



**Ganges/Brahmaputra/Indus Flux:  $\approx 1,200 \text{ km}^3/\text{year}$**

**Ice & snowmelt Flux to Plains:  $\approx 400 \text{ km}^3/\text{year}$**   
(mostly in the dry season)

Ice & snowmelt  $\approx 80\text{-}85\%$  of Ganges dry season flow

In last 30 yrs - 11% reduction in dry season flow

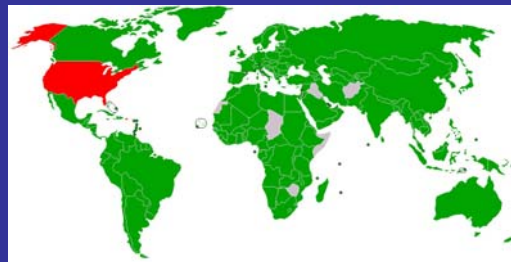
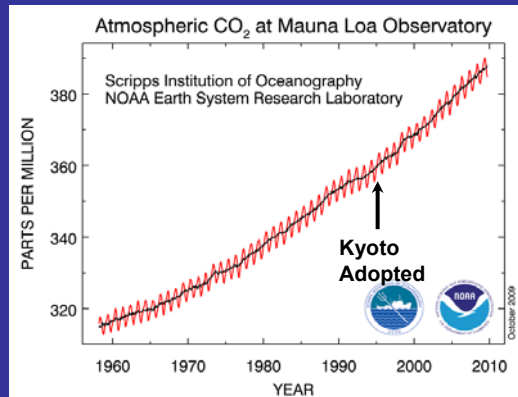
Value of 2005 Ganges production losses - \$400M

2050 Forecast - 60-70% reduction in dry season flow

**Representative October Images - Ladakh**

1976	1989	2000

## The failures of Kyoto



## Report - "Global Warming's Six Americas" - Leiserowitz et al, 2009

### The six Americas

Alarmist	18%
Concerned	33%
Prudent	19%
Disengaged	12%
Disbelievers	11%

### Demographic factors

#### Unrelated to:

- Sex
- Age
- Race
- Politics

#### Related to:

- Egalitarians - concerned
- Individualists - unconcerned

## Report - "Global Warming's Six Americas" - Leiserowitz et al, 2009

### Opinions

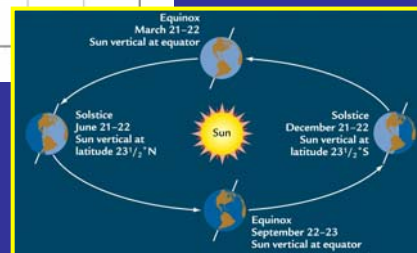
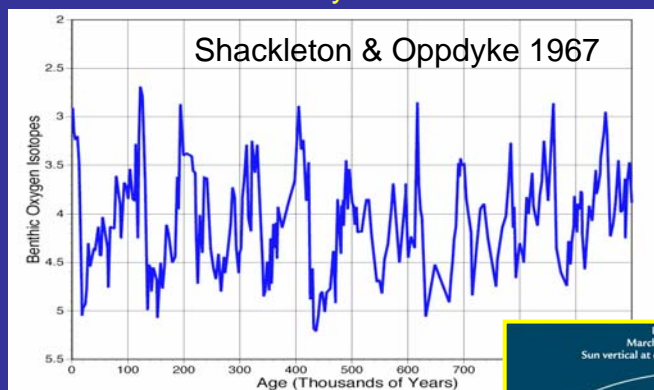
- The climate is changing 71%
- The cause is human 55%
- It is a serious issue 75%

### BUT

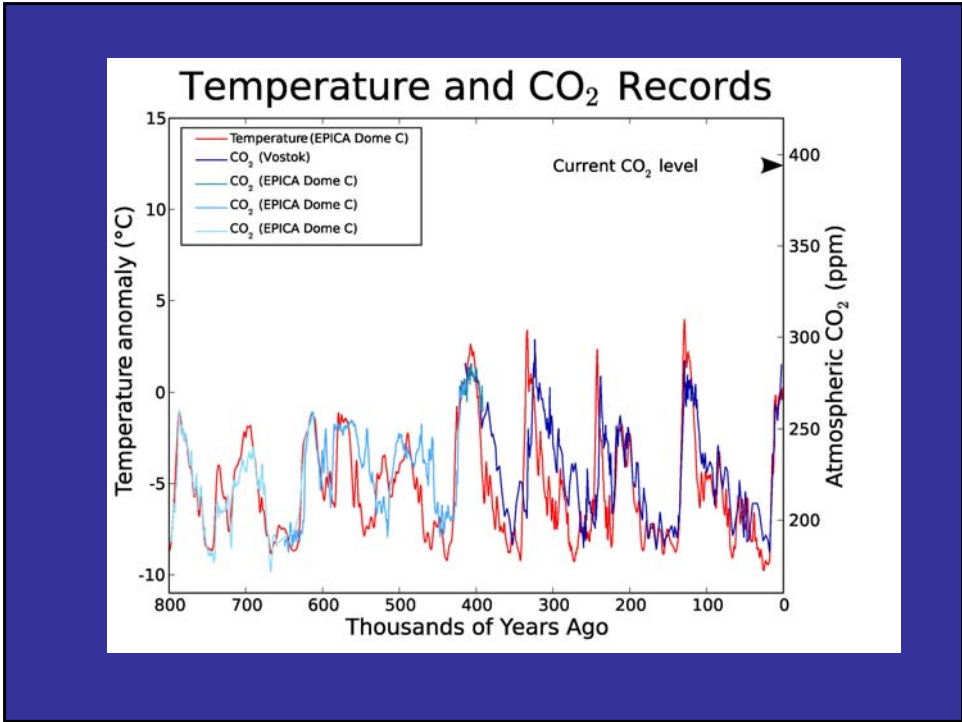
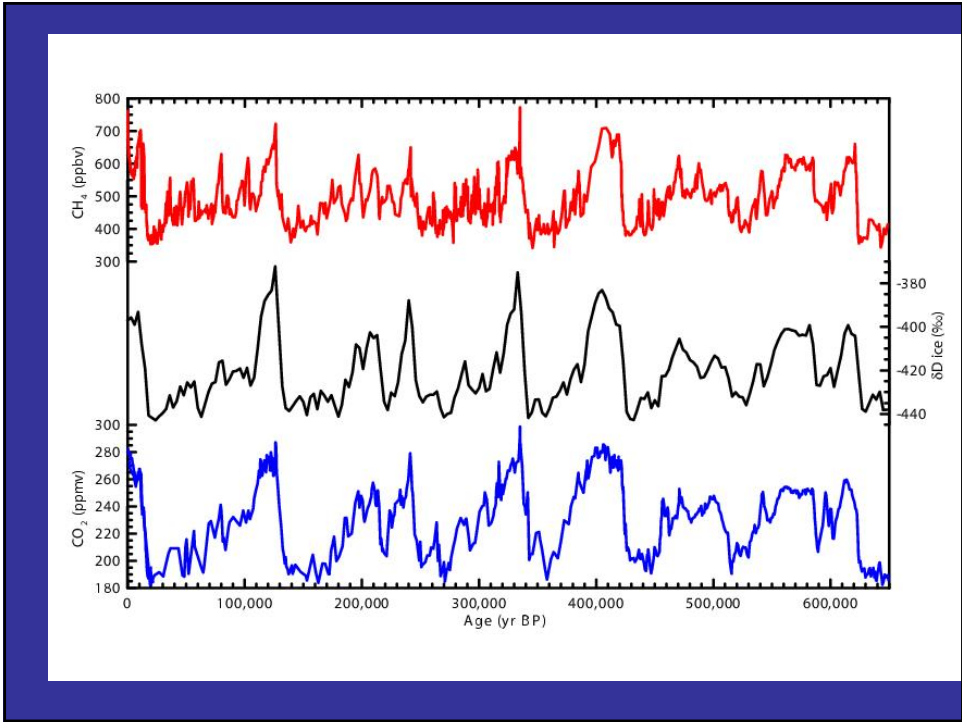
#### The nature of the threat

- Low priority (behind economy, education, health, Afghanistan/Iraq, terrorism)
- A distant threat - decades
- A serious threat for others, not the USA

## One million years of climate



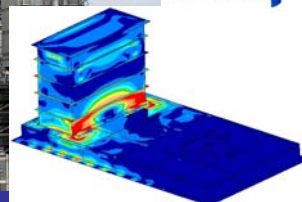
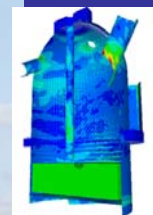
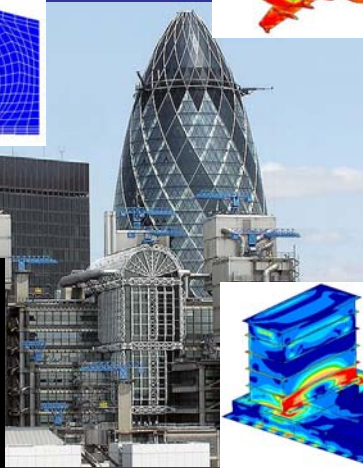
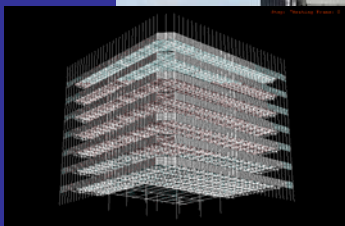
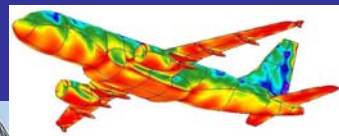
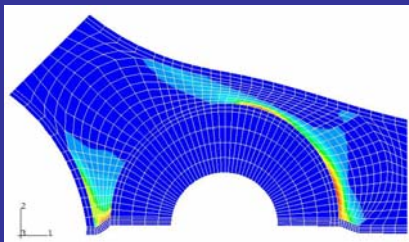
Hay's et al, 1972



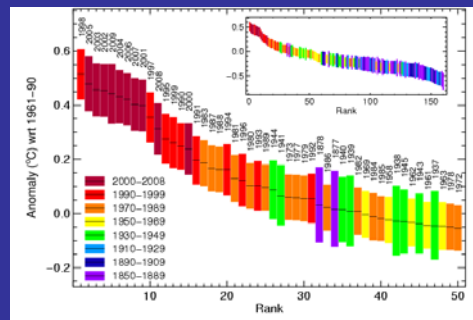
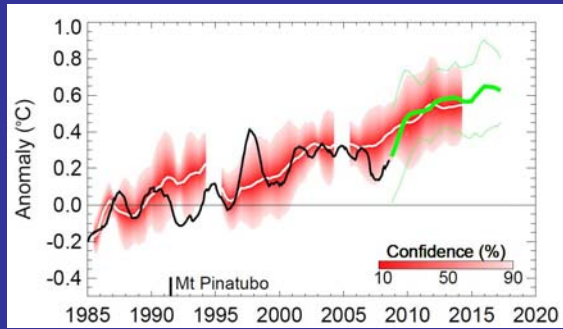
“For every complex problem there is always a simple solution that is neat, plausible - and wrong.”

- H.L.Mencken

### Every-day predictive models of complex systems



Latest decadal prediction shows that global warming will reassert itself. Beyond 2010 at least half the years are expected to be warmer than 1998.

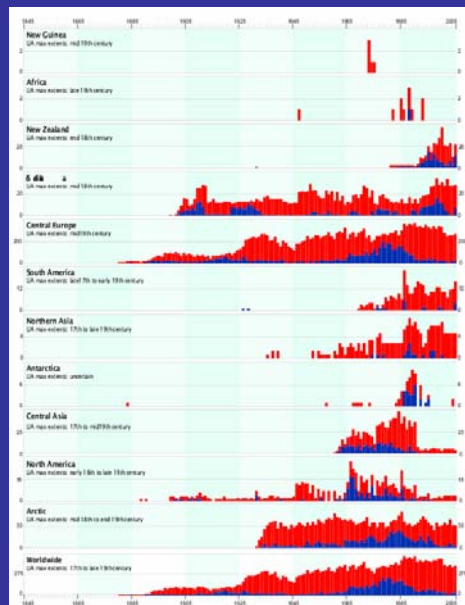


Global ranked temperatures

.... and then the black is white statement

“Glaciers are now advancing again”

David Bellamy - 2009



## Emerging adaptation strategy in Scotland

### 1. Exposure to direct climate risks

- Storm events - flooding - drainage - landslides - insurance
- Impact on property & infrastructure from a higher frequency of extreme events
  - Impact on biodiversity
- Response time of agricultural systems
  - Pests and diseases
  - Health and wellbeing

### 2. Adaptive capacity of organisations and stakeholders

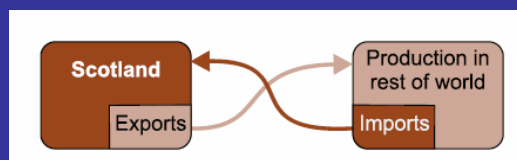
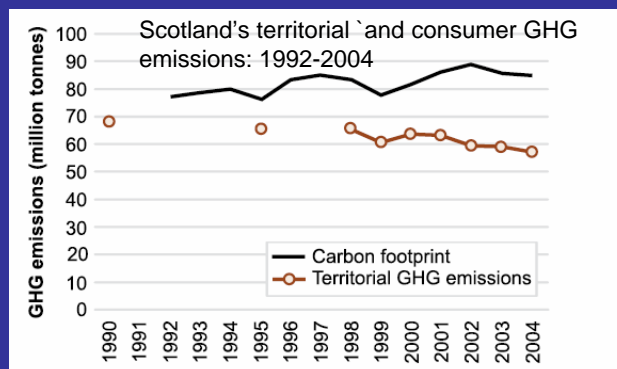
### 3. Identifying constraints on action

## BUT

- Very top-down, absence of public engagement strategy
- Engaging civic society
- Political leadership
- Coordination of "mitigation" and "adaptation" needed
- Secondary effects may be greater than primary effects  
(global economic changes/disruption, food prices, energy prices, migration, conflict)

**The discussion is only just beginning**

## Emissions: consumption or territorial emissions?



Differences between territorial and consumer emissions

## “Mitigation” strategy

### Objectives:

- to meet emissions targets
- to minimise cost
- to maximise energy security

### Ideal policy

- clear long term objectives
- long term economic instruments to force & reward change
- give suppliers freedom to utilise whatever technology
- the largest possible transmission & supply network

Carbon dioxide and methane concentrations:  
Past, present and future

