



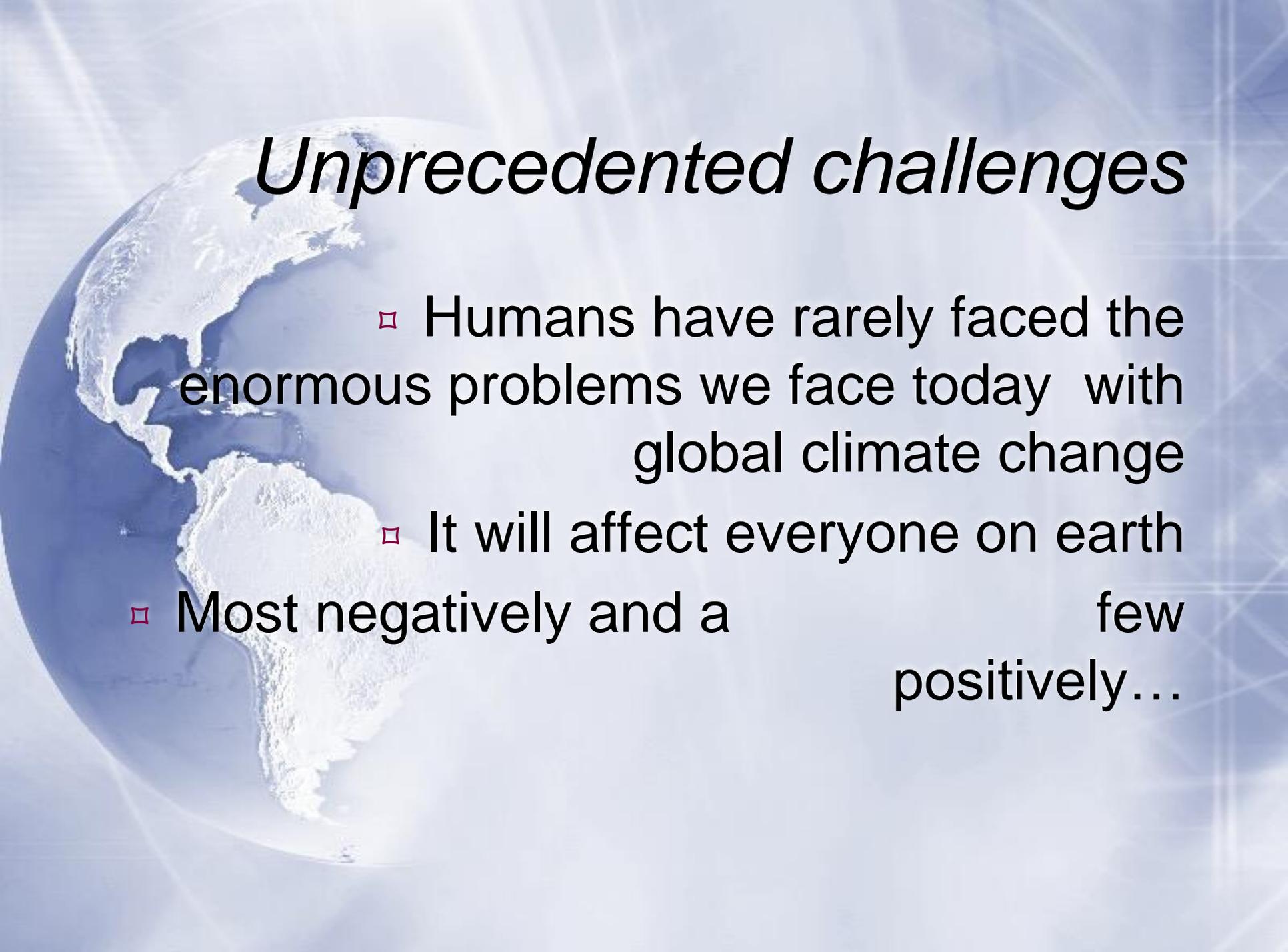
*Using Environmental
Management Reporting to
fight Global Change*

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Scripps Ranch



Unprecedented challenges

- ❑ Humans have rarely faced the enormous problems we face today with global climate change
- ❑ It will affect everyone on earth
- ❑ Most negatively and a few positively...

*A word of thanks for global warming from
“The tomato farmers of Greenland...”*



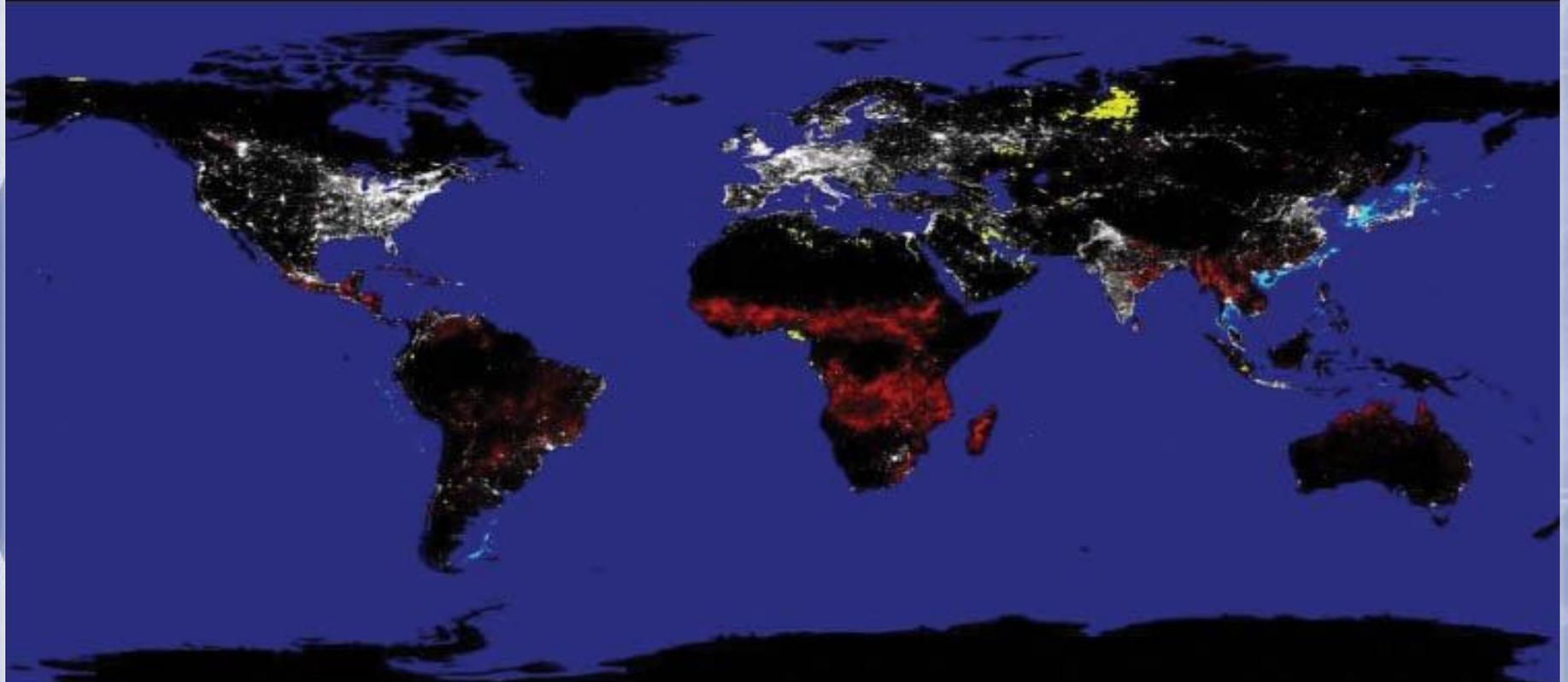
Lauren Etter



The causes

- Ignorance
 - Greed
 - Desperation
 - Stupidity
 - Poor accounting
-
- EMR can help with many of these causes

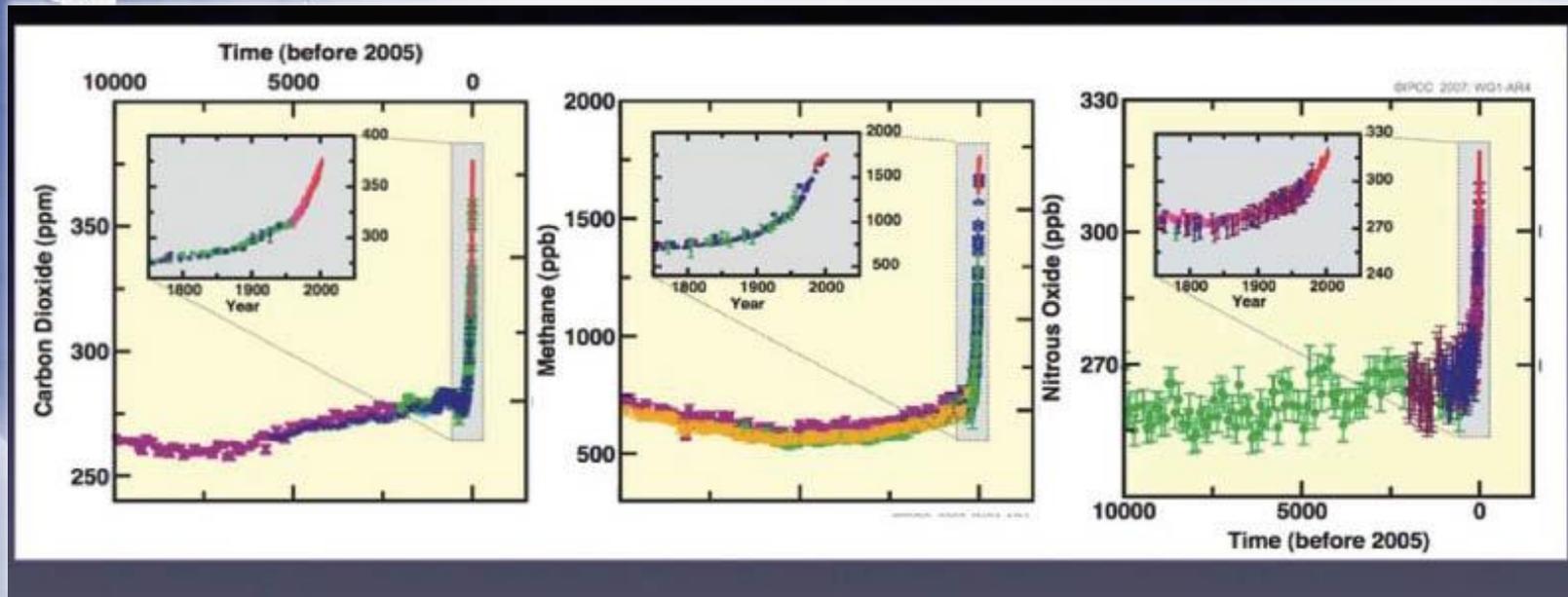
Human activity is having a global impact

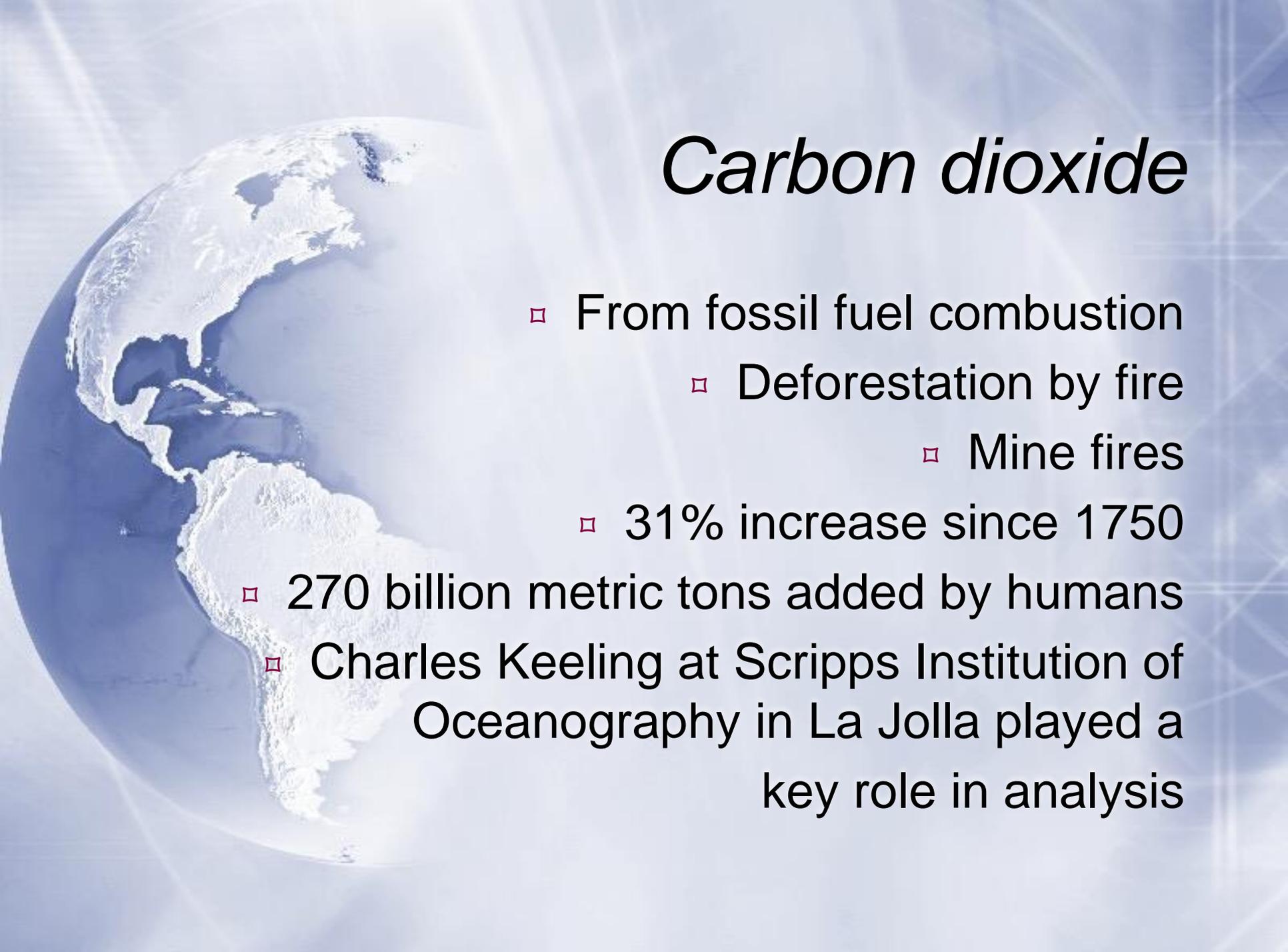


White: electricity
Red: fires (natural and man-made)
Yellow: gas flares
Blue: fishing boats and off-shore oil & gas

Global warming gases

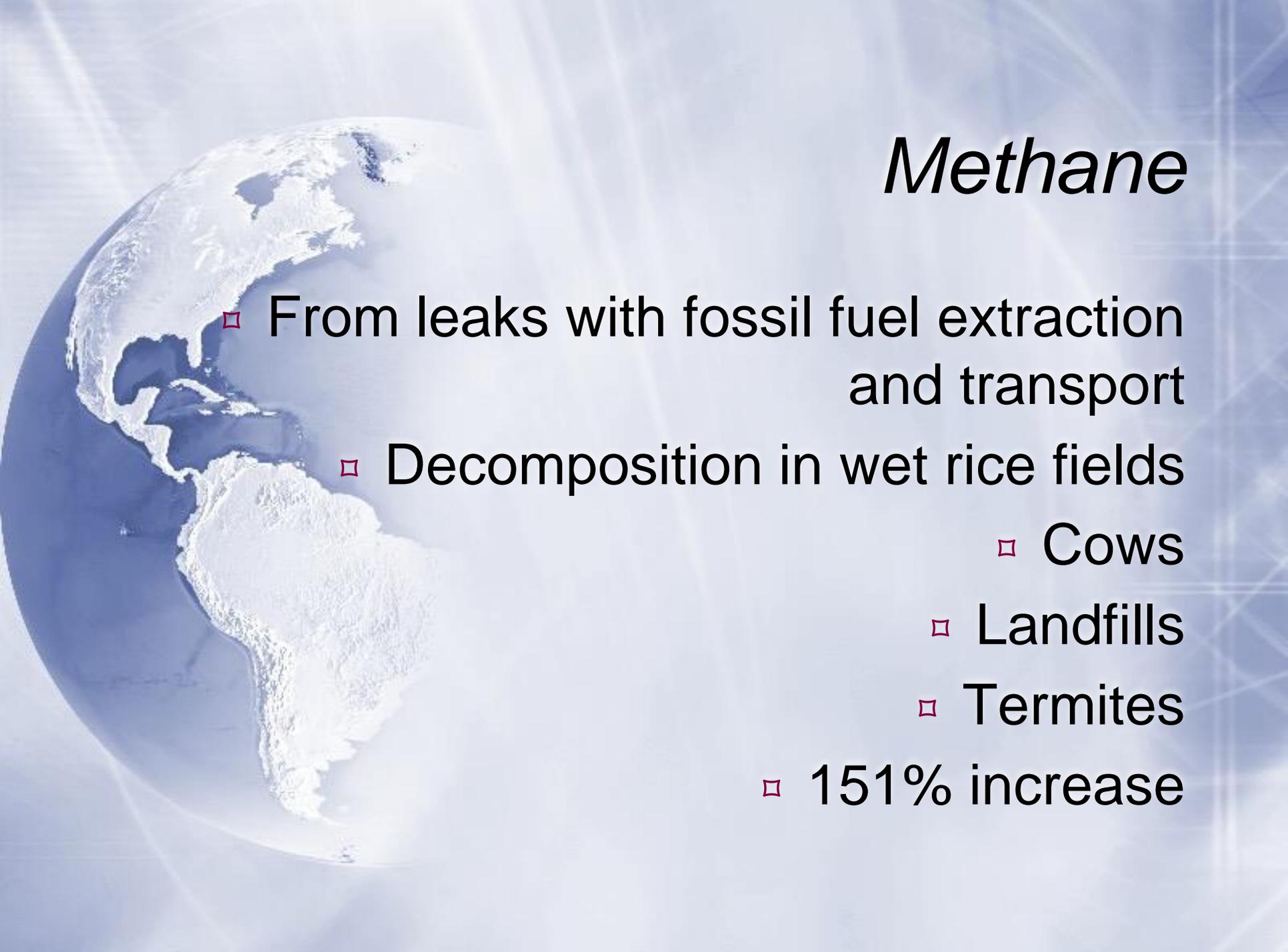
- CO₂ Methane CFCs
- No_x SO_x and others





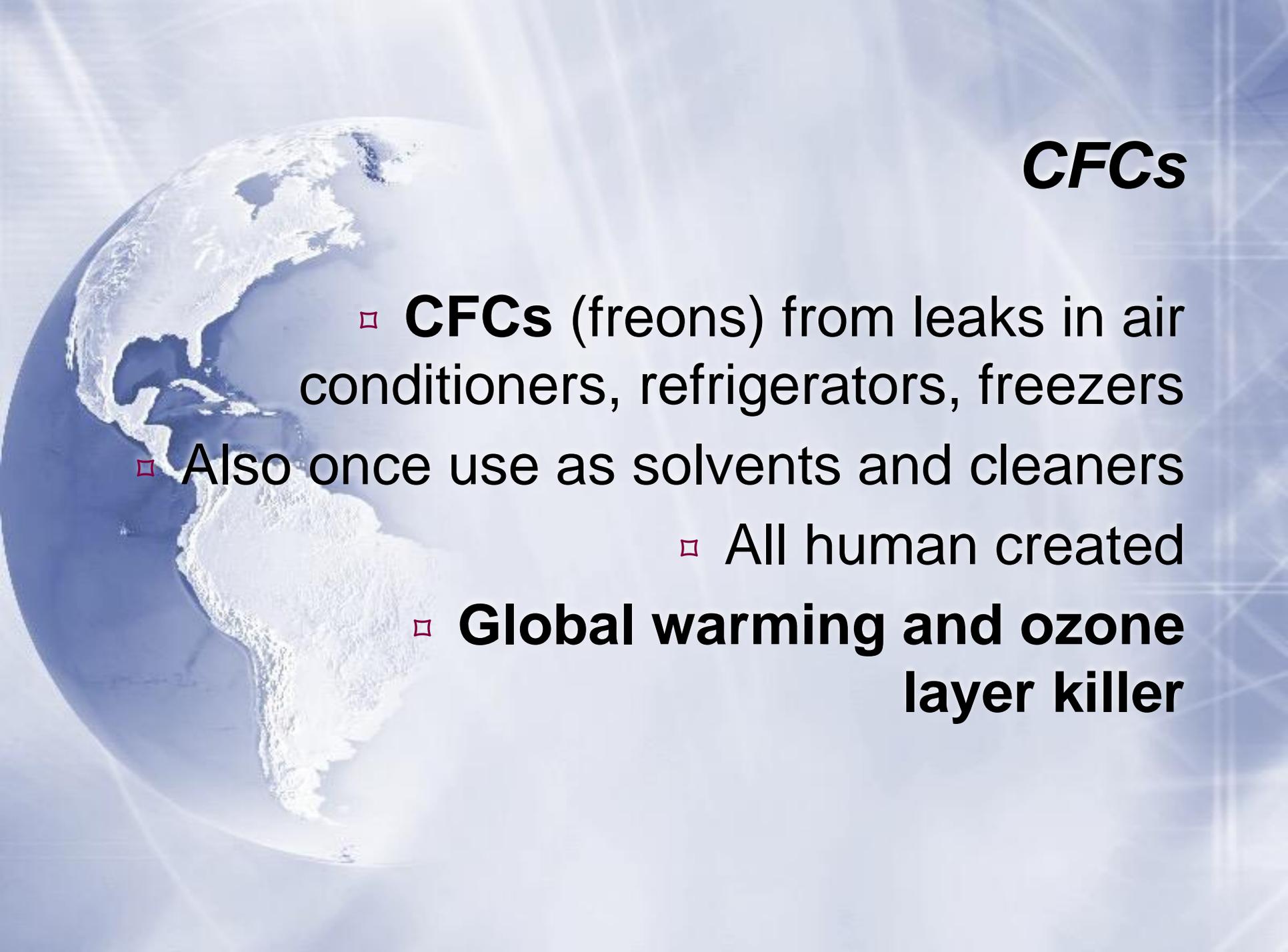
Carbon dioxide

- From fossil fuel combustion
 - Deforestation by fire
 - Mine fires
- 31% increase since 1750
- 270 billion metric tons added by humans
- Charles Keeling at Scripps Institution of Oceanography in La Jolla played a key role in analysis



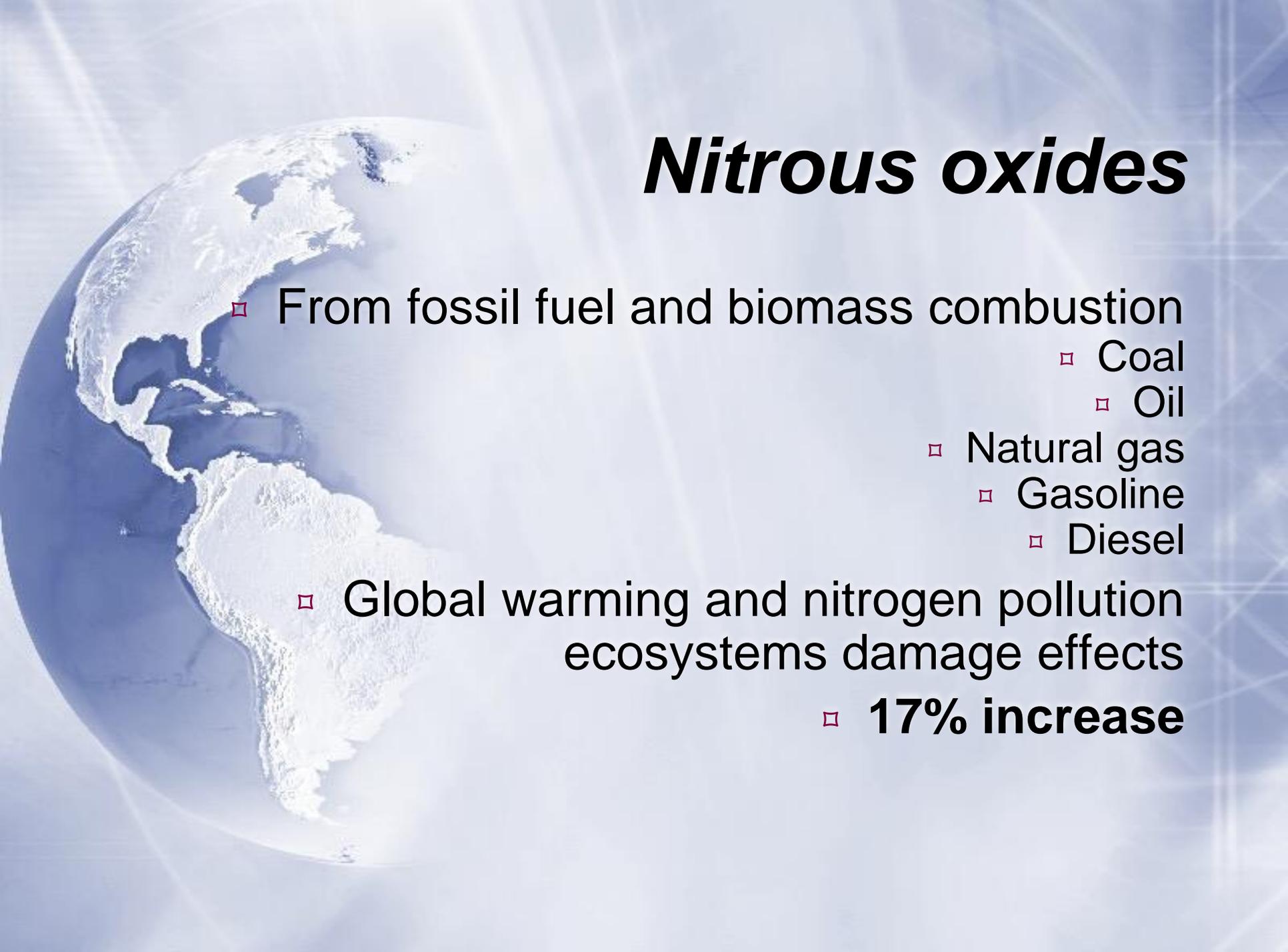
Methane

- From leaks with fossil fuel extraction and transport
- Decomposition in wet rice fields
 - Cows
 - Landfills
 - Termites
- 151% increase



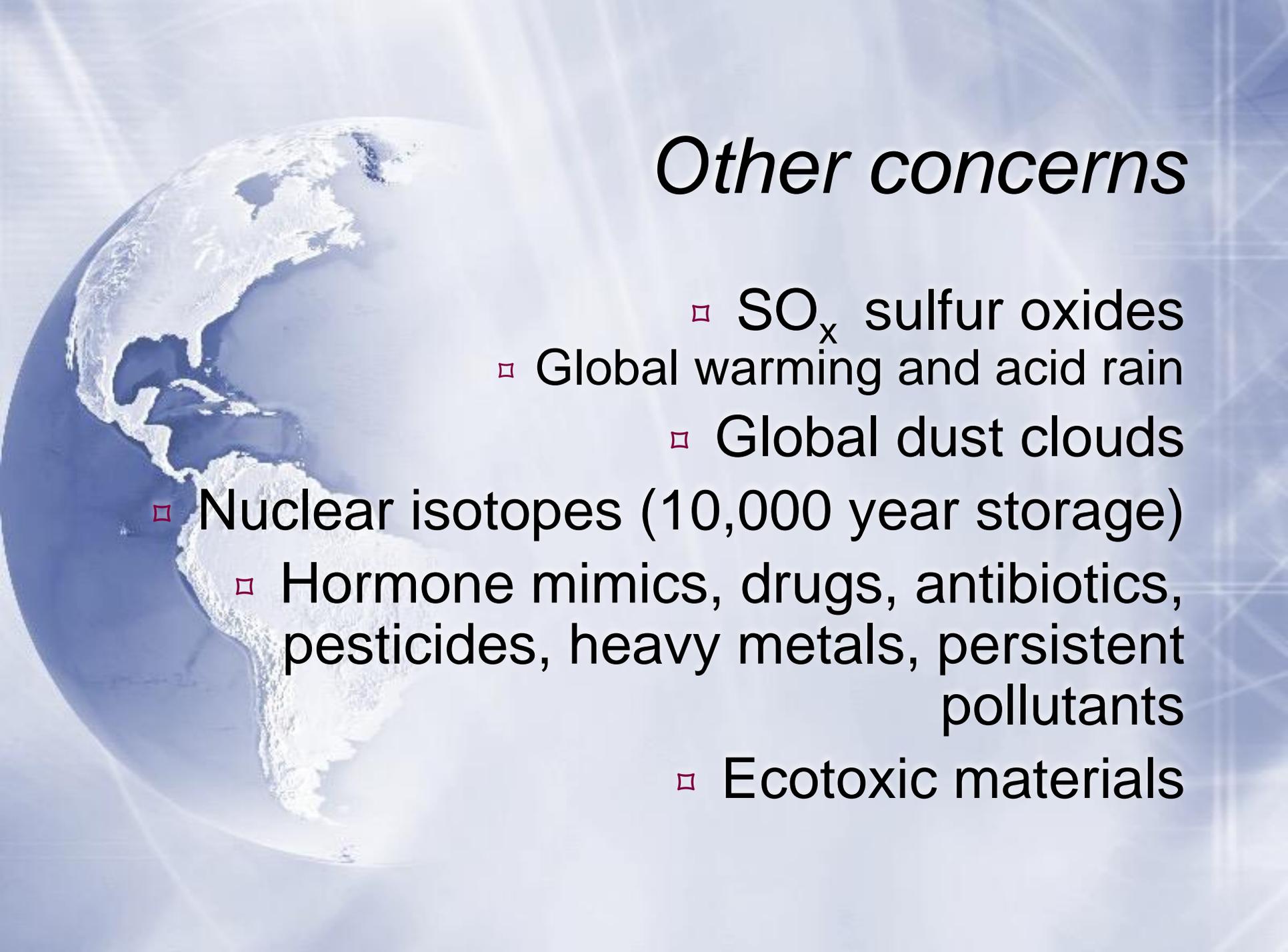
CFCs

- ❑ **CFCs** (freons) from leaks in air conditioners, refrigerators, freezers
- ❑ Also once use as solvents and cleaners
 - ❑ All human created
- ❑ **Global warming and ozone layer killer**



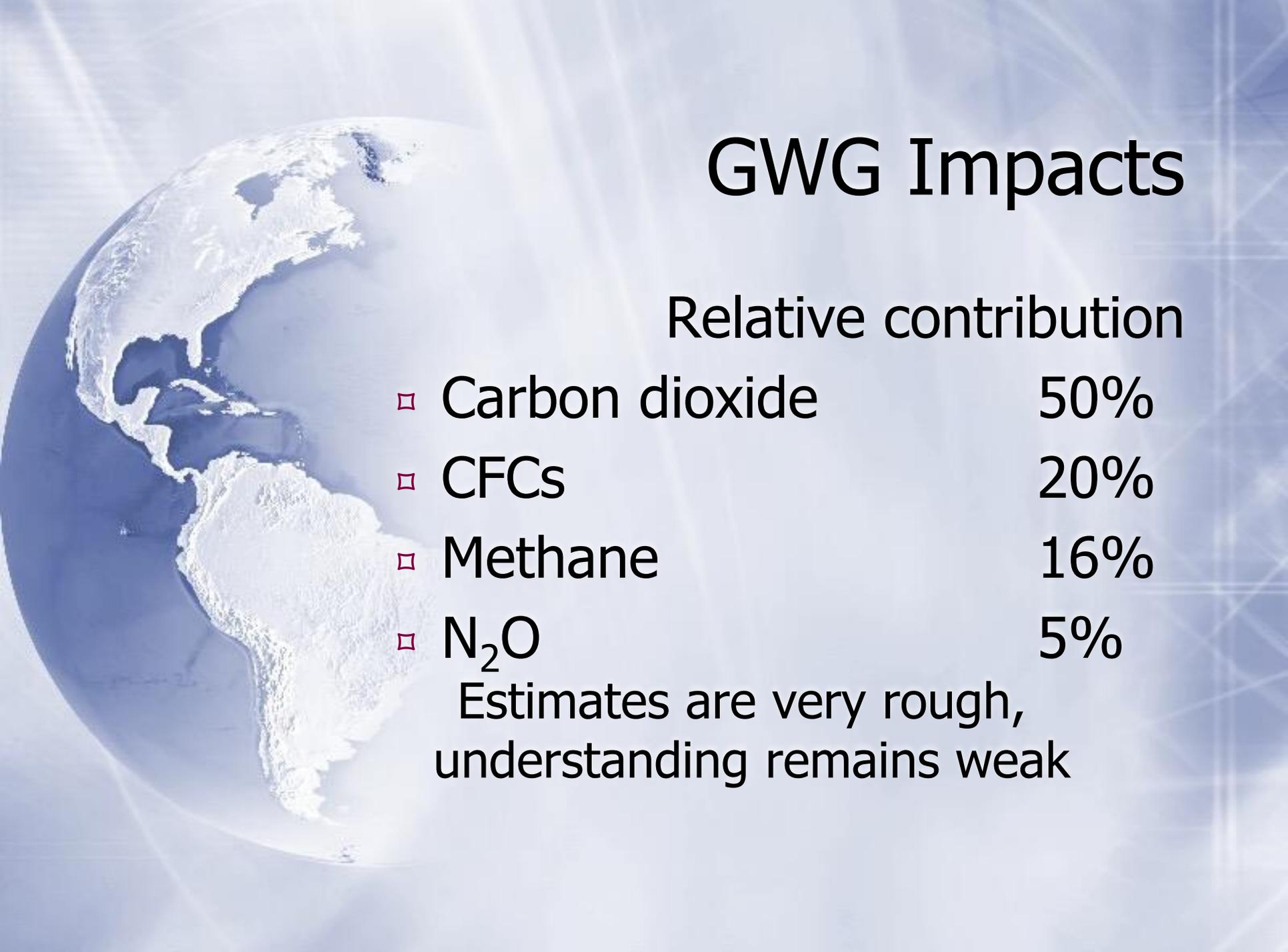
Nitrous oxides

- From fossil fuel and biomass combustion
 - Coal
 - Oil
 - Natural gas
 - Gasoline
 - Diesel
- Global warming and nitrogen pollution ecosystems damage effects
 - **17% increase**



Other concerns

- SO_x sulfur oxides
- Global warming and acid rain
- Global dust clouds
- Nuclear isotopes (10,000 year storage)
 - Hormone mimics, drugs, antibiotics, pesticides, heavy metals, persistent pollutants
 - Ecotoxic materials



GWG Impacts

Relative contribution

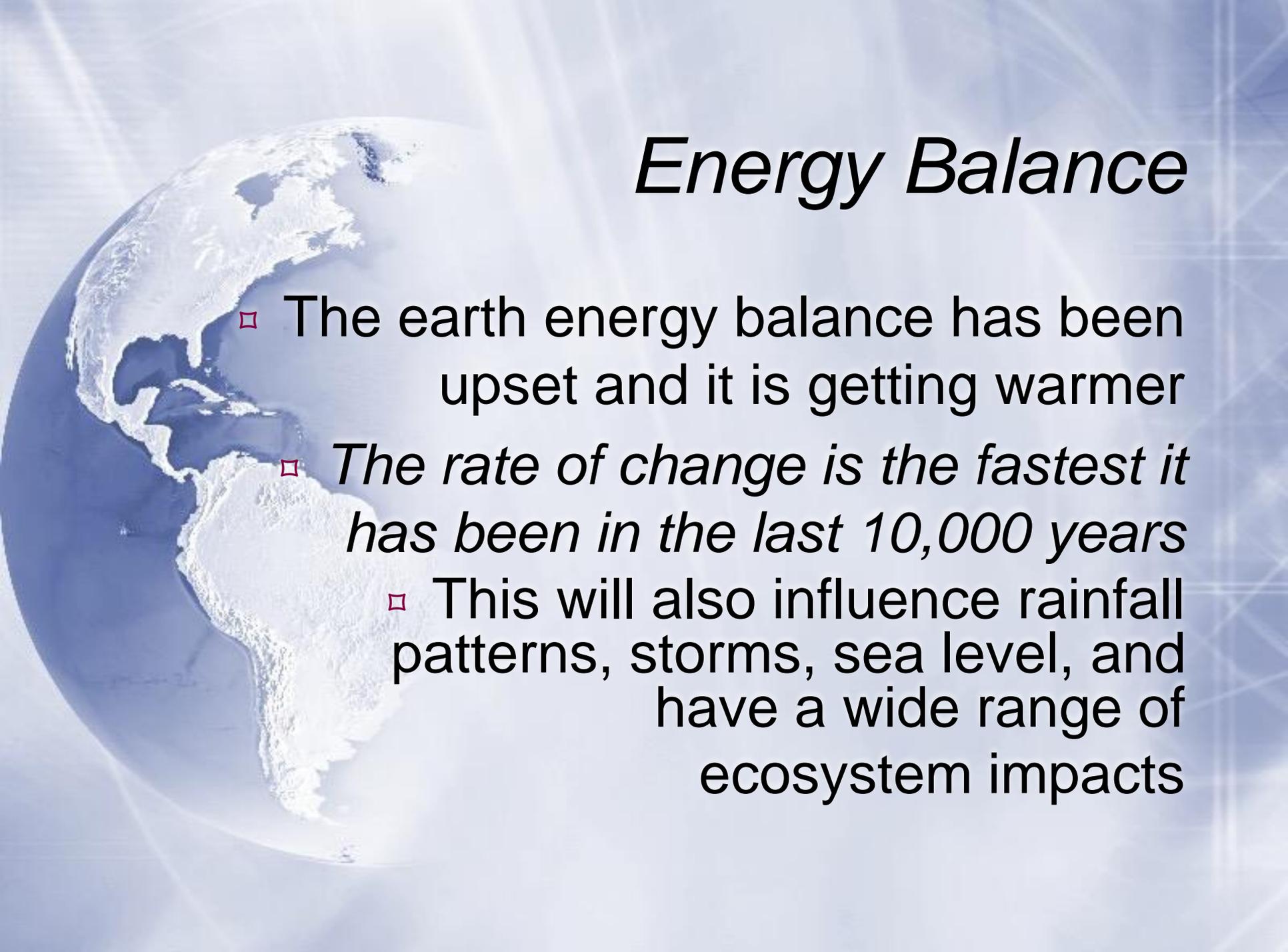
| | |
|--------------------|-----|
| ❑ Carbon dioxide | 50% |
| ❑ CFCs | 20% |
| ❑ Methane | 16% |
| ❑ N ₂ O | 5% |

Estimates are very rough,
understanding remains weak



Warming offset

- ❑ Global warming has been damped by global dimming
- ❑ Dust and high clouds from jet condensation trails have offset the warming impact from fossil fuels
- ❑ This realization led to increased concern over the true level of warming impact

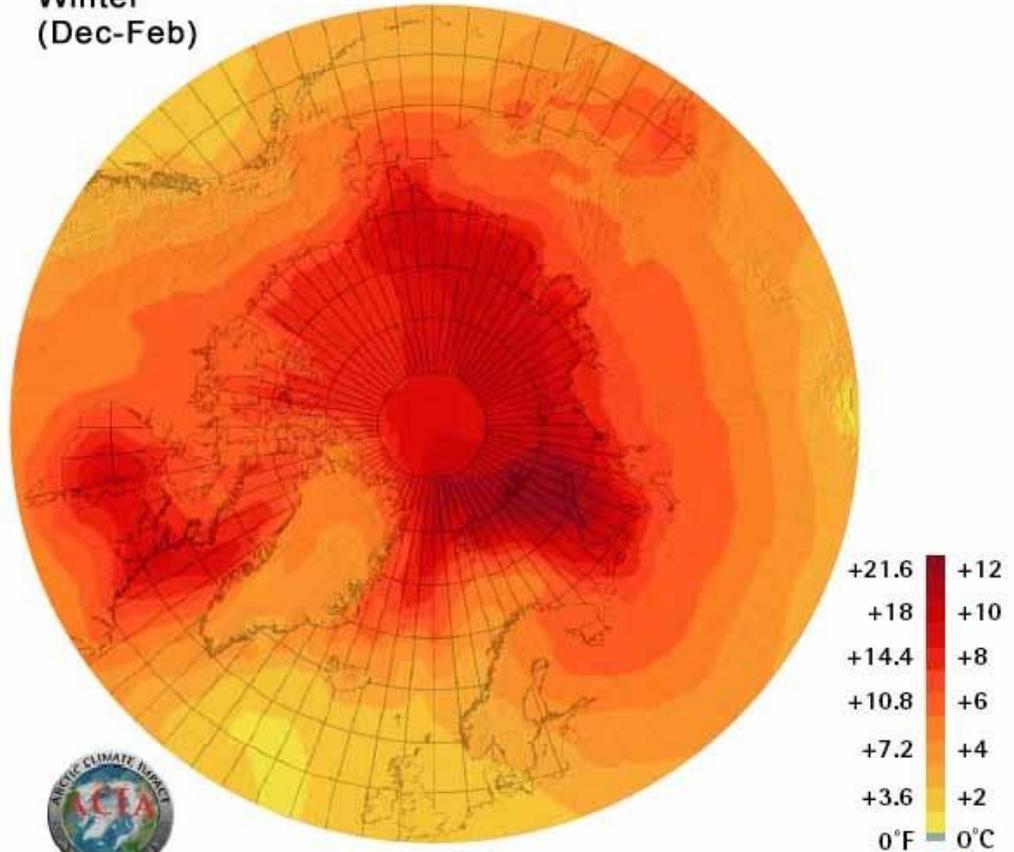


Energy Balance

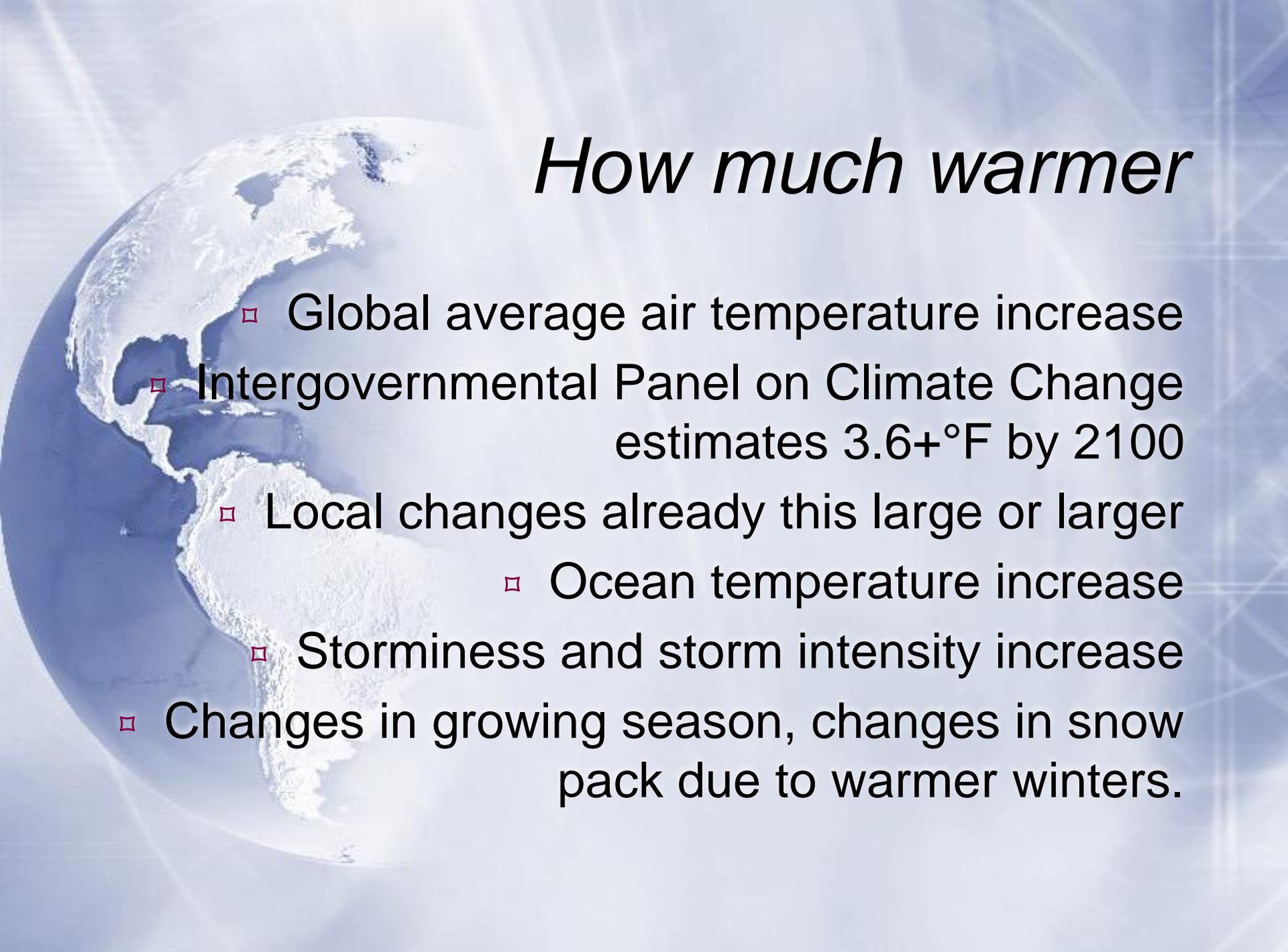
- ❑ The earth energy balance has been upset and it is getting warmer
- ❑ *The rate of change is the fastest it has been in the last 10,000 years*
 - ❑ This will also influence rainfall patterns, storms, sea level, and have a wide range of ecosystem impacts

Arctic Temperature Increase

Projected Surface Air Temperature Change: 1990s - 2090s
Winter
(Dec-Feb)



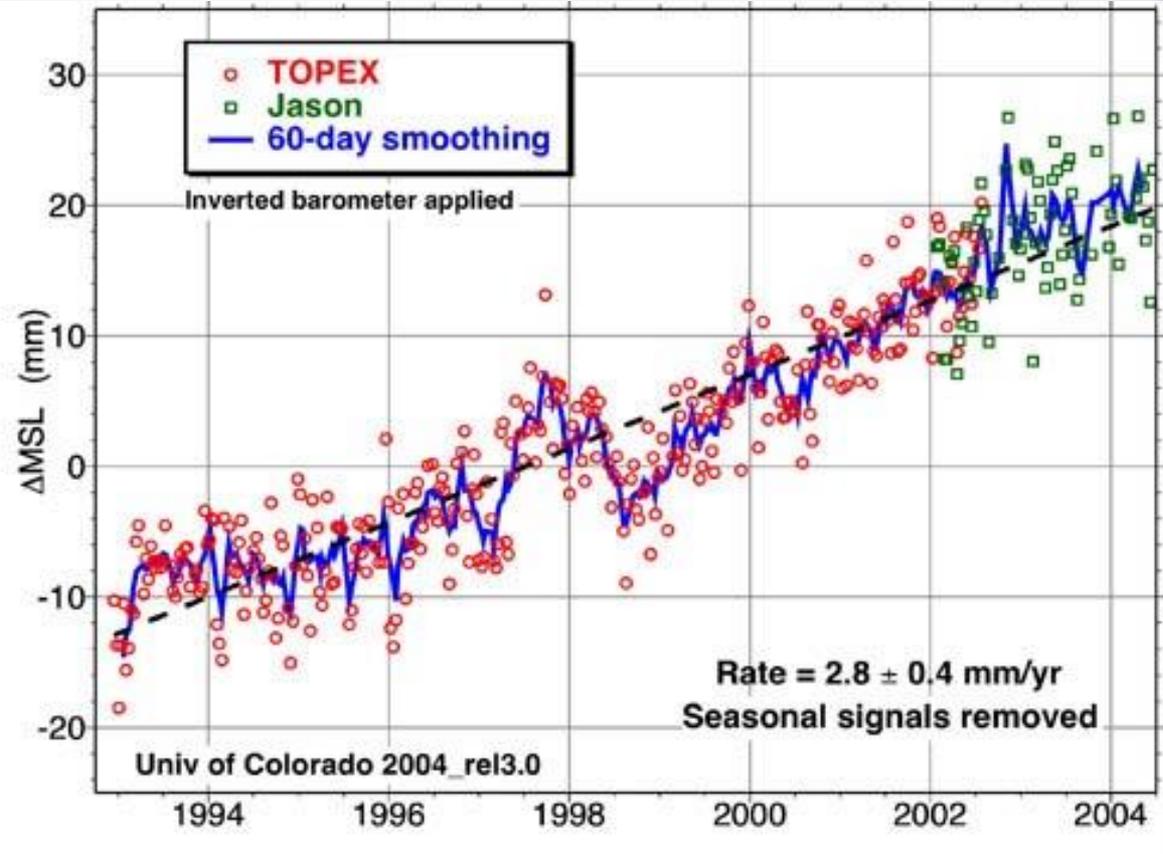
©ACIA, Map ©Clifford Grabhorn



How much warmer

- Global average air temperature increase
- Intergovernmental Panel on Climate Change estimates 3.6+°F by 2100
- Local changes already this large or larger
 - Ocean temperature increase
 - Storminess and storm intensity increase
- Changes in growing season, changes in snow pack due to warmer winters.

Sea Level Rise



From melting ice and volume change with temperature

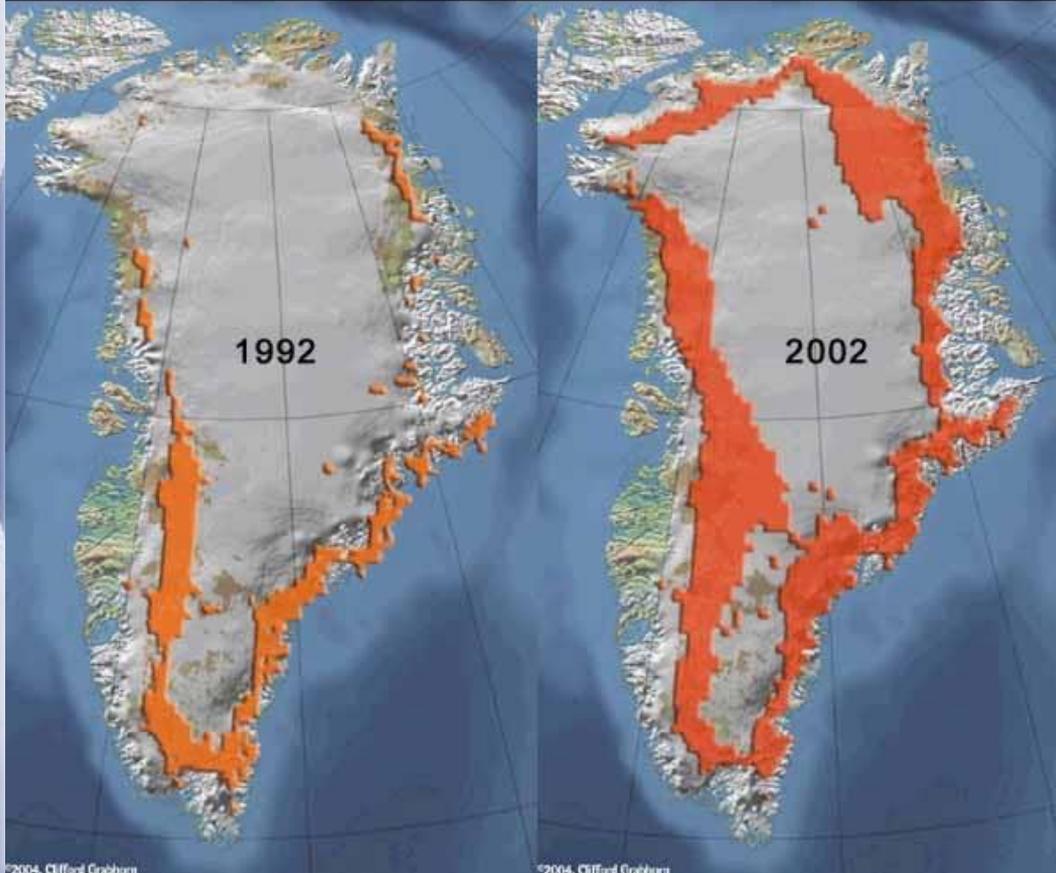
Sea Level Impact



Tuvalu and other island nations are going, going...

Sea level rise- Greenland Melt

Greenland Ice Sheet Melt 1992 to 2002

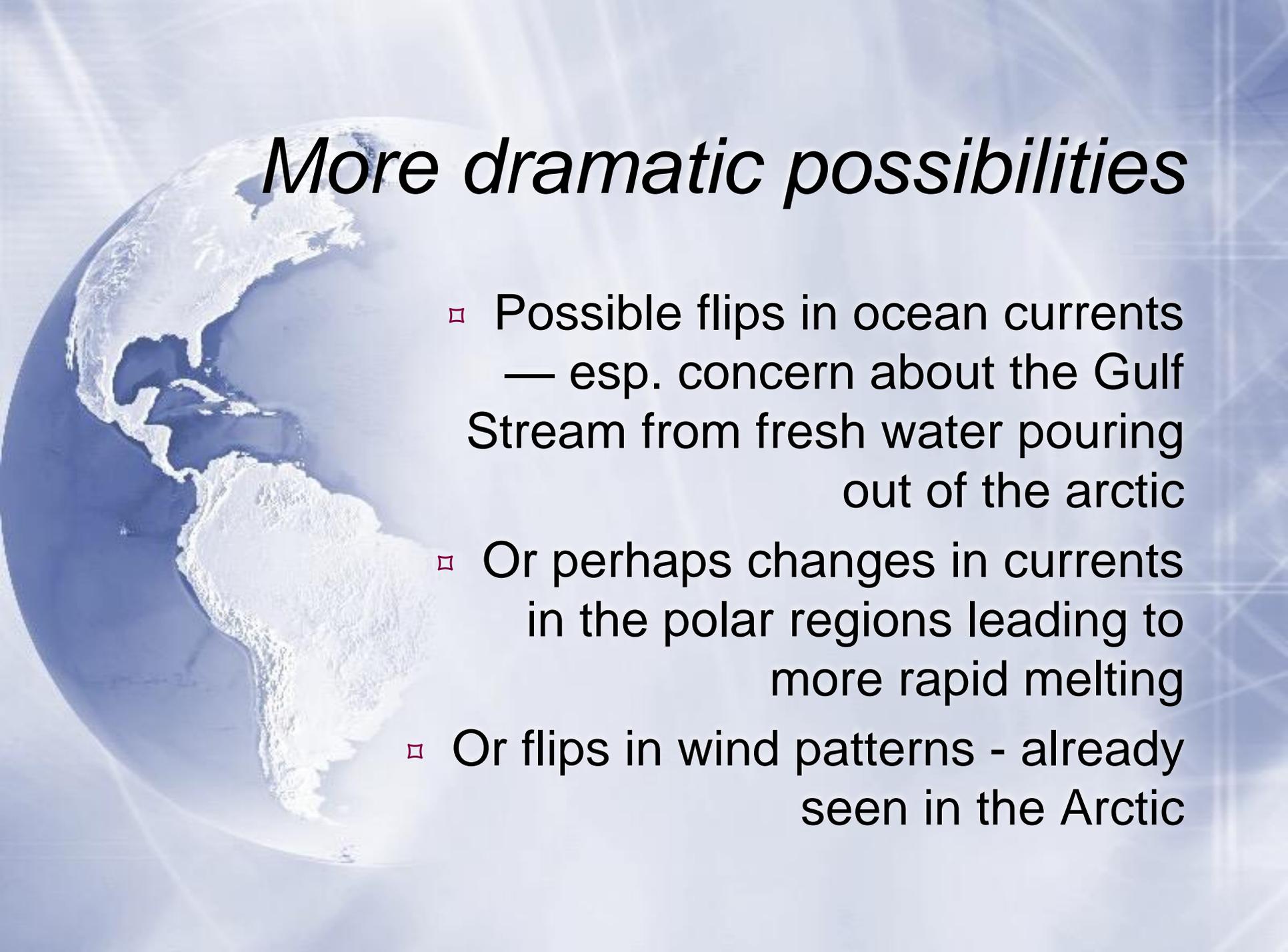


Will it be 0.5 meters?

5 meters?

Or 100 meters?

It depends how much ice melts - rates have been faster than expected



More dramatic possibilities

- ❑ Possible flips in ocean currents — esp. concern about the Gulf Stream from fresh water pouring out of the arctic
- ❑ Or perhaps changes in currents in the polar regions leading to more rapid melting
- ❑ Or flips in wind patterns - already seen in the Arctic

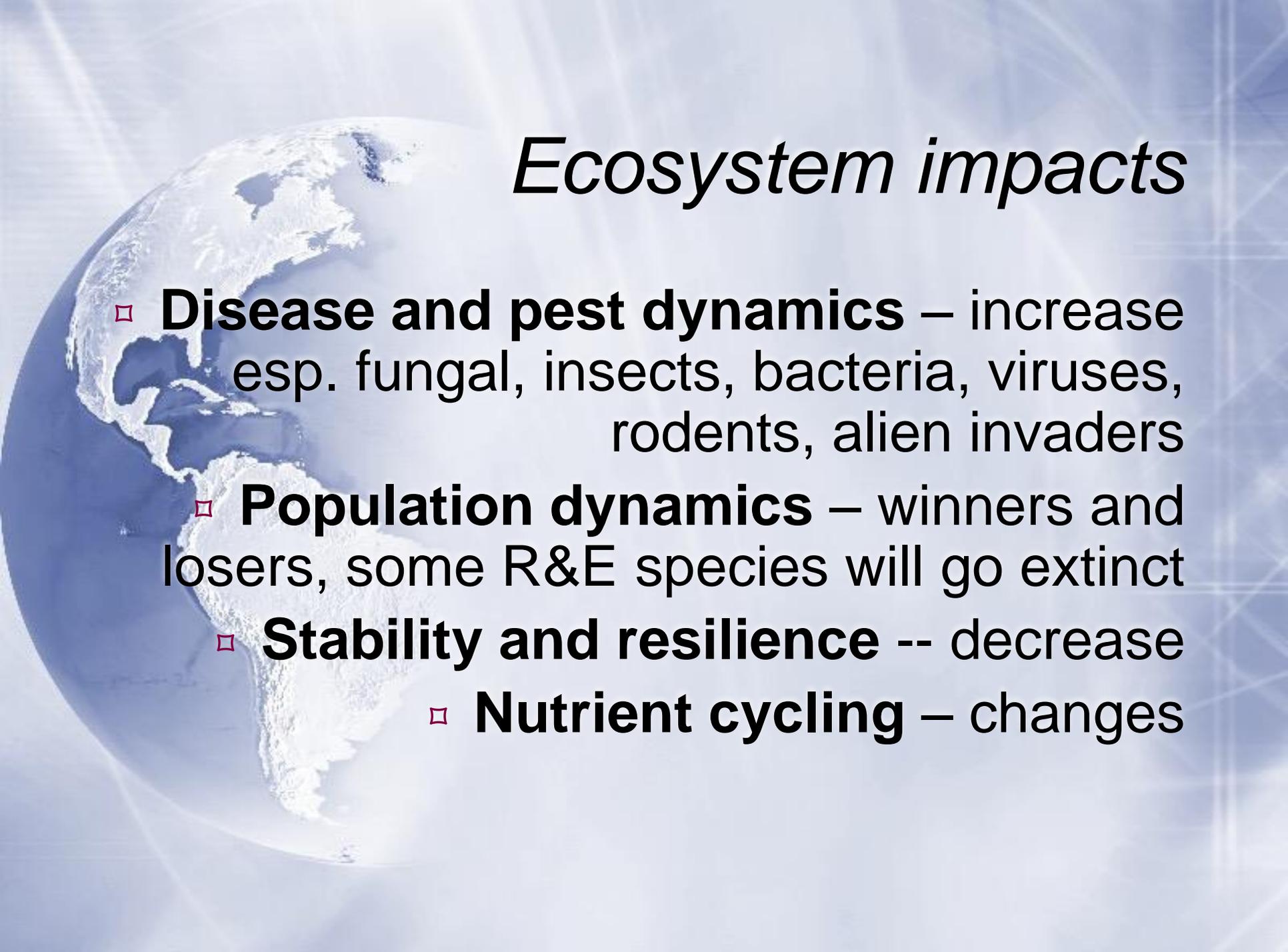
More intense storms



-- Photograph by Kevin Knupp --
-- U. of Illinois Cloud Catalog --

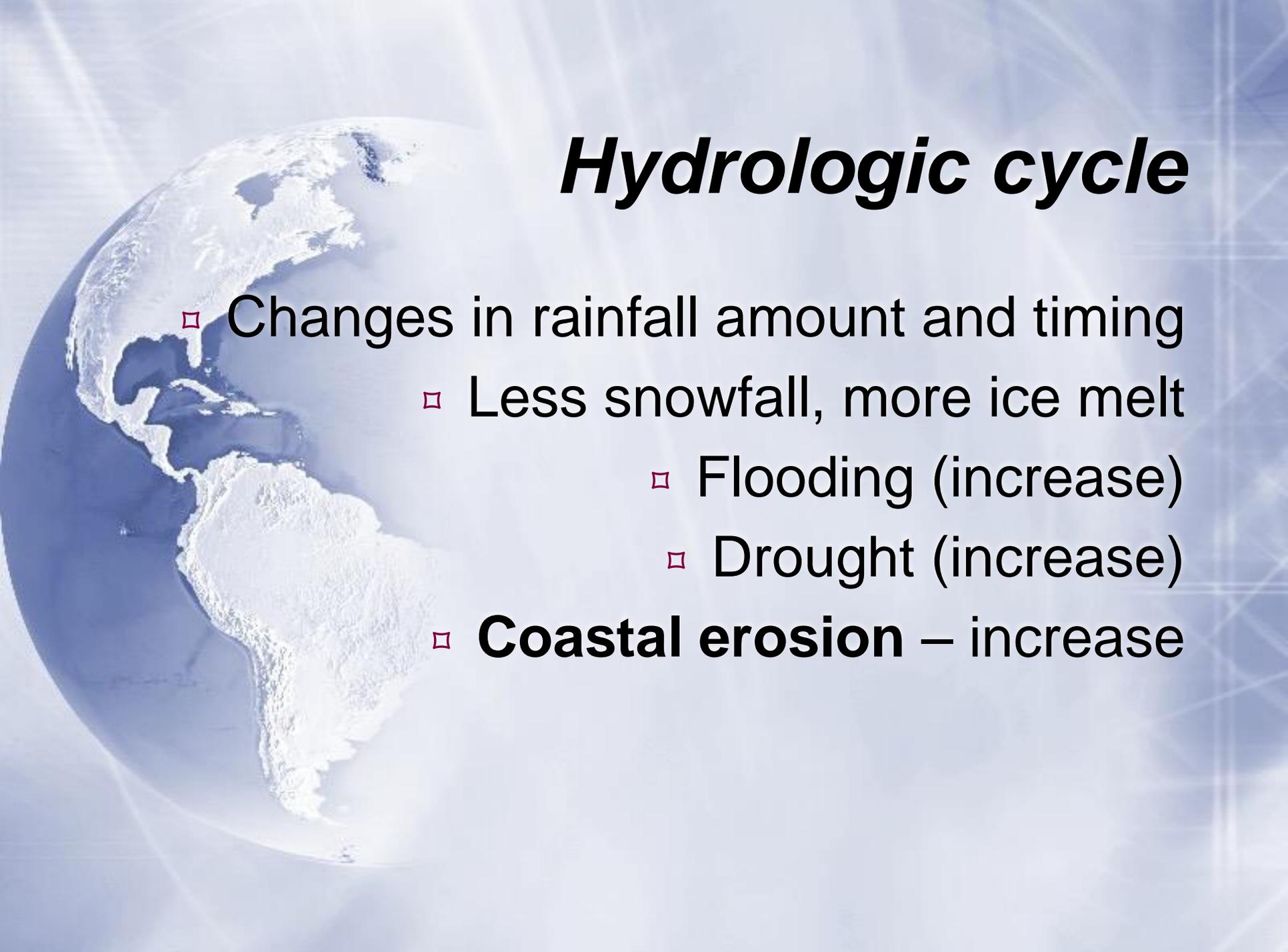


- Storms are driven by heat, so likely more hurricanes, tornadoes and intense storms



Ecosystem impacts

- **Disease and pest dynamics** – increase esp. fungal, insects, bacteria, viruses, rodents, alien invaders
- **Population dynamics** – winners and losers, some R&E species will go extinct
- **Stability and resilience** -- decrease
 - **Nutrient cycling** – changes



Hydrologic cycle

- ❑ Changes in rainfall amount and timing
 - ❑ Less snowfall, more ice melt
 - ❑ Flooding (increase)
 - ❑ Drought (increase)
 - ❑ **Coastal erosion** – increase

Drought



Chihuahua, Mexico

- ❑ **Drinking water shortage**
- ❑ **Crop risk, hunger**
- ❑ **More expensive food**
- ❑ **Less hydropower**
- ❑ **More environmental refugees**



Biodiversity loss

- ❑ **One million species expected to be lost by 2050**
- ❑ The threat to life on Earth is not just a problem for the future. It is part of the here and now.

Pounds and Puschendorf

Dying forests



Forest death British Columbia

- ❑ Warming temperatures are allowing pests to survive and prosper
- ❑ Massive dieoffs of forests are occurring in North America



Ocean reefs

- ❑ Many ocean reef systems are in decline from warming
- ❑ Bleaching occurs as reef building species die back
- ❑ Most reefs may be gone by 2050

Wildfire



- Drought and disease lead to conditions for large wildfires
- These cost money and lives



The solution

- ❑ Solving this problem will take a major change in thinking
- ❑ One key is to adopt true cost accounting!
- ❑ EMR can help with this critical task



Education

- ❑ EMR also helps raise awareness, improves understanding and highlights areas of ignorance
- ❑ This can help drive research and innovation



Where do we start

- ❑ With whatever organization or company we work with
- ❑ Ask to help start an EMR program
- ❑ Prepare a GRI report
- ❑ Fix just one small thing
- ❑ Build support and fix the big things



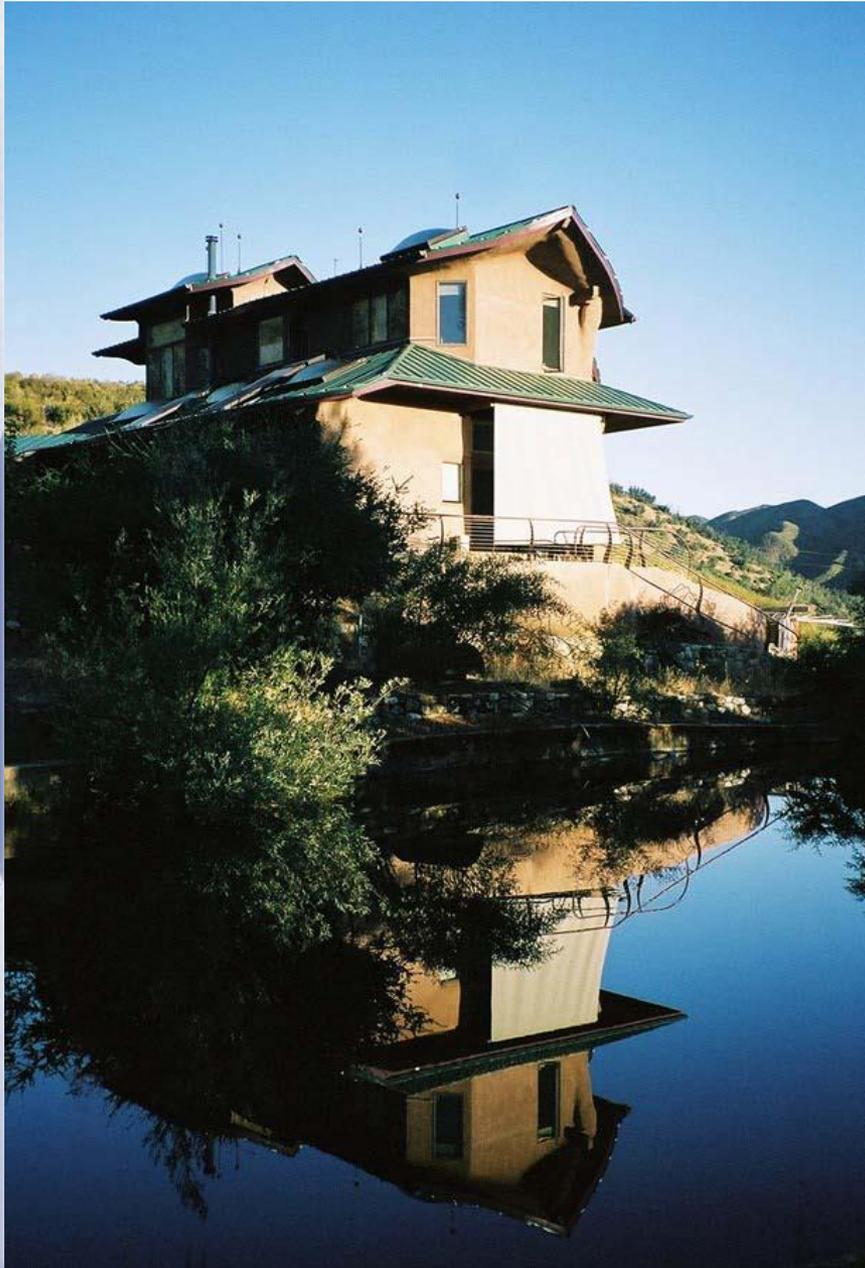
When do we start?

- ❑ Now
- ❑ This year
- ❑ Work for a GRI report next year
- ❑ Ask the companies you buy from to do the same



Time is running out

- ❑ Many of these GWG have a long residence time
- ❑ We need to reduce impacts quickly
- ❑ This requires improvements in efficiency and eco-accounting
- ❑ These can improve comfort and security



Buildings

- ❑ Effective design can eliminate the need for heating and cooling
- ❑ This off grid house is naturally heated and cooled
- ❑ And uses solar and microhydro electricity generated on site

Transportation



- ❑ Bicycles can meet many transportation needs with safe routes, showers at work and education
- ❑ Bicycles also help fight obesity



Join the effort

- ❑ Become a member of the International Society for Sustainability Professionals
- ❑ Participate in local sustainability programs
- ❑ Develop EMR skills and support EMR efforts around the world