

# 2016 IPL Integrated Resource Plan



Public Advisory Meeting  
June 14, 2016.

Stakeholder # 2, 9:40-9:55 AM



RICHARD M. FAIRBANKS  
SCHOOL OF PUBLIC HEALTH



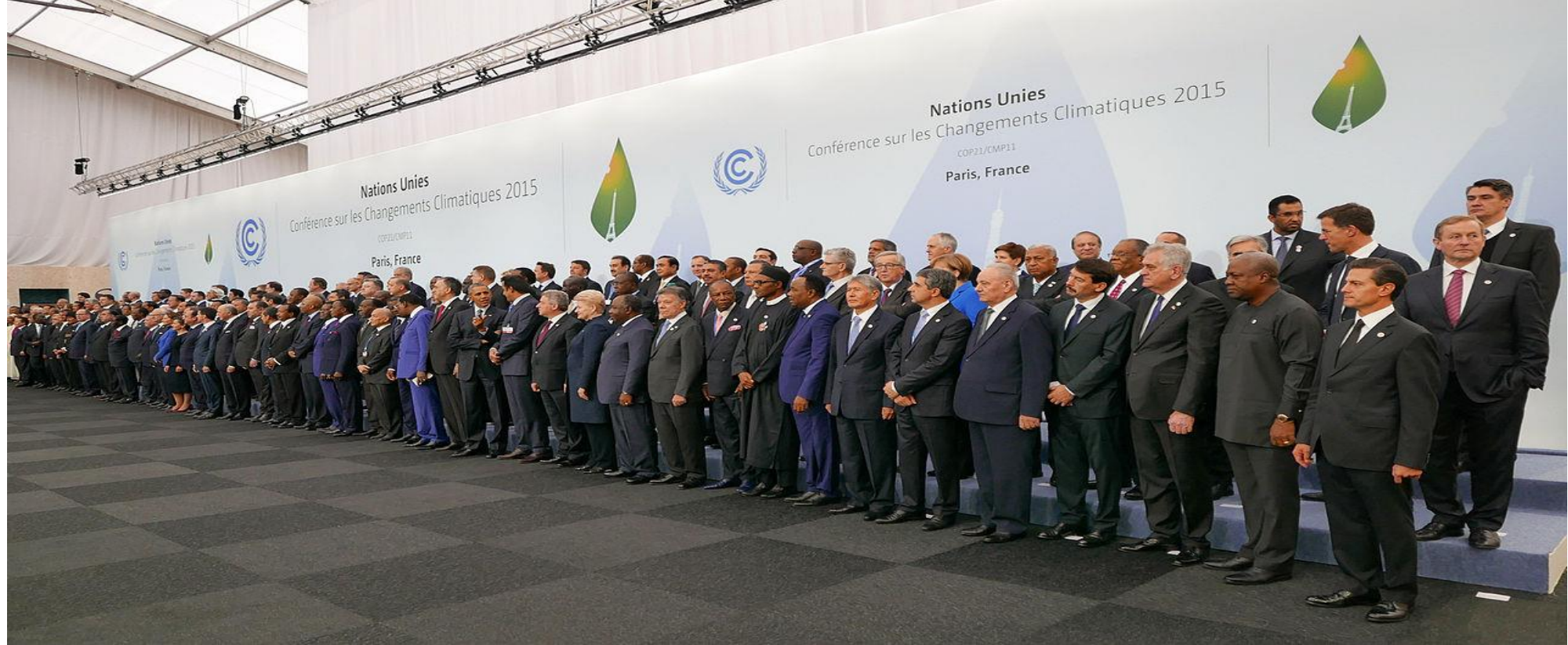
INDIANA UNIVERSITY  
Indianapolis

## Climate Change:

## “The Defining Issue for the 21<sup>st</sup> C.”

Stephen J. Jay M.D. Prof. of Medicine & Public Health,  
IUSM & Richard M. Fairbanks School of Public Health





In Paris, 5 mo. ago, 196 nations  
signed historic agreement:  
Collective action on Climate Change



# We Don't Have to Look Far for Evidence



# Isle de Jean Charles, LA.

## Biloxi-Chitimacha-Choctaw Native Americans

Lose “football field” per hour.

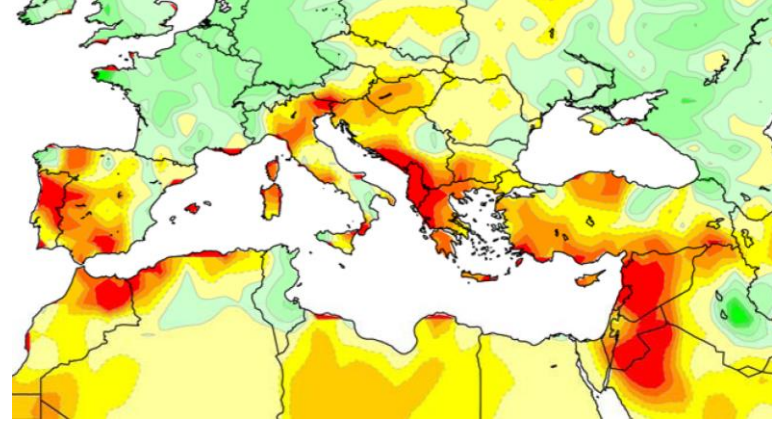




# 4000 Miles From MS Delta, Alaskan Natives Threatened in Kivalina: Chukchi Sea Levels Rising



# 6000 mi. from Alaska, Middle-East Suffers Unprecedented, Sustained Drought.



- 2006-11: 1.5 m refugees.
- Destabilized Countries-- Civil wars
- The dangerous ***‘Threat Multiplier’***



# Jay Inslee, Gov. WA

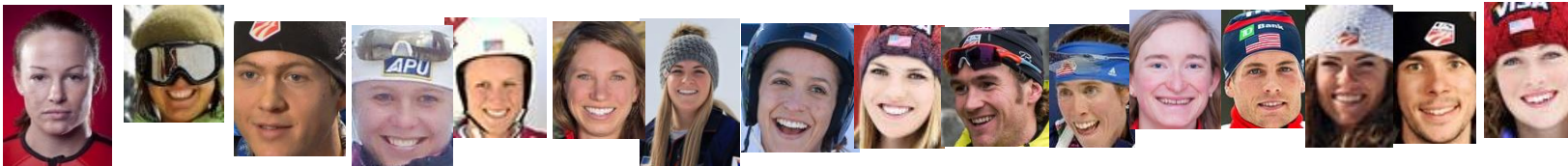
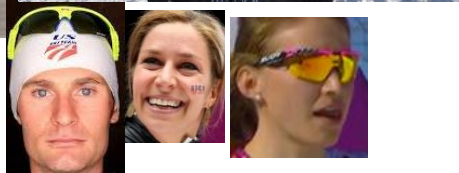


*“We’re the first generation to feel the sting of GW/CC ... the last ...that can do something about it.”*



# 2013: President Obama & Congress

## *"Please Take Action on Climate Change and Clean Energy."*



# Paris 21<sup>st</sup> Conf. of Parties (COP)

## Curb 'C' Emissions. Mitigation & Adaptation

### • 1979: Geneva

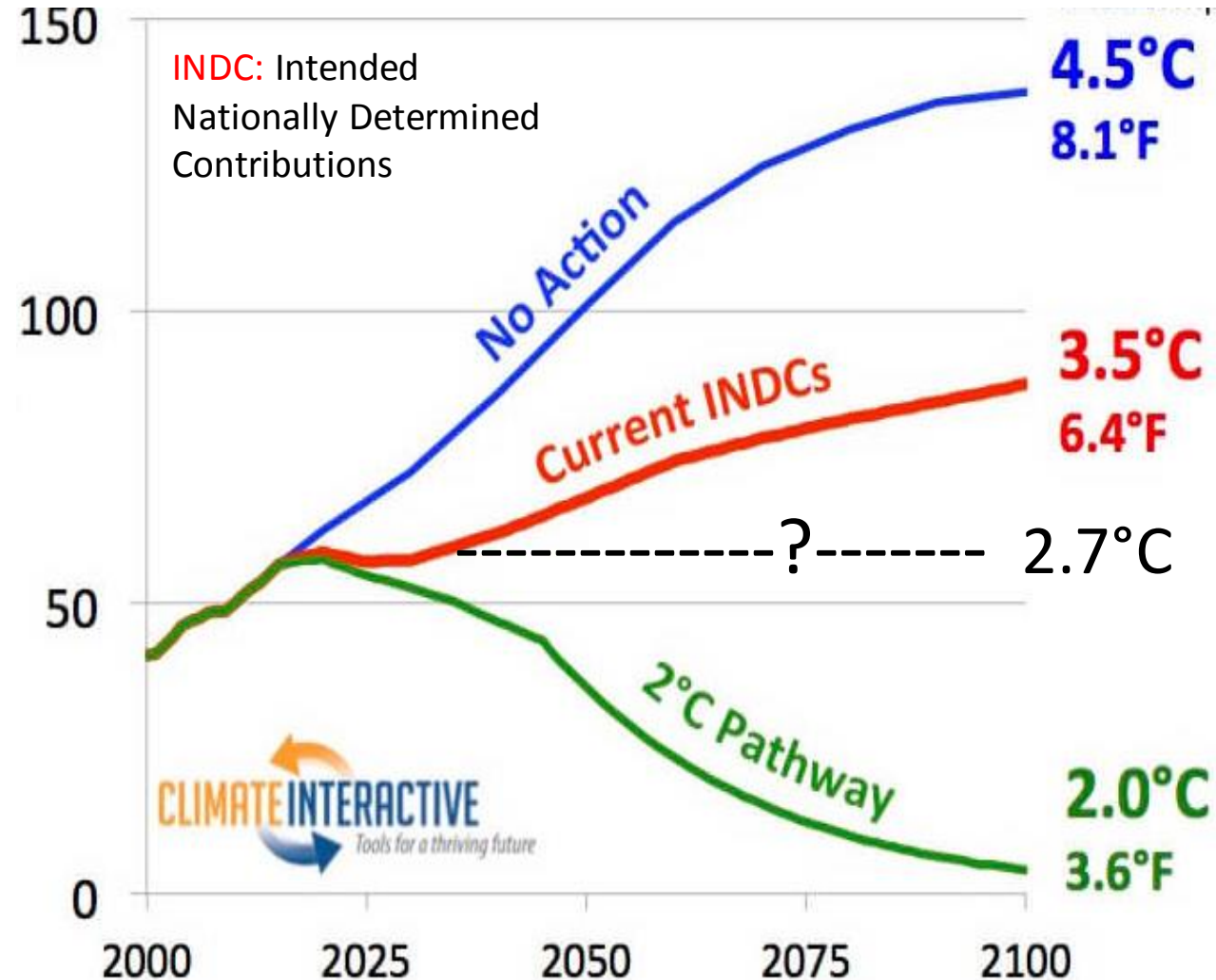
- 1992: Rio
- 1997: Kyoto
- 2007: Bali
- 2009: Copenhagen
- 2010: Cancun
- 2011: Durban
- 2012: Doha

### • 2015: Paris

CO<sub>2</sub>  
Gt/yr.



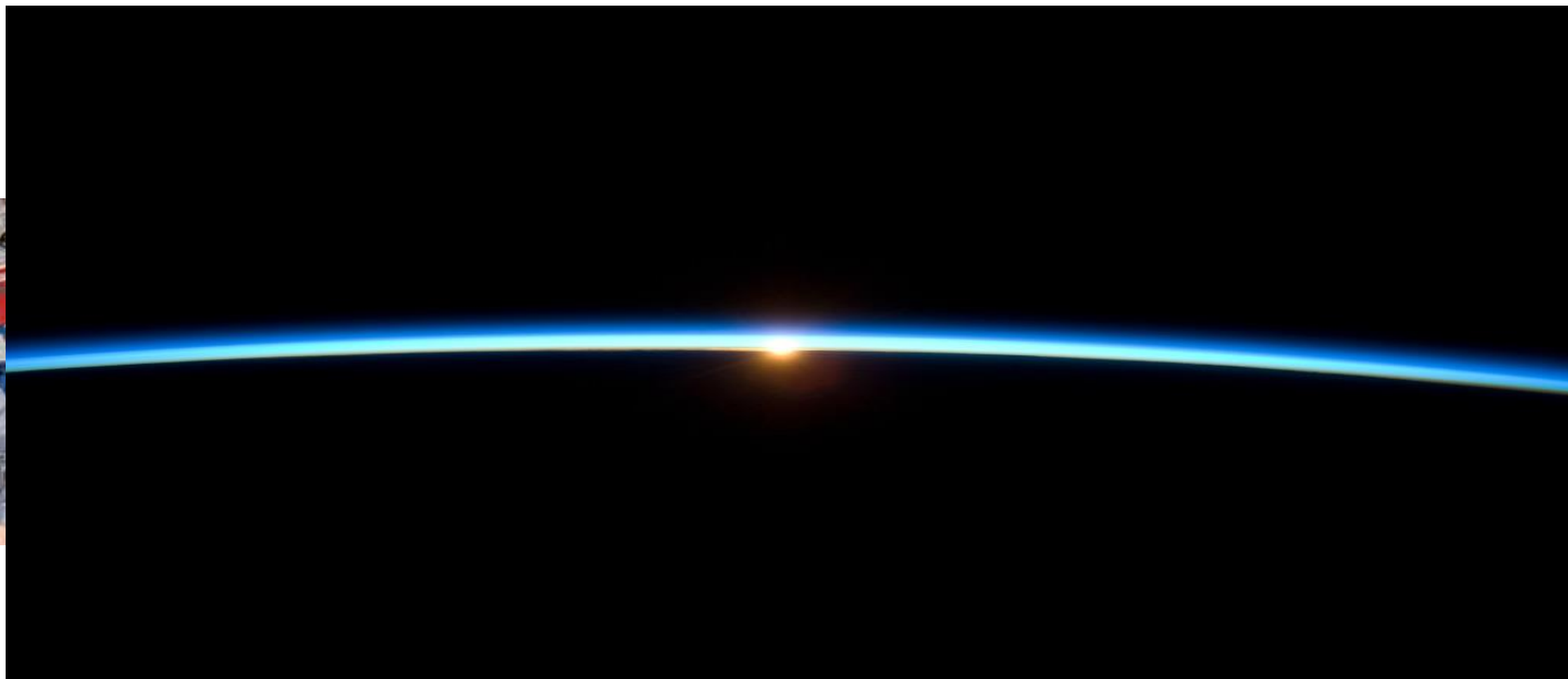
PARIS2015  
UN CLIMATE CHANGE CONFERENCE  
COP21·CMP11







DW and  
Cosmonauts,  
NASA-MIR  
1997-98.



## 'Thin Blue Line'

*Earth's Fragile Atmosphere*

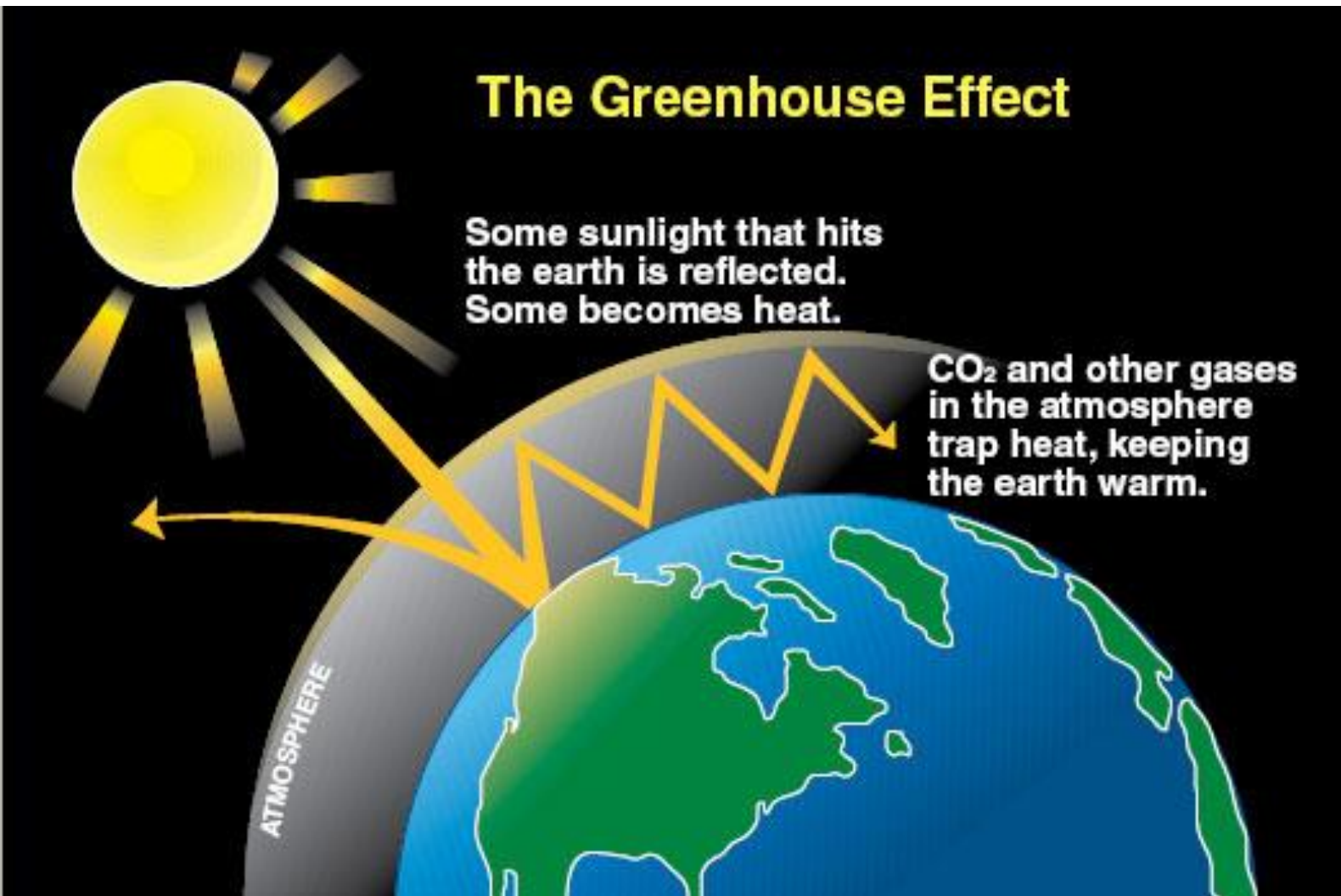
Atlantis STS-129- Setting Sun



D. Wolf,  
Intern  
Methodist  
Hosp. 1982.



# Burning Fossil Fuels



Greenhouse  
Effect-Climate  
Change

# 1938 Callendar

Man's Prod. of  $\text{CO}_2$ : Influence on T.

***World Temp.  $\uparrow$  0.005 °C / yr. during past  
 $\frac{1}{2}$  c. due to added  $\text{CO}_2$ .***

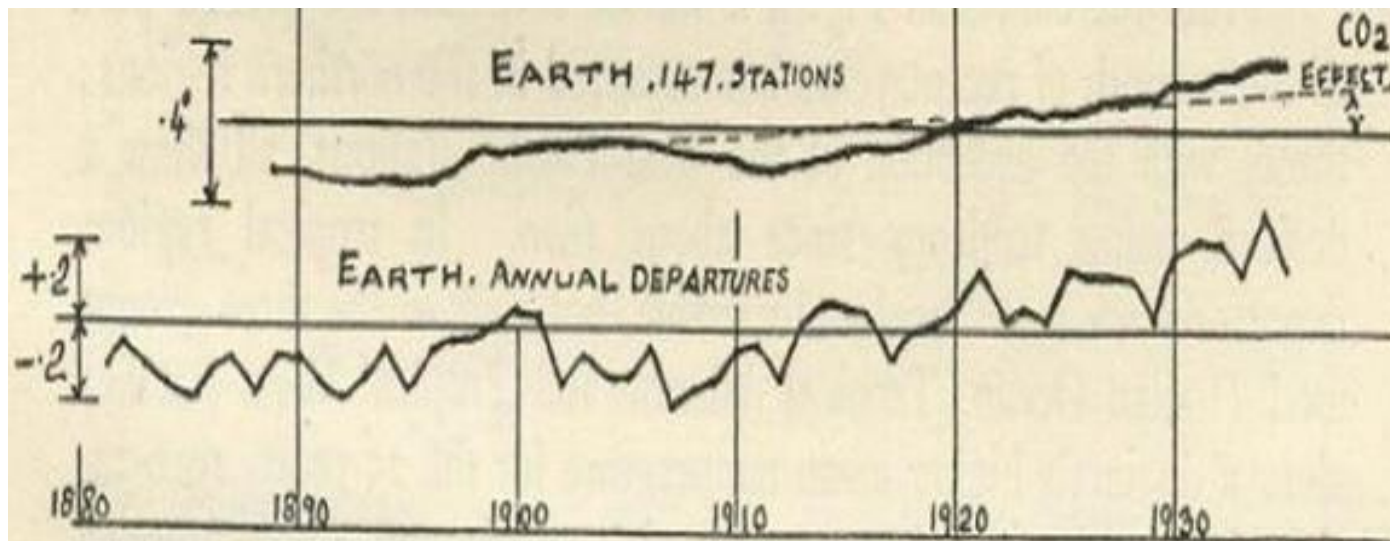
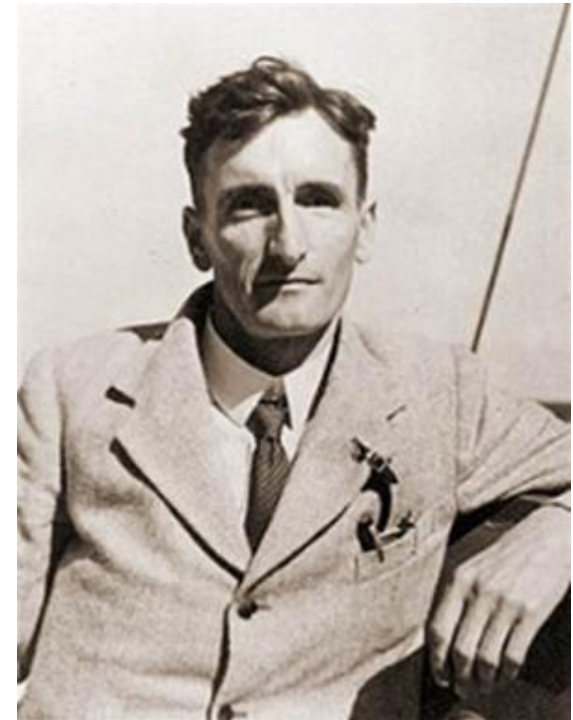
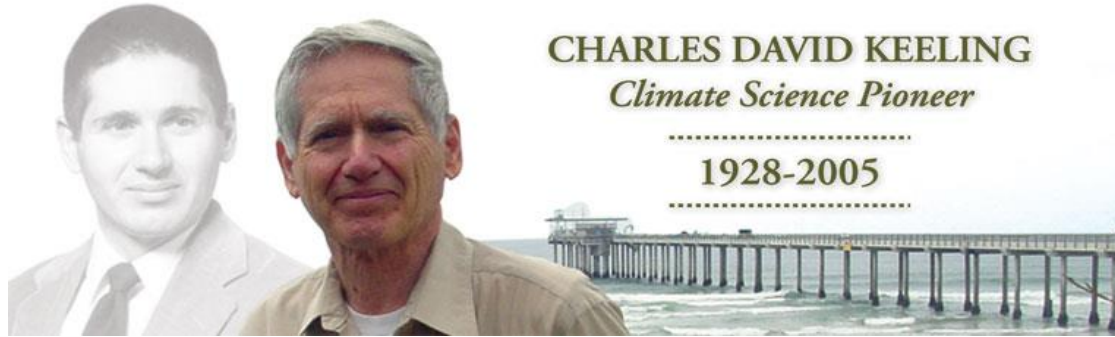


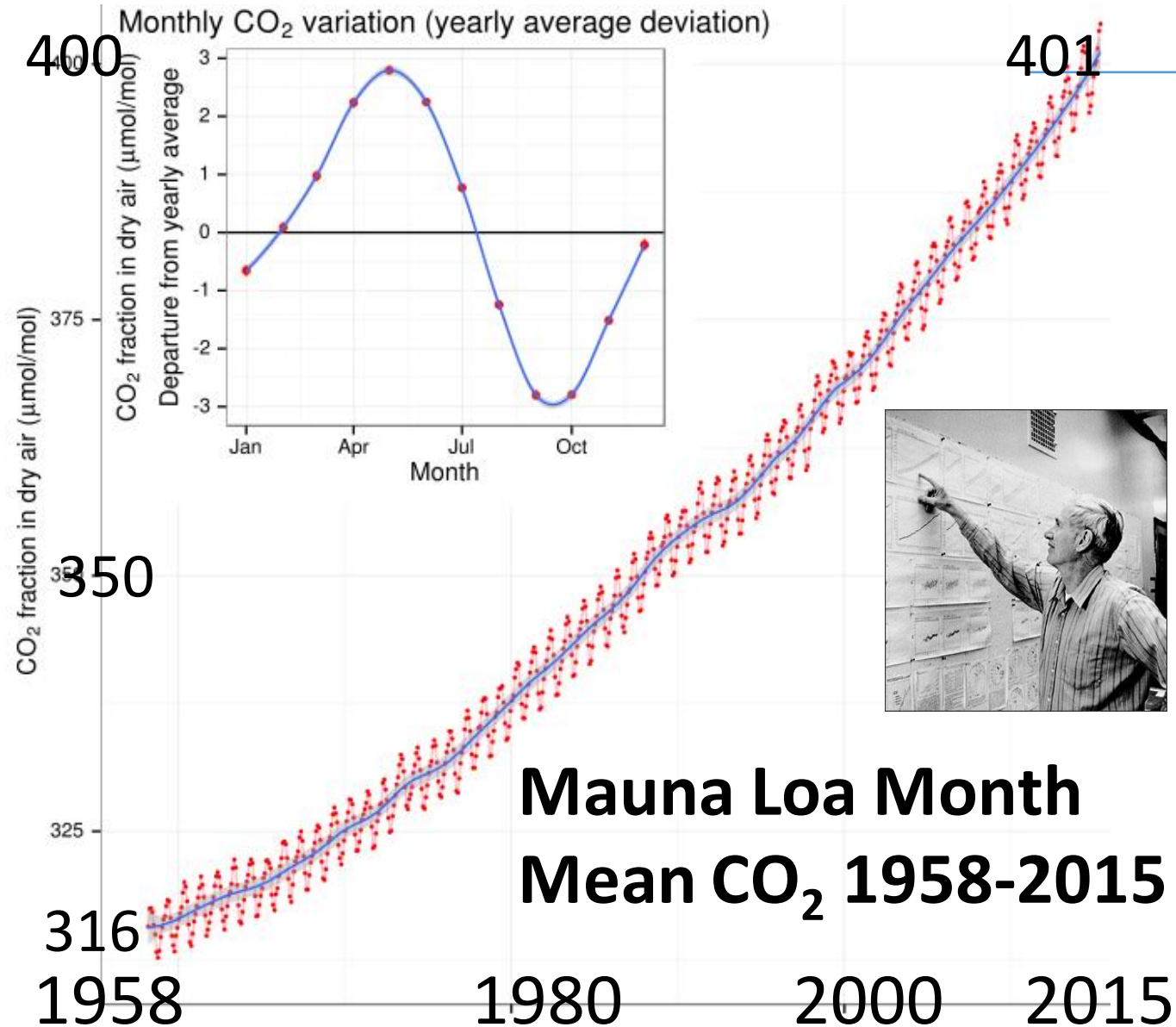
FIG. 4.—Temperature variations of the zones and of the earth. Ten-year moving departures from the mean, 1901-1930, °C.



# 1958, 'Father' of Climate Science



1950s: Scientists:  
 $\text{CO}_2$  ↑ 25% by  
2000- ? 'radical'  
effects on climate.





# 1965- LBJ Warns World

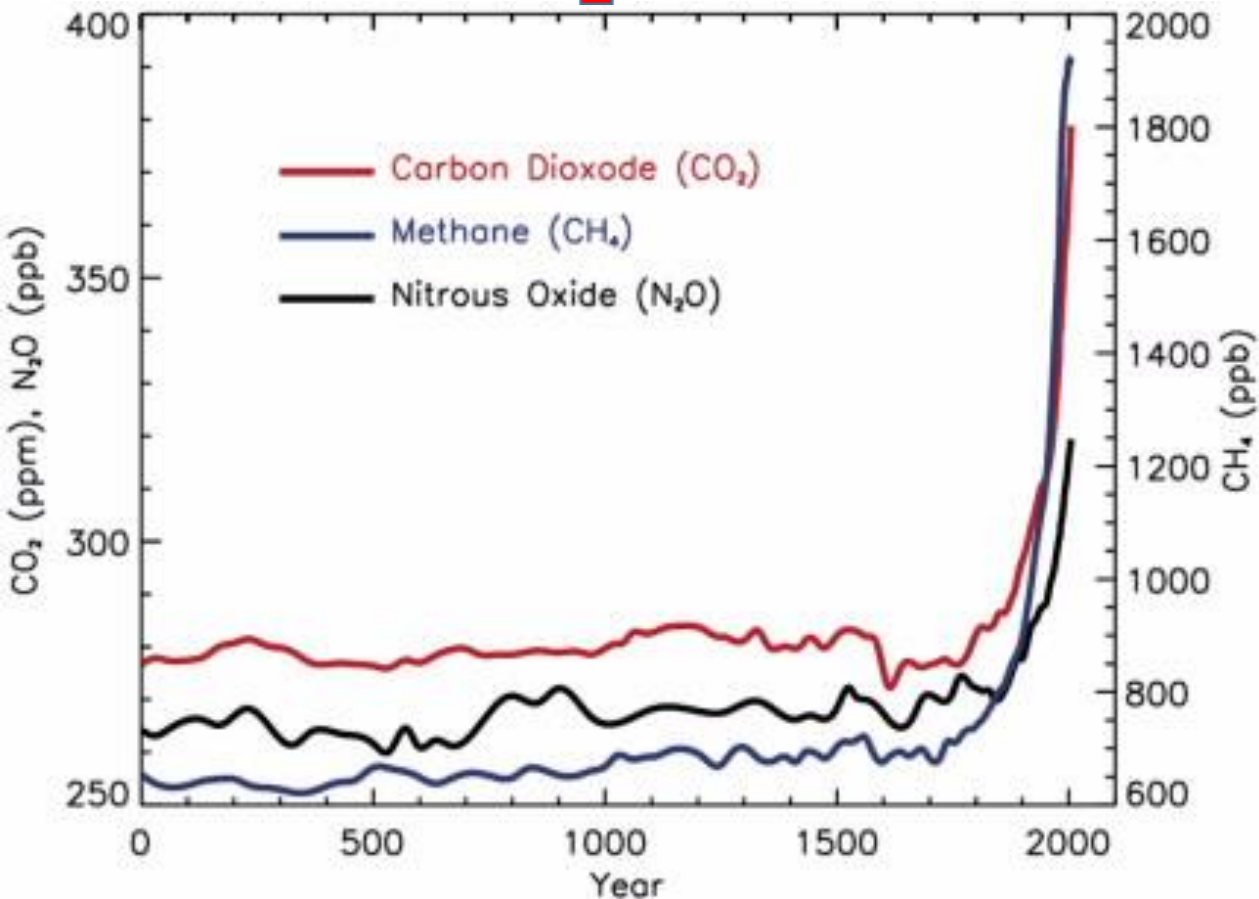
Climate Scientist Ravelle  
& LBJ Oval Office



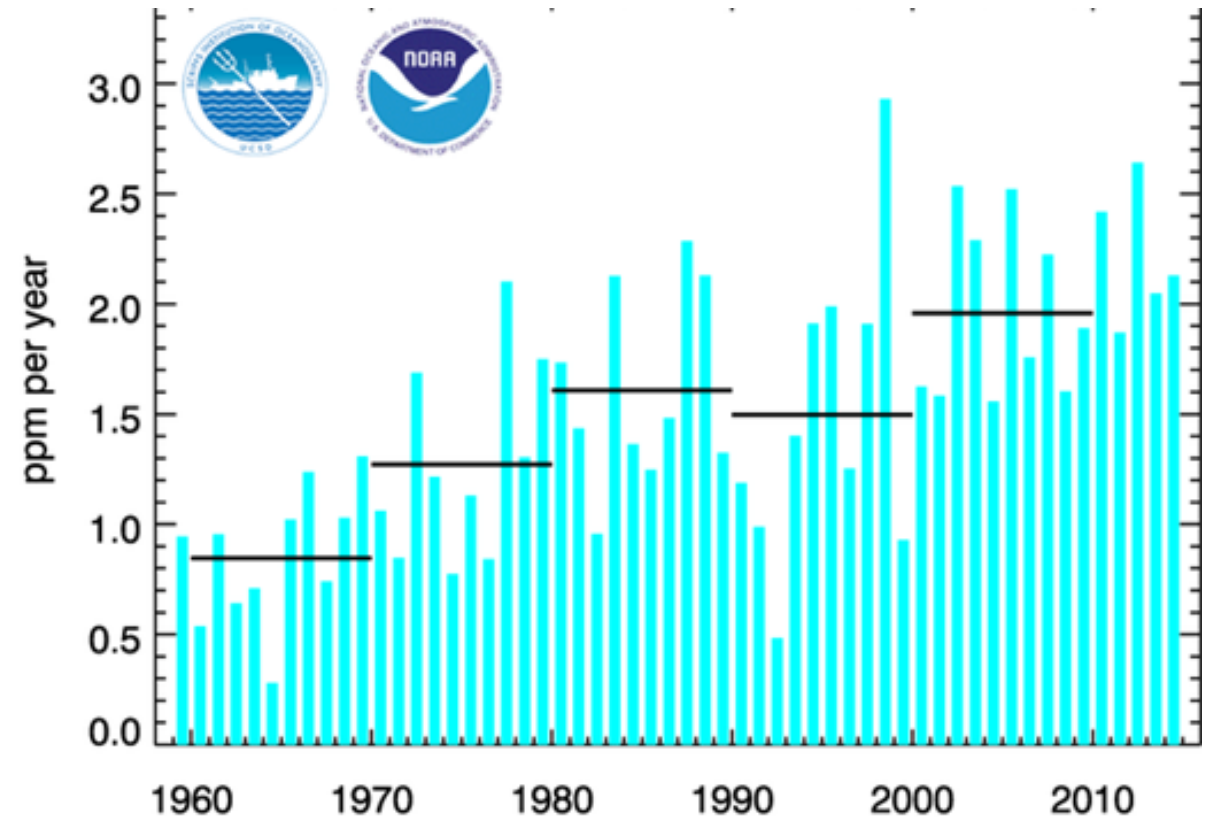
*"This generation has altered  
the atmosphere on a global scale  
through...a steady increase in CO<sub>2</sub> from  
the burning of fossil fuels."*

For 650,000 Yrs. CO<sub>2</sub> never  
above ~ 300 ppm. NASA 2013

Since 1750 ↑↑

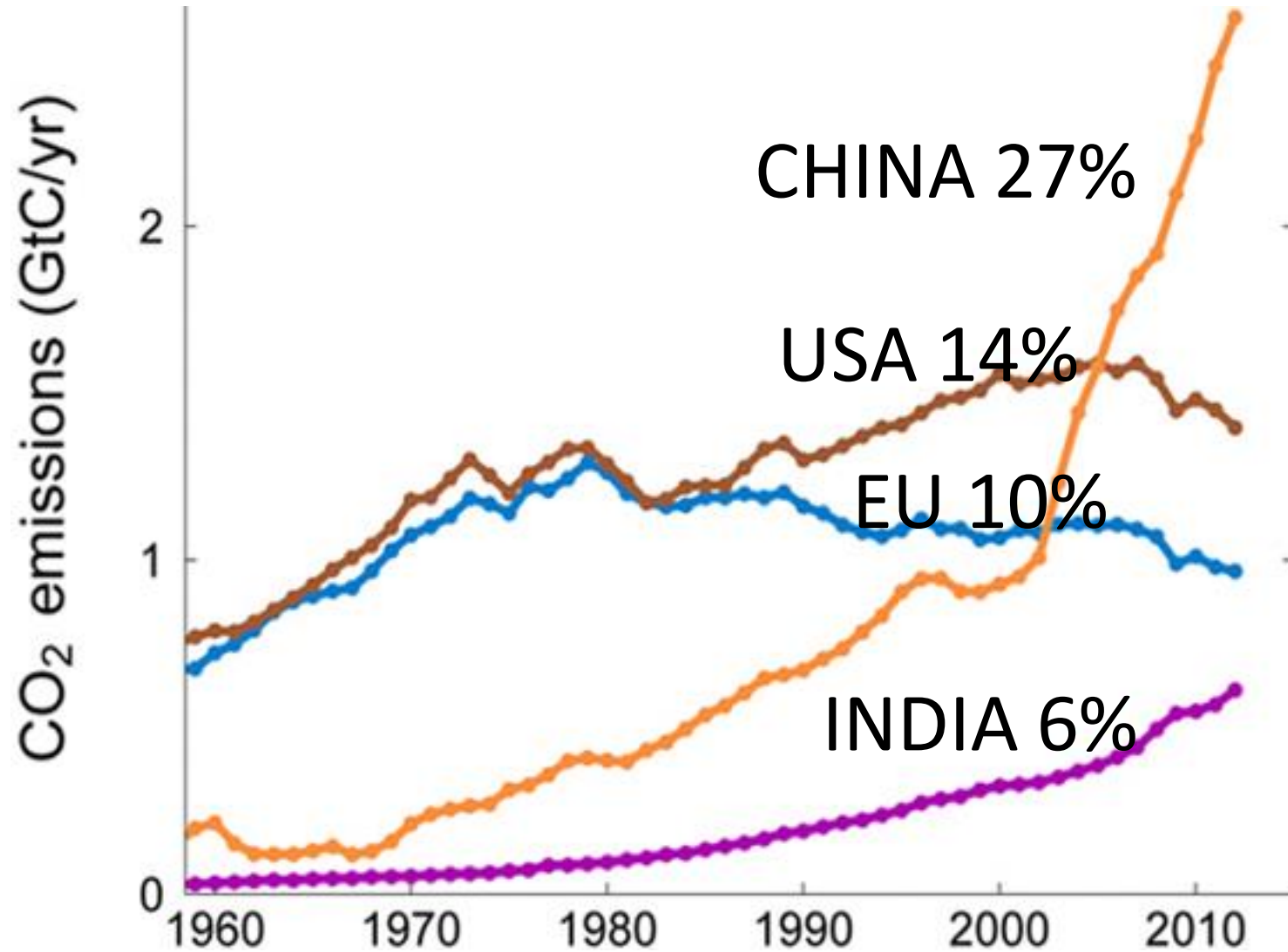


Since 1958 CO<sub>2</sub> rate ↑↑



# CO<sub>2</sub> Top 4 Emitters

## 58% Global (2012)



# 2011-2012

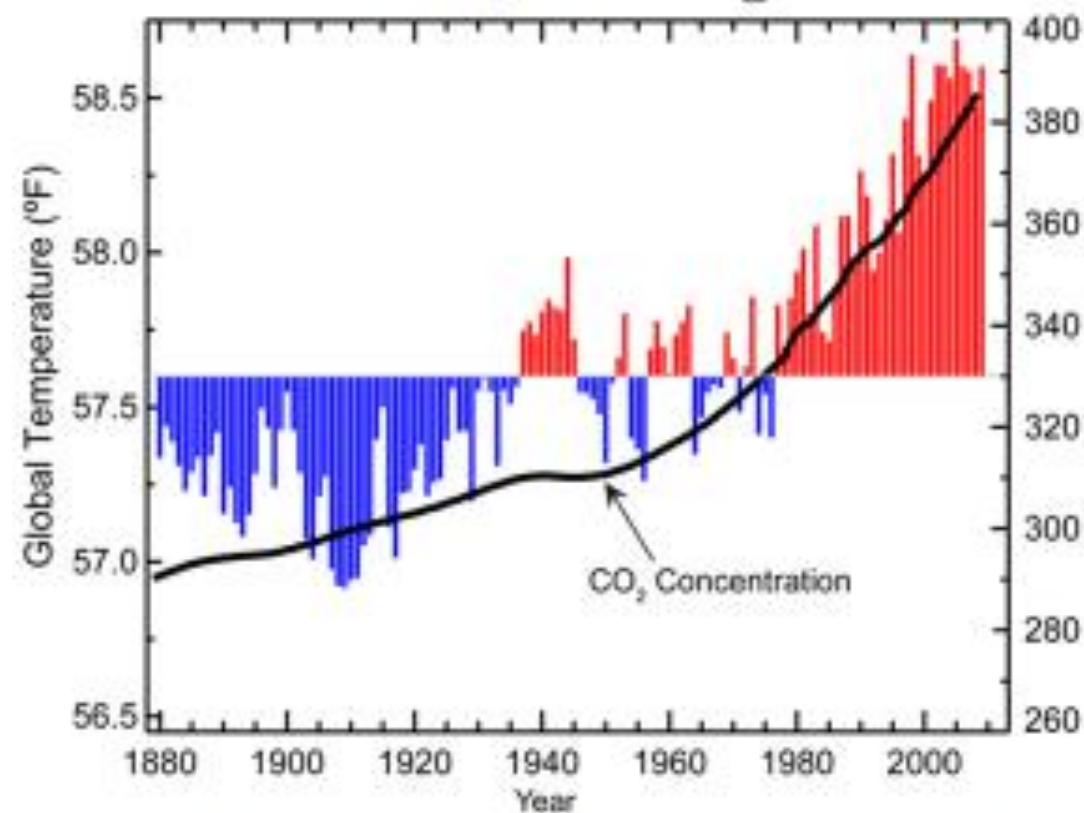
## Growth Rates

CHINA	5.9%
USA	-3.7%
EU	-1.3%
INDIA	7.7%



# Temperature: Land & Ocean. NOAA.

## Temp & CO<sub>2</sub>

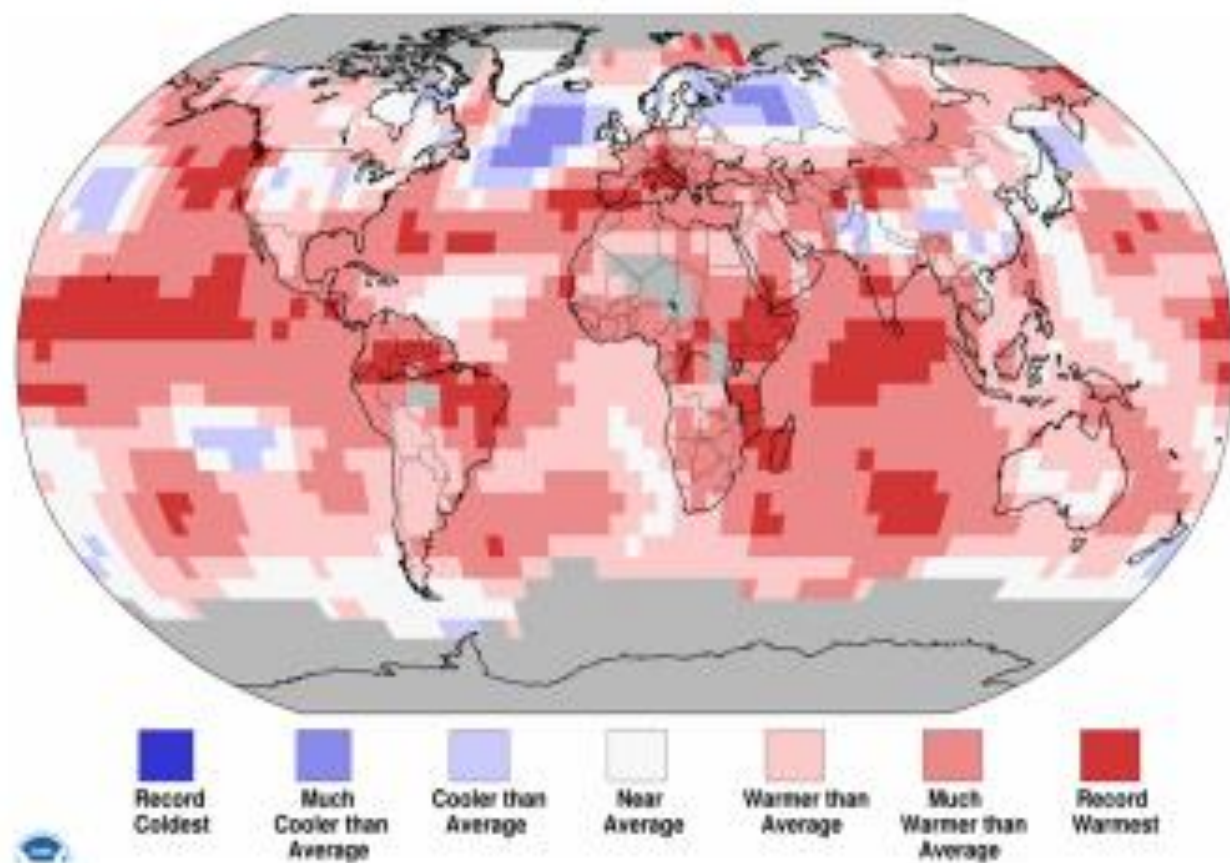


1880

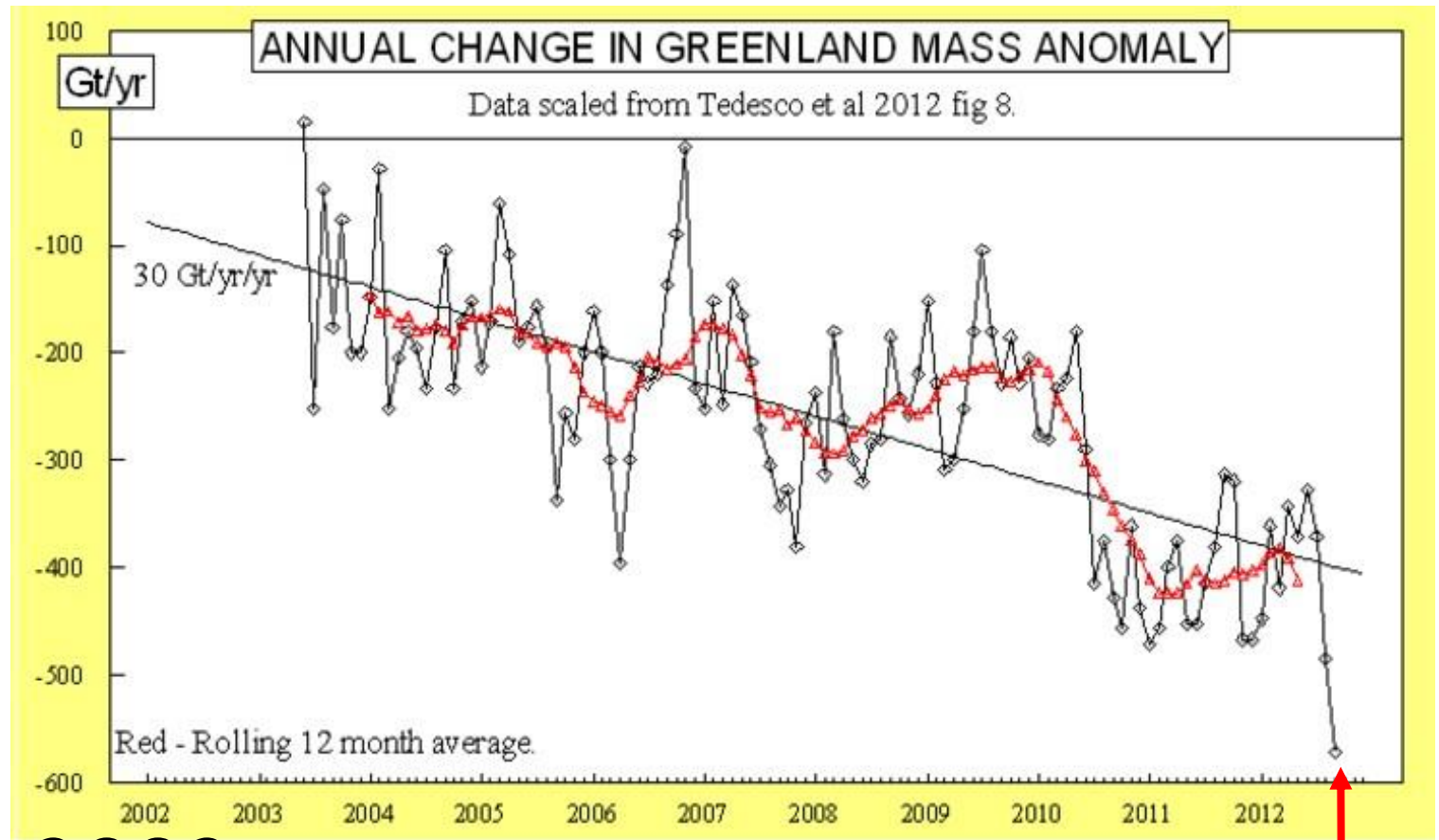
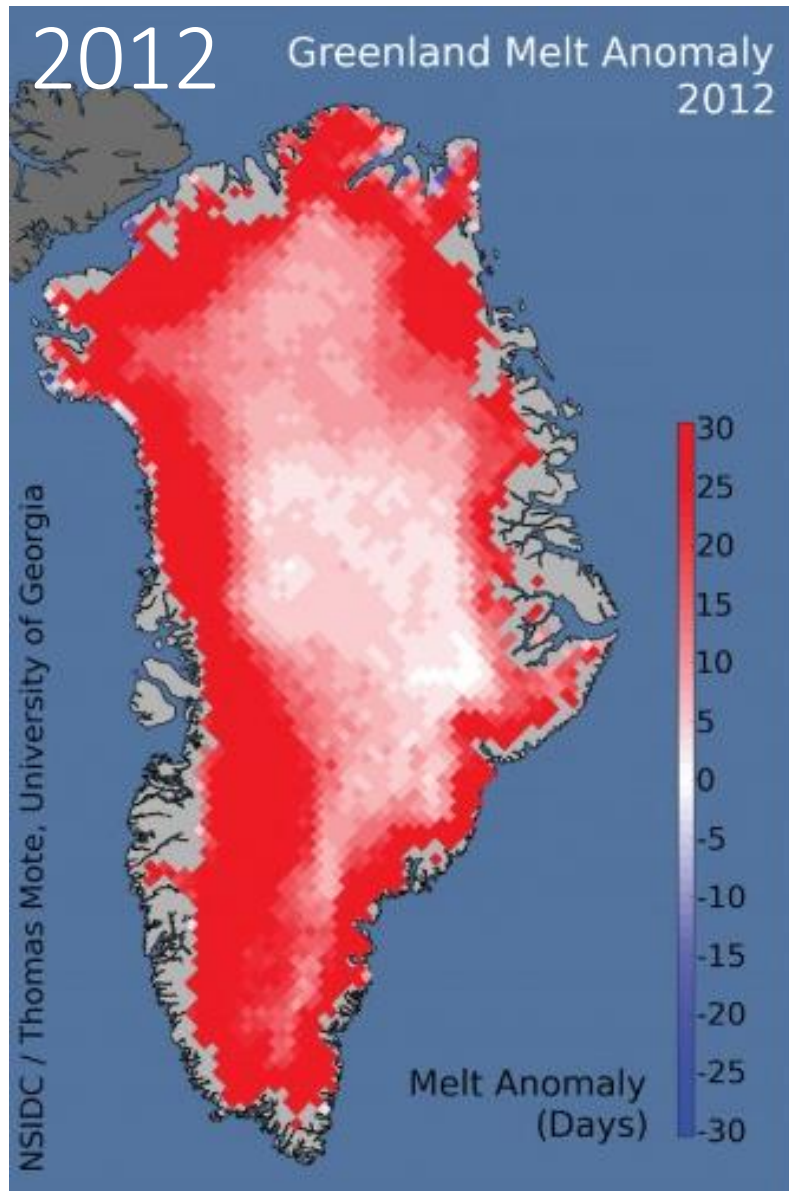
1940

2014

## Temp % tiles, July 2015



# Greenland Ice Cap Melting



2002

2012

Record: 570 gigatonnes/yr



# Permafrost Melting, Alaska

Arctic Coast



Chukchi Sea Coast



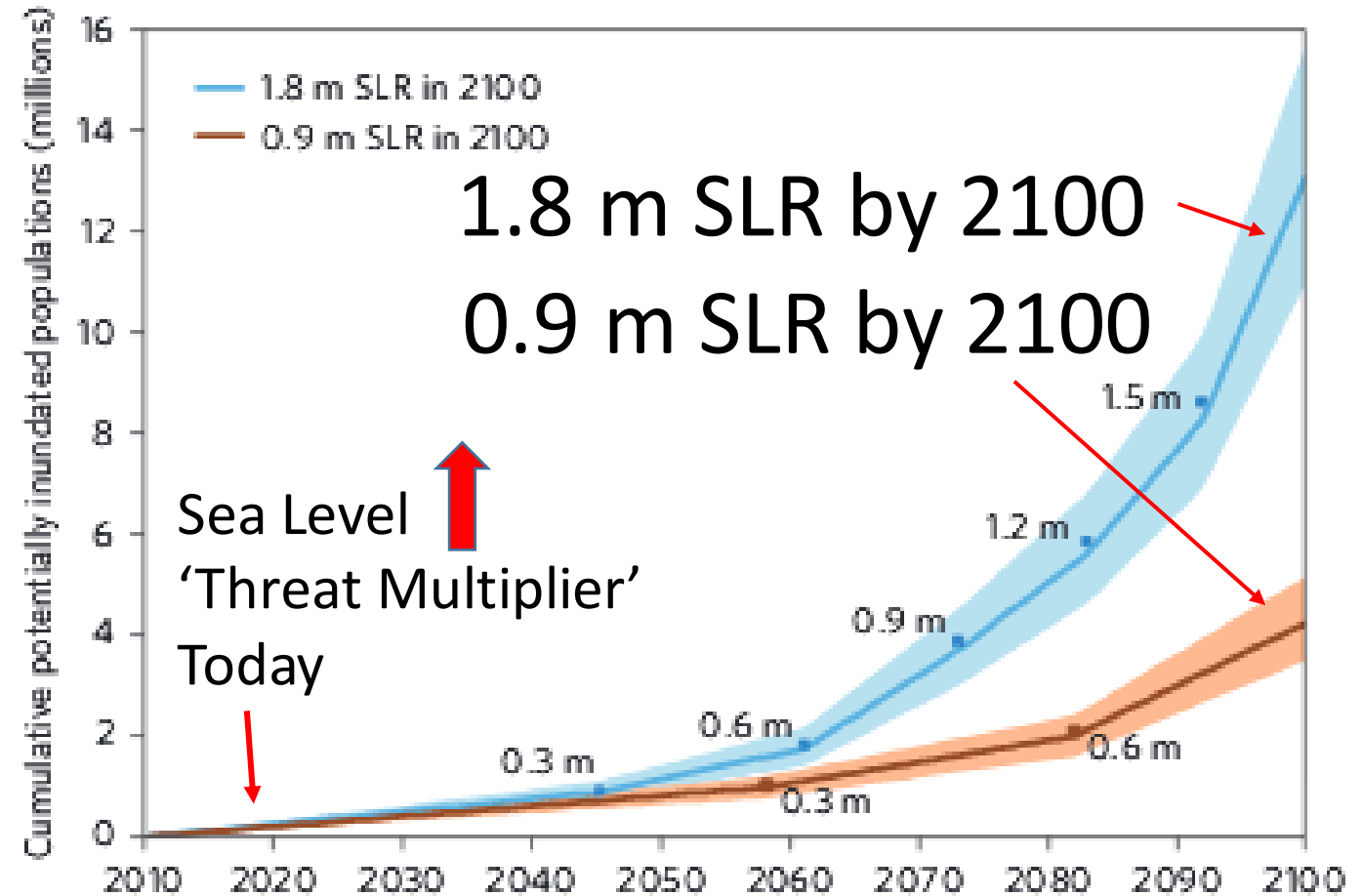
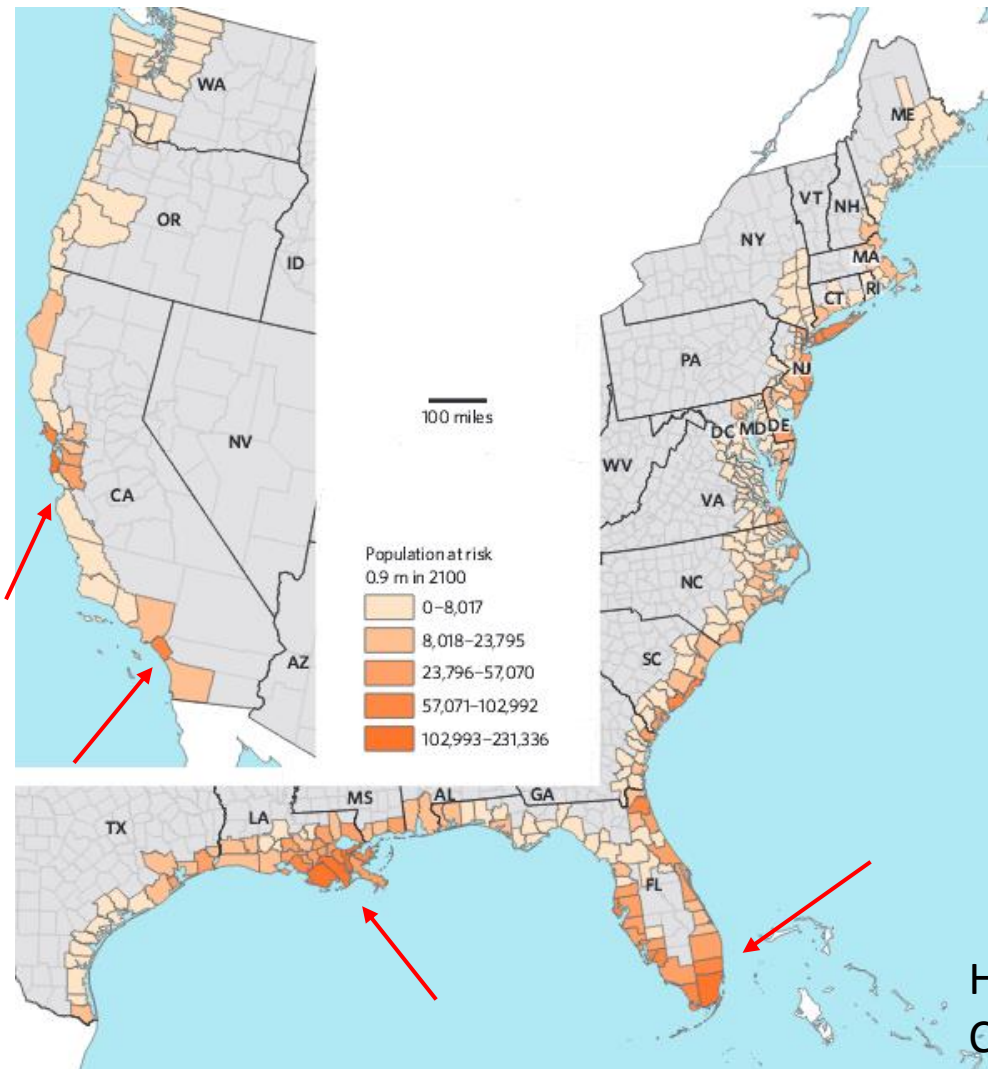
Methane  
'Bubbles'



GW ↑ Methane release & ↑ rate of GW 20-30%  
Sea levels rise



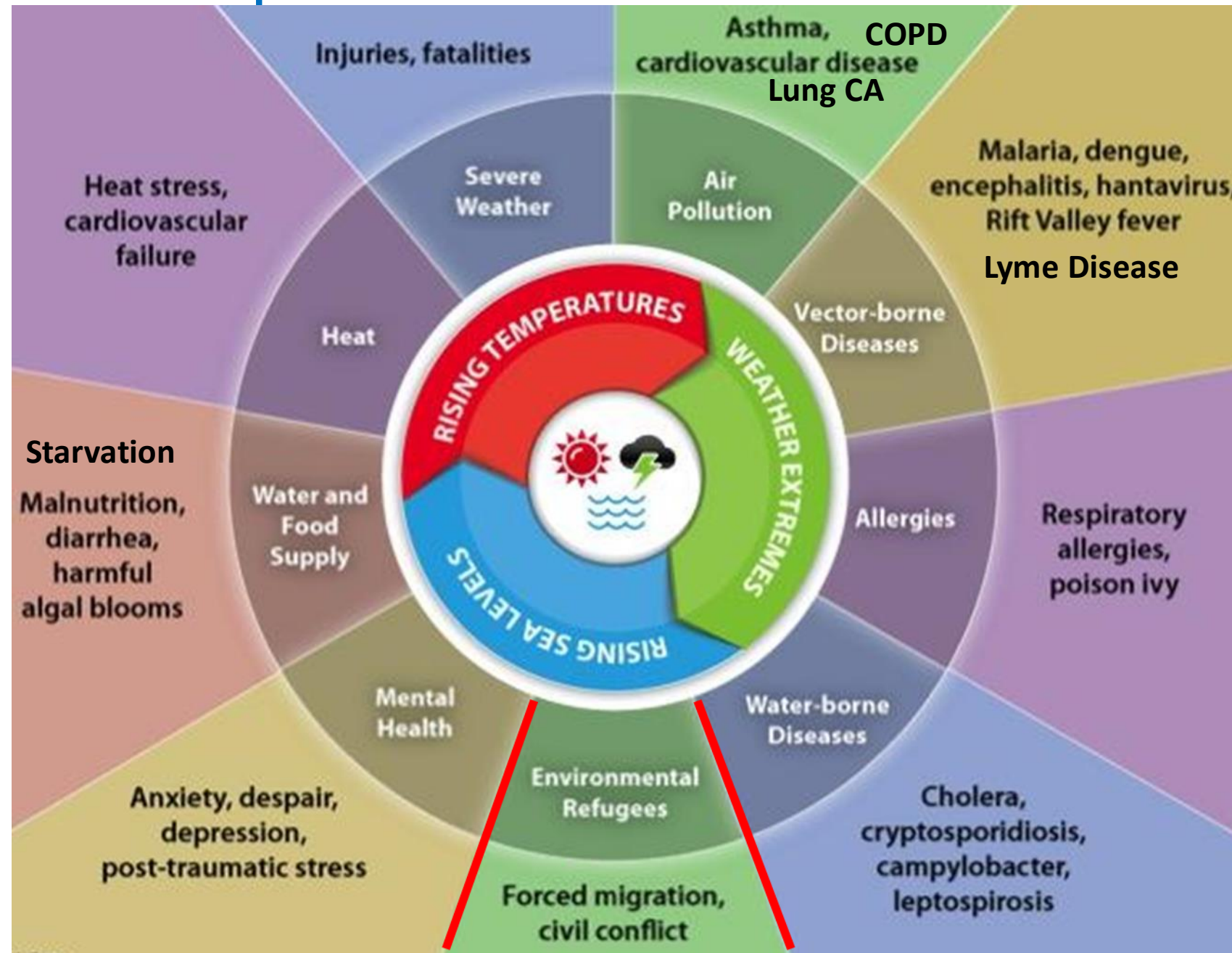
# Cumulative Potent. Inundated Pop. (mil) with Sea Level Rise: Exponential 2016 --2100



Hauer ME et al Millions proj. at risk from sea-level rise in U.S. Nature Climate Change. 14 Mar 2016.

<http://www.nature.com/nclimate/journal/vaop/ncurrent/pdf/nclimate2961.pdf>

# Impacts of CC on PH.



Katrina, USA 2005



CDC 2015 (Patz)

# What's Working? Good News!

- Policy



- Business



- Higher Education



- Cities & States



- Health Systems



- Grass Roots Advocacy



- Build Ethical Case





# Business Transformation

## Clean Power Why?

- Threats to supply chains.



- Profit Potential Enormous \$\$\$



# Business Future: Clean Energy



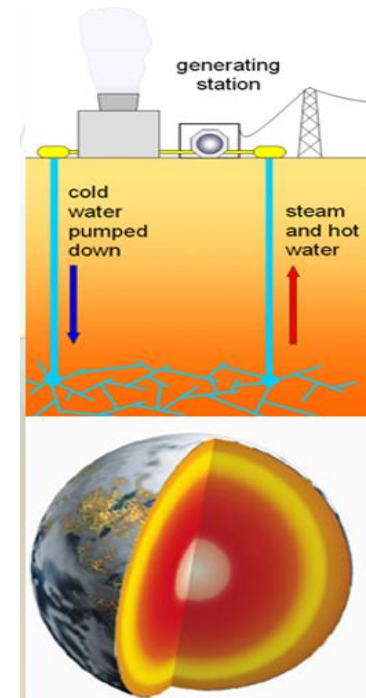
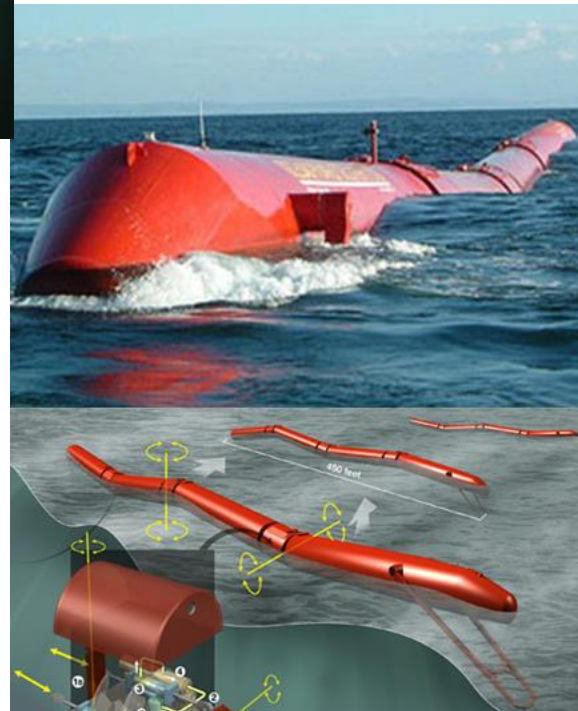
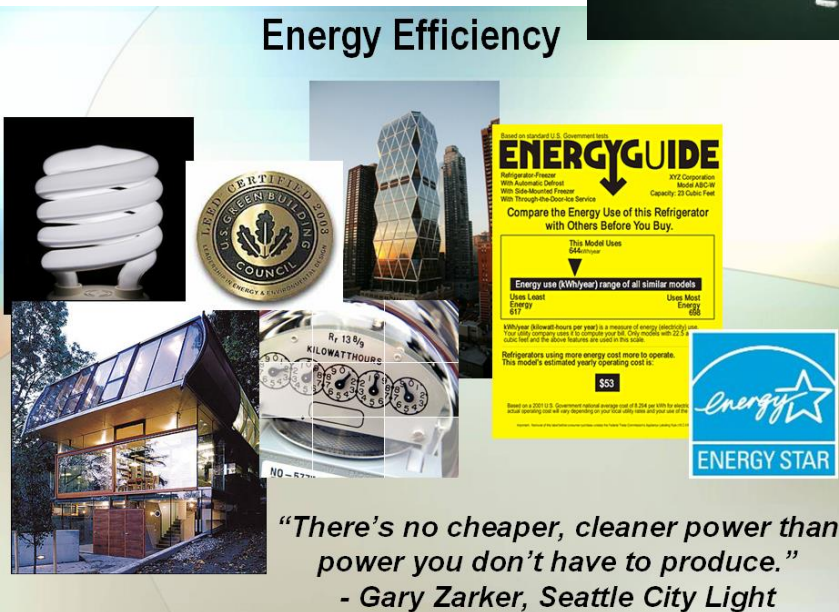
- ↑ Price of 'C'
- ↓ Price on RE
- Ethical Transition Of Workforce



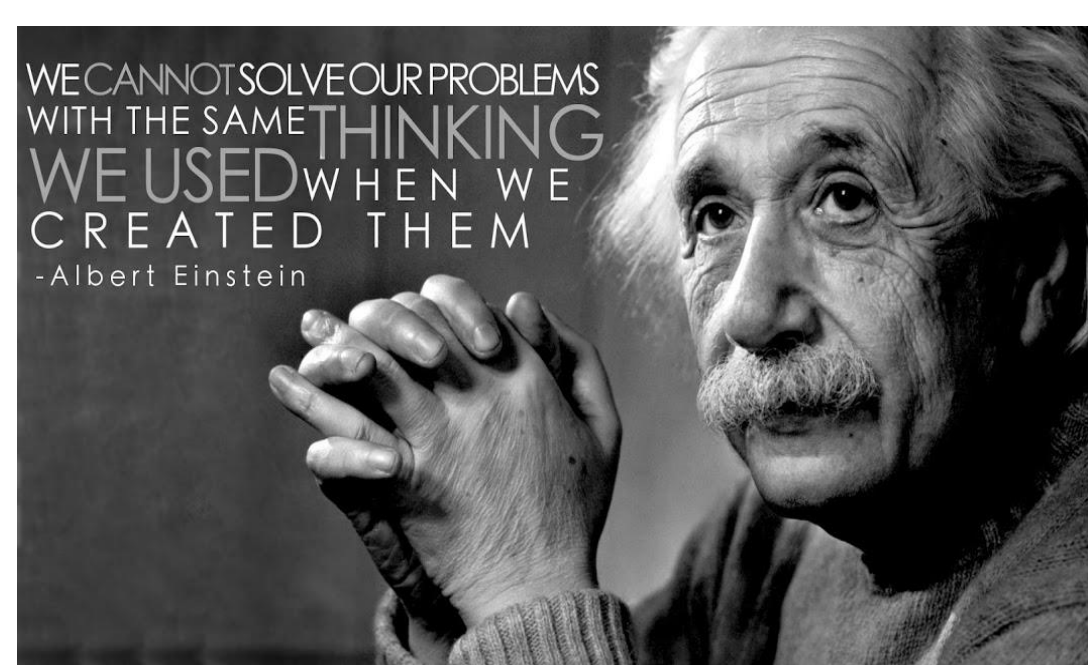
# Entrepreneurs



## Energy Efficiency







Use Science, Moral Values, Respect for Life to Search for Common Ground...

*“Example is not the main thing in influencing others, it is the only thing.”* A Schweitzer

