

97% of scientists agree.

The data are of mixed quality and length, but together tell a compelling story leaving no doubt about the human role in climate change.

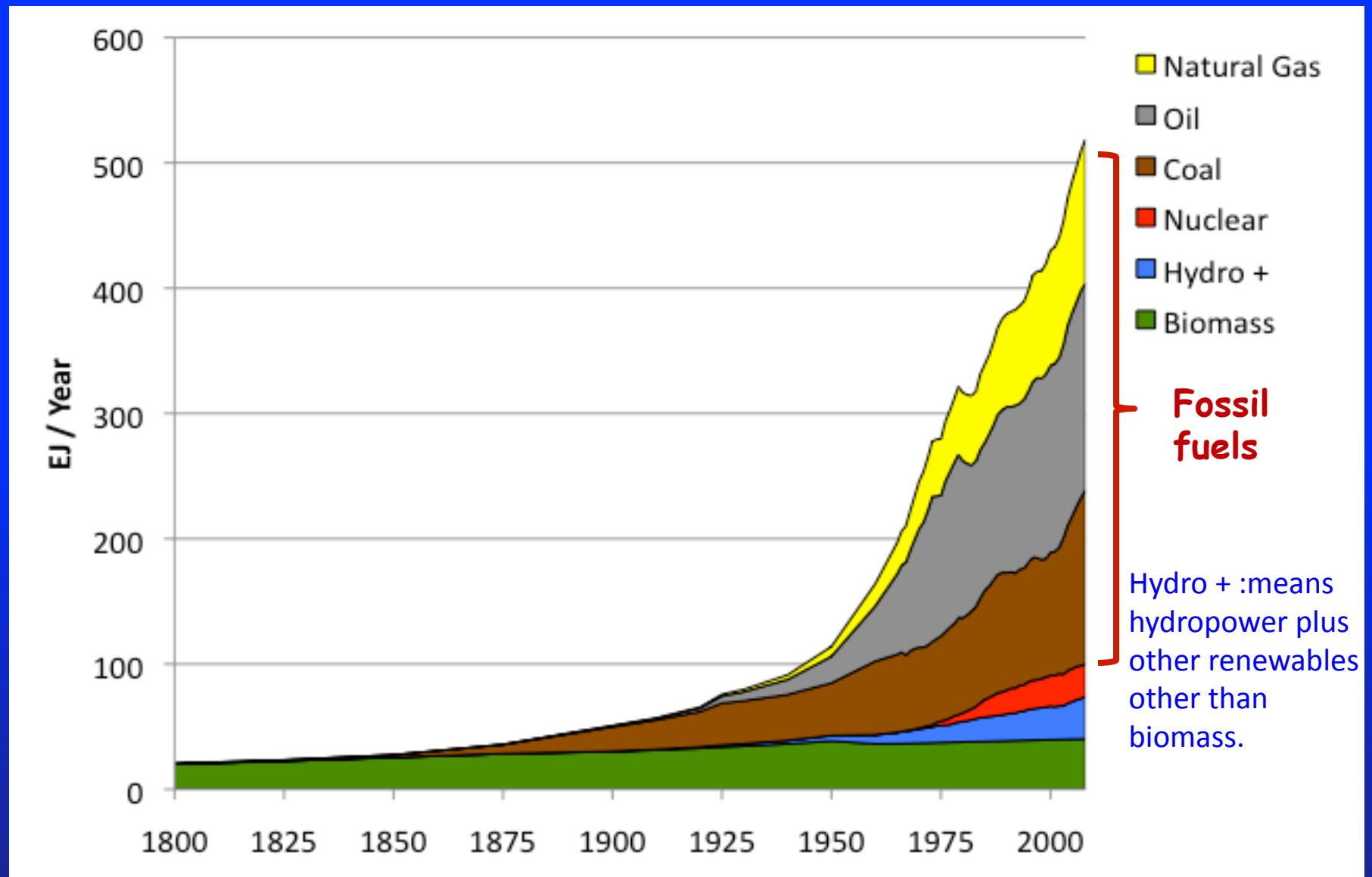
What we do about this problem involves
value systems and politics!

What Is Causing the Warming?



Emissions of carbon dioxide pollution

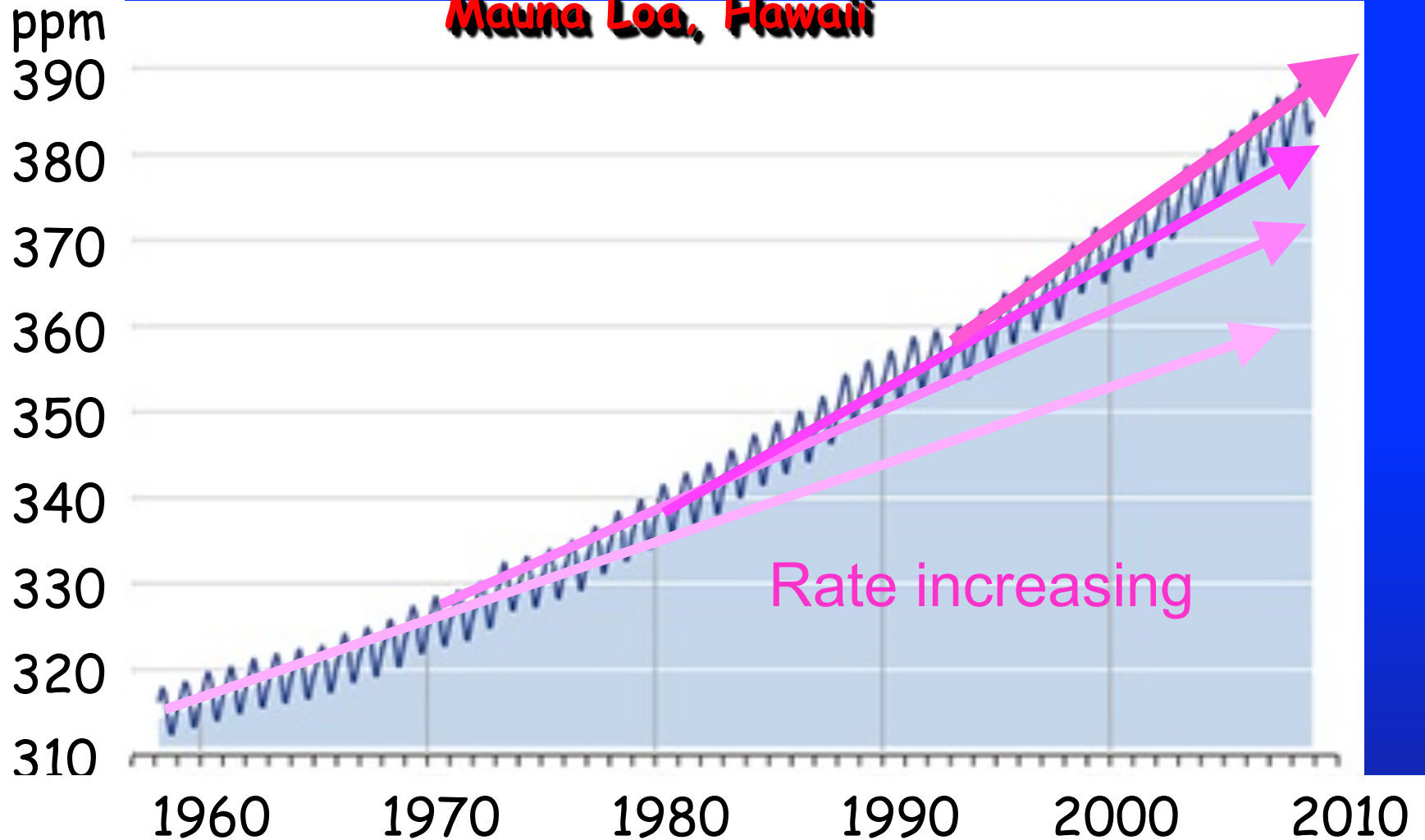
World Primary Energy Supply: 1800 - 2008



Sources: Grubler (2008) - Energy Transitions, BP (2009) - Statistical Review of World Energy, EIA (2009) - International Energy Annual

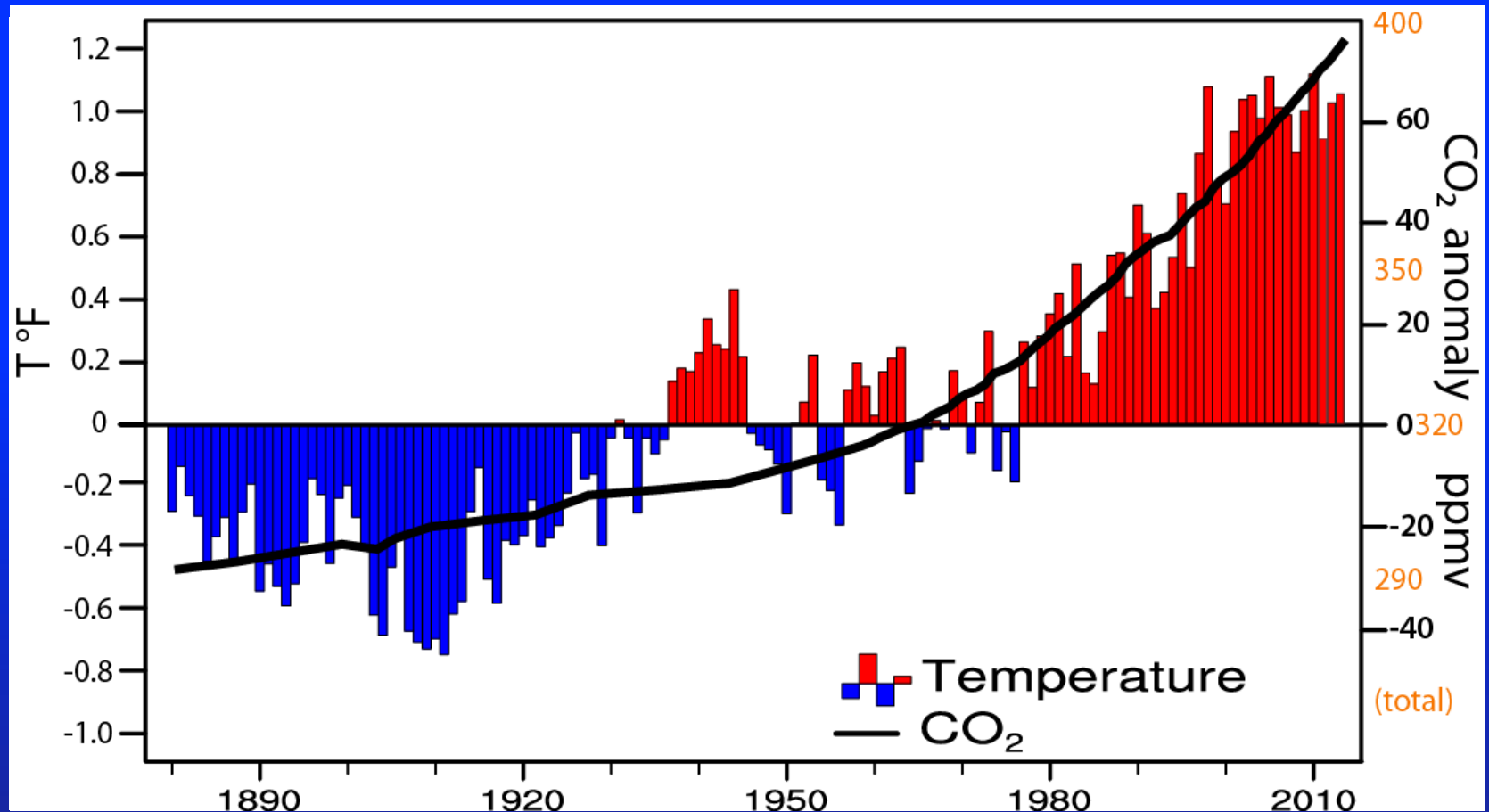
Changing atmospheric composition: CO₂

Mauna Loa, Hawaii



Data from Climate Monitoring and Diagnostics Lab., NOAA. Data prior to 1974 from C. Keeling, Scripps Inst. Oceanogr.

Global temperature and carbon dioxide: anomalies through 2013



Base period 1900-99; data from NOAA
Trenberth and Fasullo 2013 updated

Global Warming is Unequivocal

IPCC AR4: approved 113 govts

Since 1970, rise in:

- ❖ Global surface temperatures
- ❖ Tropospheric temperatures
- ❖ Global SSTs, ocean Ts
- ❖ Global sea level
- ❖ Water vapor
- ❖ Rainfall intensity
- ❖ Precipitation extratropics
- ❖ Hurricane intensity
- ❖ Drought
- ❖ Extreme high temperatures
- ❖ Heat waves
- ❖ Ocean acidity

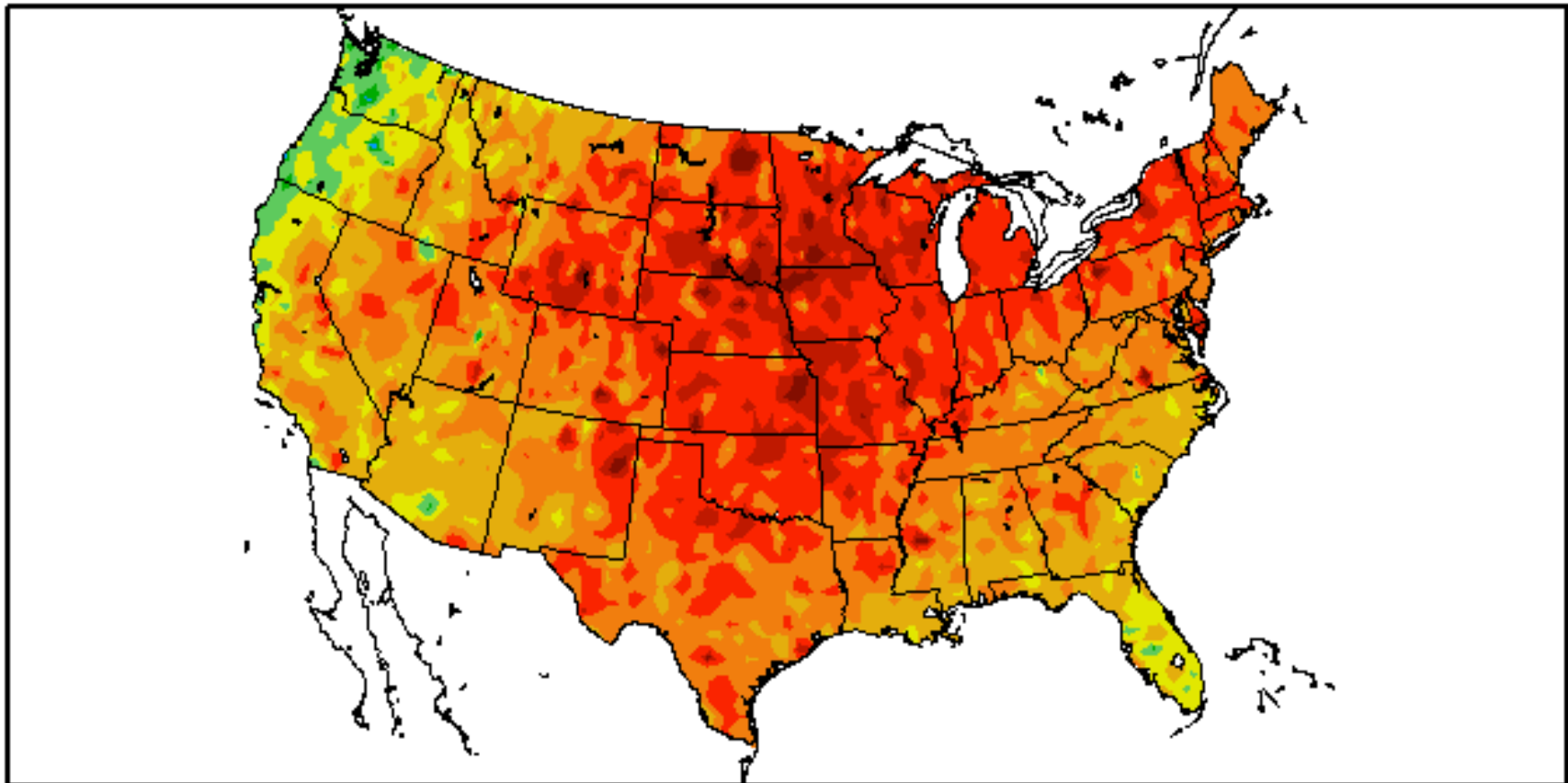
Decrease in:

- NH Snow extent
- Arctic sea ice
- Glaciers
- Cold temperatures



U.S. Temperatures: 2012 Hottest year on record

Departure from Normal Temperature (°F)



362 all time record Highs; 3,527 monthly weather records
0 record lows

Colorado on Fire: June 2012



Flagstaff fire: above NCAR, circled.
High Park fire 259 houses, 1 death

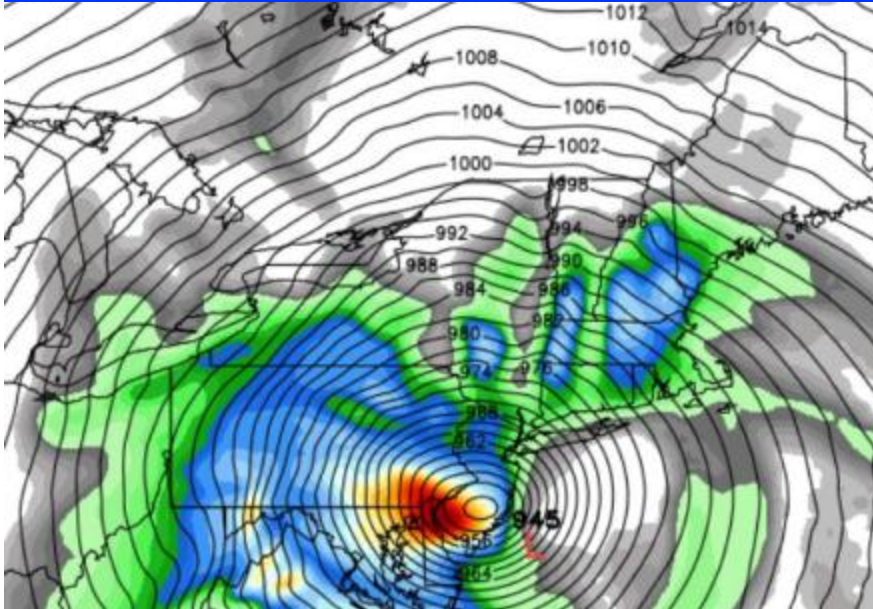


Waldo Canyon fire
346 homes...



Super Storm Sandy: Oct 29-31, 2012.

It was more intense with stronger winds because of climate change
Sea level is higher => Much greater damage



Hybrid storm:
Over \$70B damages
>110 lives lost

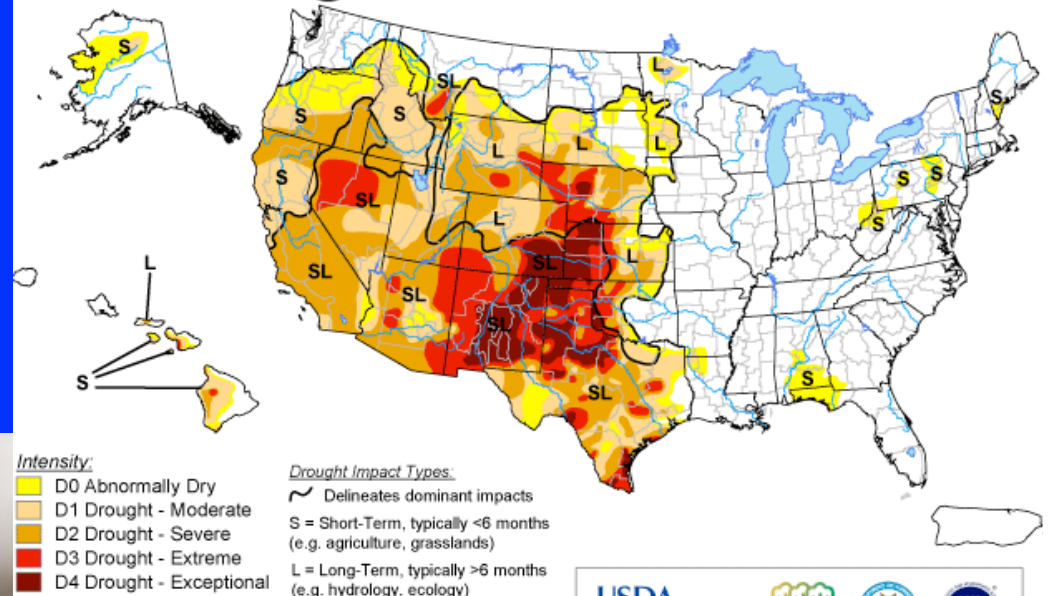


U.S. Drought and wildfires June 2013

Dust storm Lamar, CO
(June 15, Denver Post)

U.S. Drought Monitor

June 18, 2013
Valid 7 a.m. EDT



Black Forest wildfire CO: >511 homes burned



Boulder Flooding September 2013





Former location of Mesa Trail over Bluebird creek. Green Mountain Rd
(Flagstaff)

<http://www.flickr.com/photos/bouldercolorado/sets/72157636661981633/>

Science knowledge is going in one direction and politician views are going in another!

Many reports deal with the facts and the science of climate change. A new one by AAAS "**scientists agree that humans are the primary cause of climate change**". There are many other reports, such as from the IPCC.

Of 10,855 climate studies published and reviewed literature in 2013 only 2% deny climate change. [James Lawrence

160 members of the 113th Congress have taken \$58.8 million from fossil fuel industry

56% (>130 members) of the House of Representatives deny climate science. 66% (30 members) of the Senate Republican caucus also deny the reality of climate change.

Selective use of “facts” is done to reinforce one's initial position

There is considerable psychological and social science research (e.g. Kahan et al. *J Risk Res.* 2011)

- Polarization can increase
- People with different values draw different conclusions from same information

Tragedy of the Commons

Everyone for themselves!

Solution requires people of the world to work together.

- We are together on "spaceship Earth".

To many people, that may suggest altruism:

- Sharing the money, well-being and profits so carefully accrued to help other people.

Our society is founded on the premise of cheap and easily available fossil fuels that do not take into account the **external costs** of using those fossil fuels:

Need a principle of **User Pays**.

"Unless someone like you cares a
whole awful lot
Nothing is going to get better.
It's not."

The Lorax
Dr Seuss 1972

