

# Climate Change Where Do We Stand on the Science?

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*Foundation for Science and Technology 2 June 2010*

## *The Royal Society*

*....Nullius In Verba...*

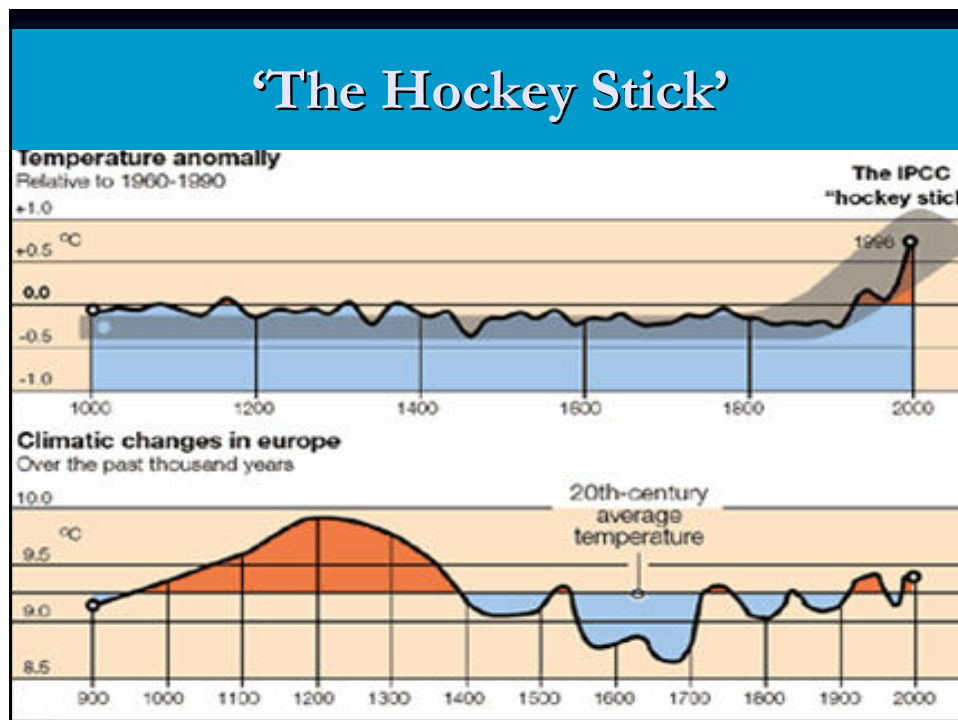
“..question everything..”

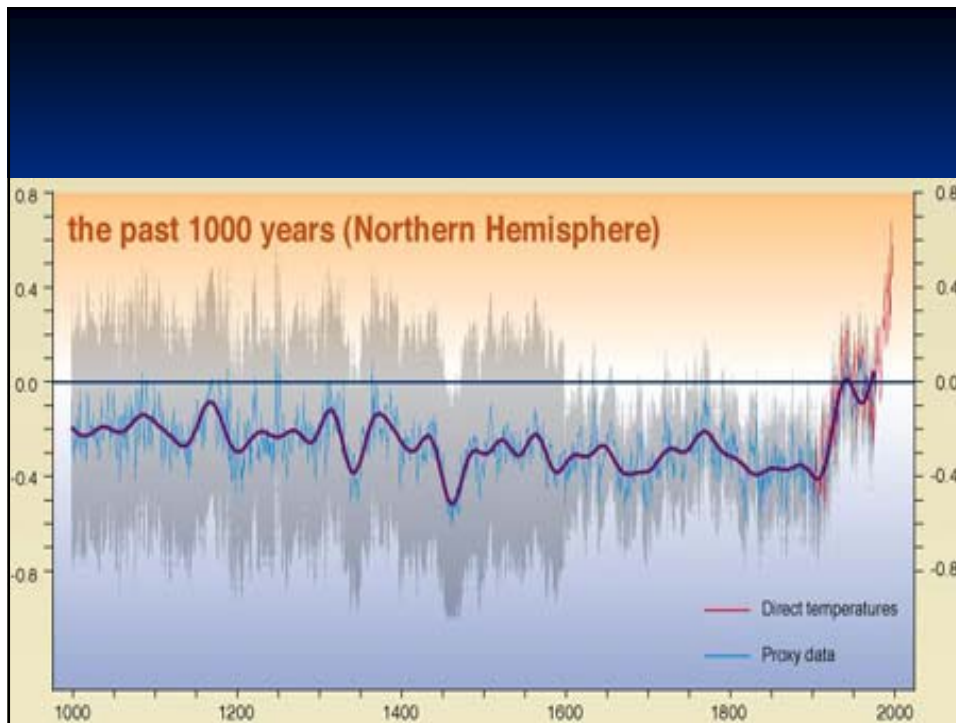
“..keep an open mind..”

“..be sceptical...”

## Some Sceptical Arguments against Human Influences on Climate

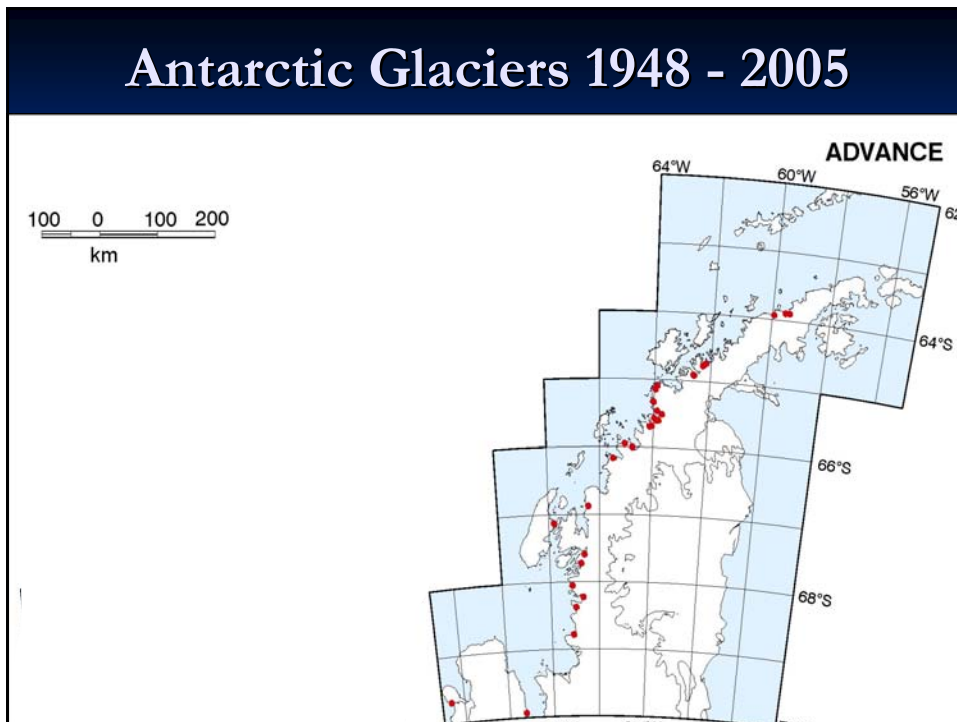
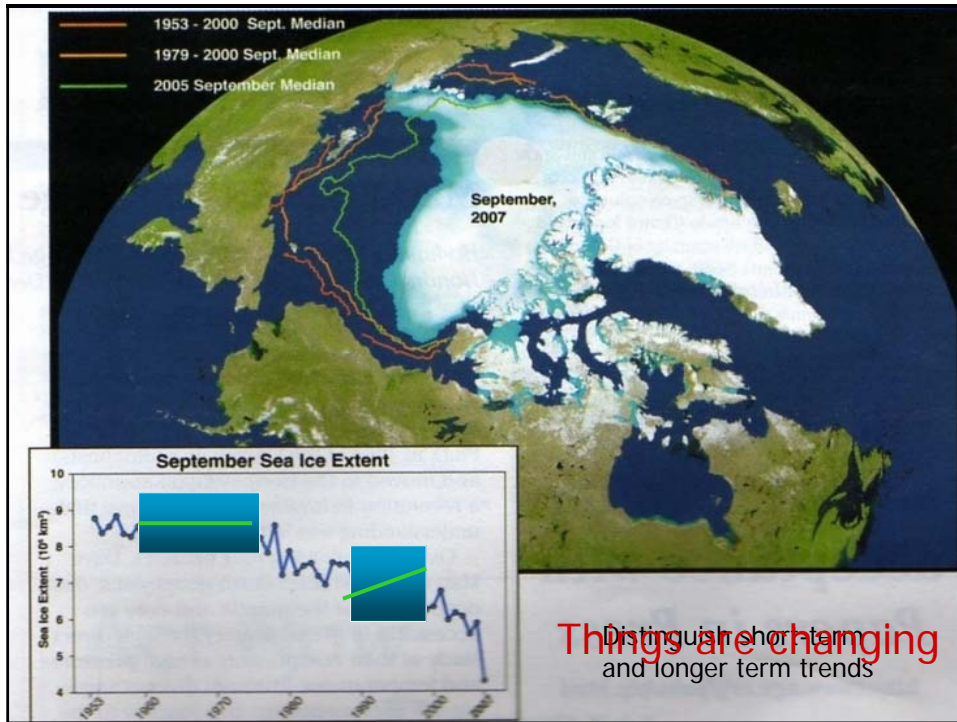
- General arguments:
  - We've just had the coldest winter for years – how can there be global warming?
  - Hasn't the Earth had very warm periods before? What's different now?
  - The case for human influences has been grossly over simplified
- Specific arguments
  - Examples of spurious evidence
  - Unquantified negative feed-backs
  - Manipulation of data
  - The mediaeval warm period



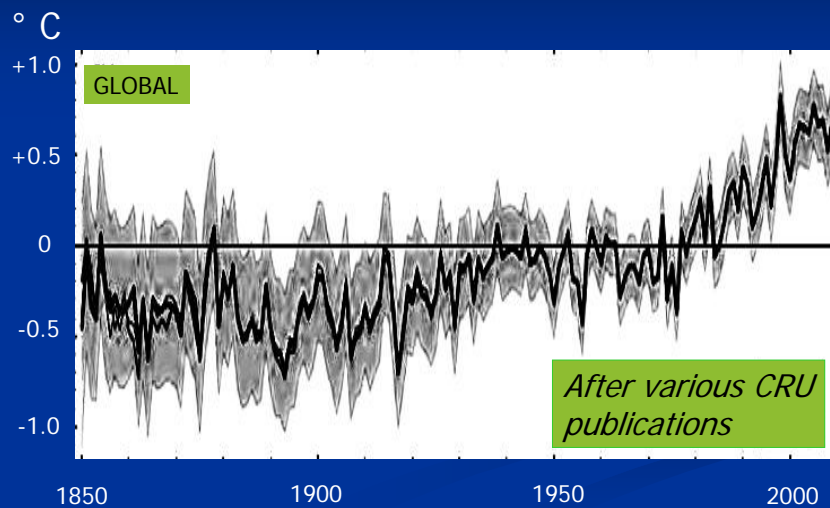


Is the climate changing?

...Back to basics.....



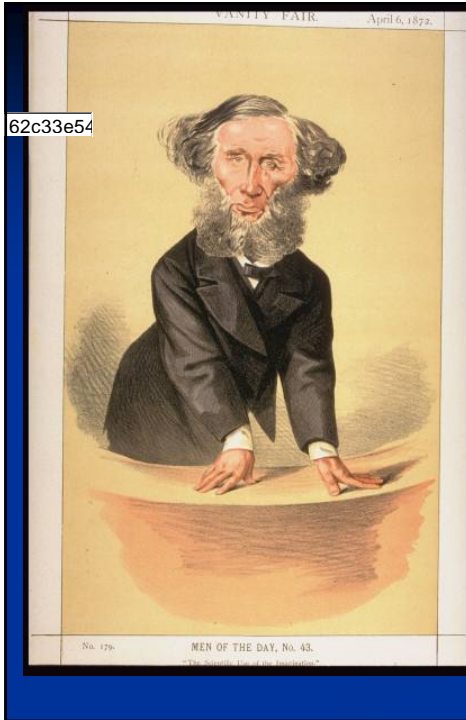
## Global Temperatures from Instrumental Measurements 1850 - 2009



So.....

- The climate seems to be changing today but.....
- If it is changing in one direction in one place it may be doing the opposite somewhere else
- Geology shows that in the past, climates changed without human influence (effects of e.g. solar variability, orbital changes, etc.)

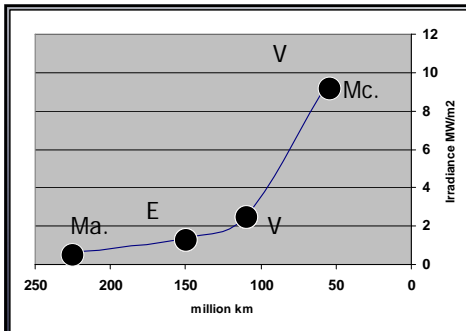
*So why's today different from the past?*



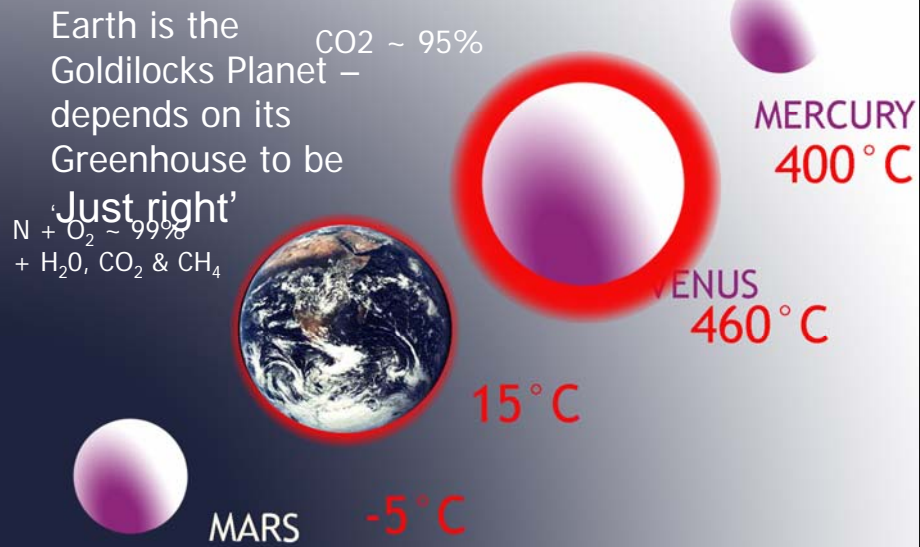
# John Tyndall (1820 - 93)



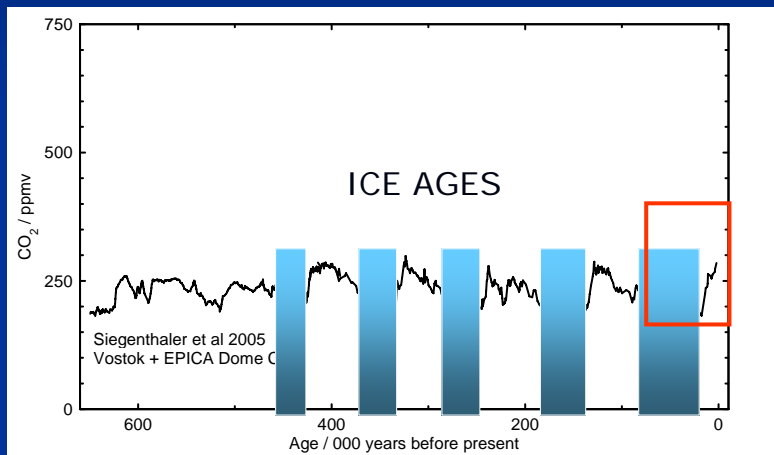
Carbon dioxide } to determine  
 whether the Earth's atmosphere could be  
 heated } by the atmosphere. His experiments  
 showed that }  
 Oxygen (20% of dry mass) }  
 Methane }  
 Small amount - powerful effect



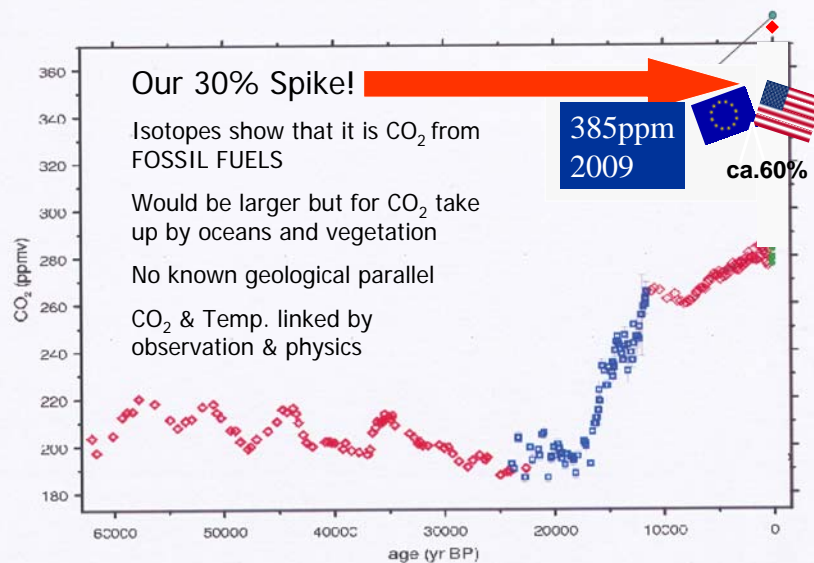
## Earth & Neighbours



## Atmospheric CO<sub>2</sub> for 700,000 years



## Carbon dioxide levels over the last 60,000 years



## The Consequences of increasing atmospheric CO<sub>2</sub> by 30%

- Climate modelling calculations vary in detail but agree on direction of change – a rise in *global average* temperatures
- Faster turnover of ‘climate engine’ because oceans warmer
  - Shifts in weather patterns; more intense storms & rainfall
  - More extreme weather events e.g. once in 100 years events become once in 10 years
  - Sea level rise
  - Ocean acidification



## Who Are the Sceptics?

- They are not many but they are very vocal
  - A minority of experienced engineers & scientists mostly, but not all, from other disciplines
  - Some diligent and well-informed amateurs
  - Rather more poorly informed amateurs
  - Professional lobbyists who seem to use fair means or foul to discredit climate science and climate scientists

## Comments & Conclusions

- There is never 100% certainty but the evidence for a malign human influence on climate is strong and becoming more so
- International political action remains urgent
- Recent events threaten to undermine public support – how much simplification is justified?
- Commercial interests may be promoting public scepticism
- Elected governments will not be able to take appropriate measures if the electorate does not believe they are necessary
- The risks from inaction are too great.