

Economics of Climate Change

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The Forecasting Project
April 22, 2009
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Global Impacts of Climate Change

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Greenhouse Effect

SUN

Solar radiation powers the climate system.

Some solar radiation is reflected by the Earth and the atmosphere.

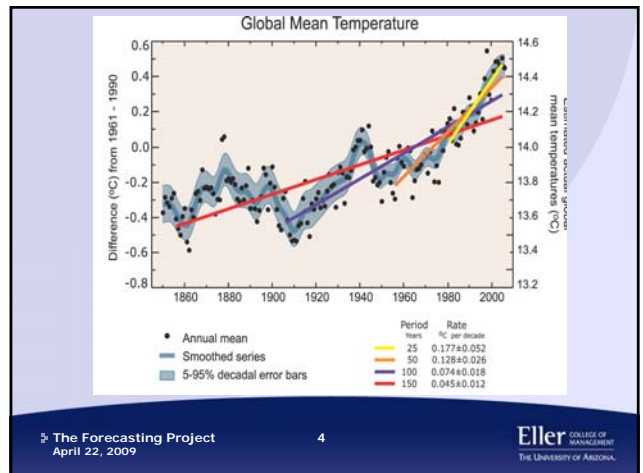
ATMOSPHERE

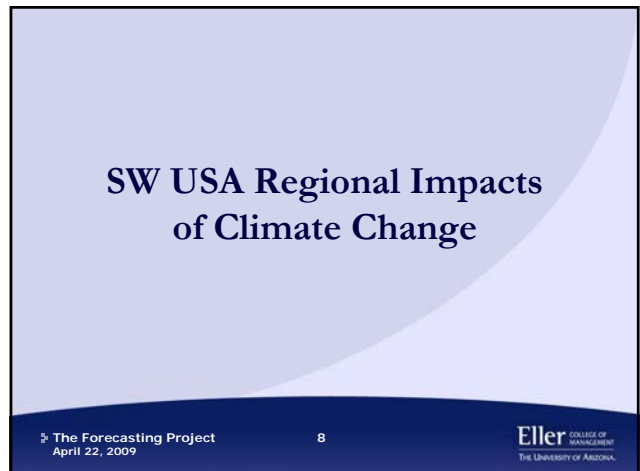
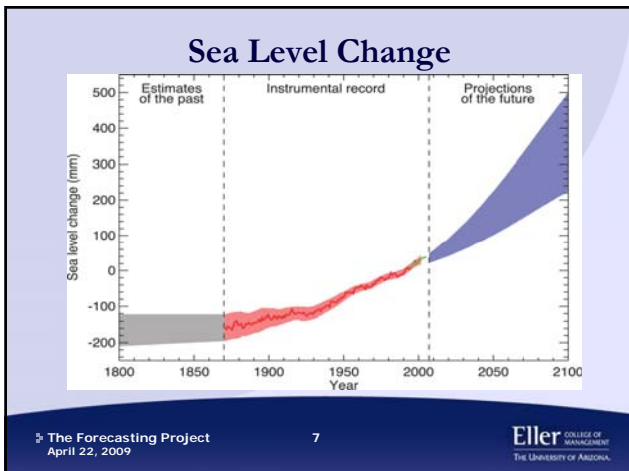
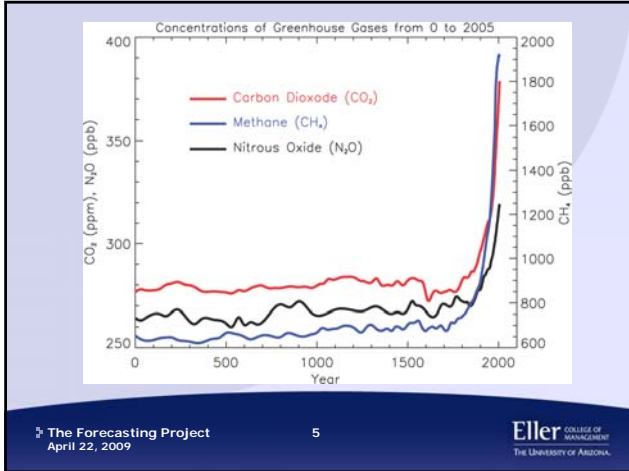
EARTH

Some of the infrared radiation passes through the atmosphere but much is absorbed and re-emitted in all directions by greenhouse gas molecules and clouds. The effect of this is to warm the Earth's surface and the lower atmosphere.

About half the solar radiation is absorbed by the Earth's surface and warms it. Infrared radiation is emitted from the Earth's surface.

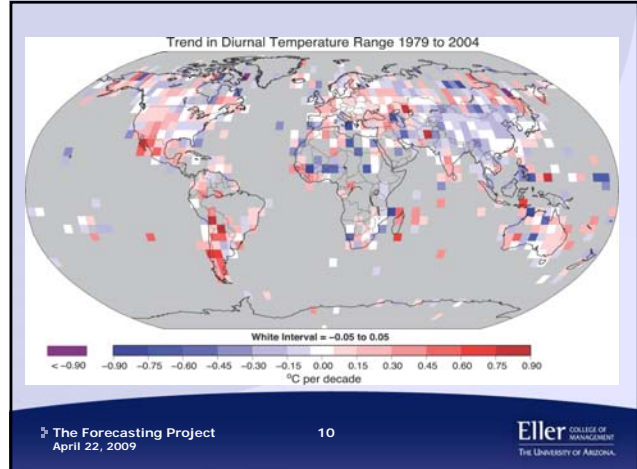
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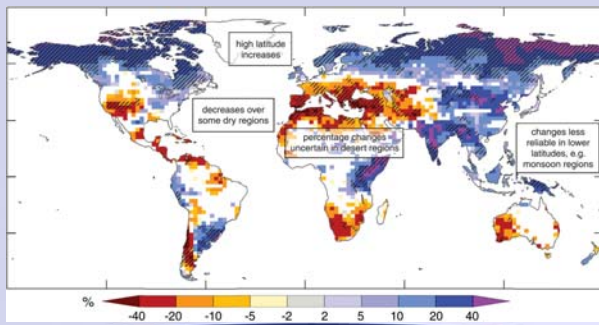


SW USA Regional Impacts of Climate Change

- Increase in temperature → Hotter, drier in SW U.S. → Decreased snow pack → Decreased precipitation in summer (snow and rain) → Drought → Shift in agricultural production → Increased irrigation → Increase in water salinity → Reduced agricultural yields → Reduced agricultural profits, farms and ranches go out of business → Reduced Colorado River flow → Arizona has junior share of water rights, could lose part of allotment during drought → Water becomes more expensive (recycled waste water, water Desalination) → Destruction of wildlife habitat → Wildlife migration patterns and habitats change → Greater risk of flooding → Increased frequency and severity of extreme weather



Regional Water Impact



SW Climate Change Connections

- Increase in temperature → Hotter, drier summers → Wetter winters → Decreased Snow Pack → Decreased summer precipitation and soil moisture → Drought → Heat waves → Shift in agriculture → Increased irrigation → Increase in water salinity → Reduced agricultural yields → Reduced agricultural profits, farms and ranches go out of business → Reduced Colorado River flow → Arizona has junior share of water rights, could lose part of allotment during drought → Water becomes more scarce and more expensive (recycled waste water, water desalination) → Destruction of wildlife habitat → Wildlife migration patterns and habitats change → Greater risk of flooding → More frequent and severe wildfires and forest fires → Reduced hydropower production → More frequent and extreme weather

Water Issues

- Water shortages
- Reduced river and stream flow
- Reduced reservoir storage
- Increased demand for irrigation and urban water use
- Droughts and flooding
- Increased salinity
- Increased water costs

Economic Impacts of Climate Change

- Reduced agriculture production
- Less tourism and in-migration
- Increased frequency and severity of floods, forest fires and wildfires (damage to infrastructure)
- Slower economic development and economic growth (offset by investments in renewable energy and conservation)
- Drop in hydropower production
- Increases energy demand and energy prices
- Increased human health risks
- Disruptions to ecosystems

Difficulties Preventing and Reversing Climate Change

- Fossil fuel-based economies
- Economics not favorable to renewable energy, efficiency, etc. without incentives
- Process occurs gradually, thus
 - economic discounting minimizes future economic costs of climate change as compared to the cost of remediation
 - some argue that we will be able to adjust using technological fixes
- Global effects are well understood, but microclimatic effects are not.
- "Tragedy of the Commons"

Commercial Energy Mitigation Technologies



