

Alberta's Climate Plan

A burden with no benefit

Energy Industry Electrical Engineering
Associates

Ken Gregory, Ba.A.Sc.

Friends of Science Society

April 11, 2017.

Friends of Science Event May 9, 2017

Friends of Science Society 14th Annual Climate Science and Policy Event



Robert Lyman
Ottawa energy policy
consultant,
former public servant
Author of numerous reports.

**Can Canada Survive
Climate Change
Policy?**

Climate Dogma Exposed

*Carbon Taxes Can't Stop Nature...
Can Kill the Economy*



Steve Goreham
Author of
"The Mad, Mad World of
Climatism" and "
Outside the Green Box"

**Climate Science and
the Myths of
Renewable Energy**

May 9, 2017 • 6:00 - 9:00pm • Red and White Club • McMahon Stadium, Calgary
Tickets Online • \$45 members • \$55 non-members • Table 8 \$360 • Students \$30

Buffet dinner included • Free Parking after 6pm • Or take the LRT

www.friendsofscience.org – Order tickets by May 1, 2017

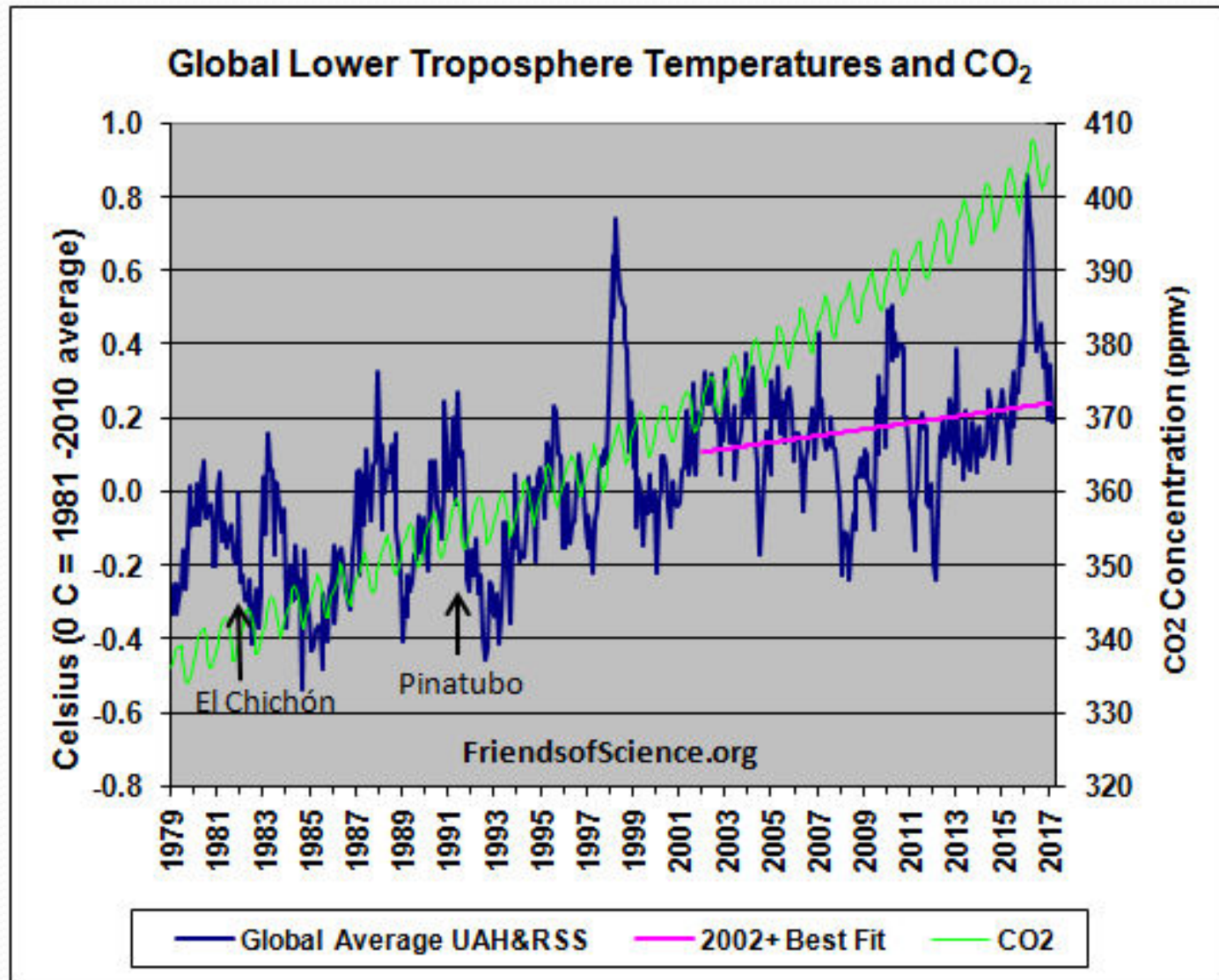
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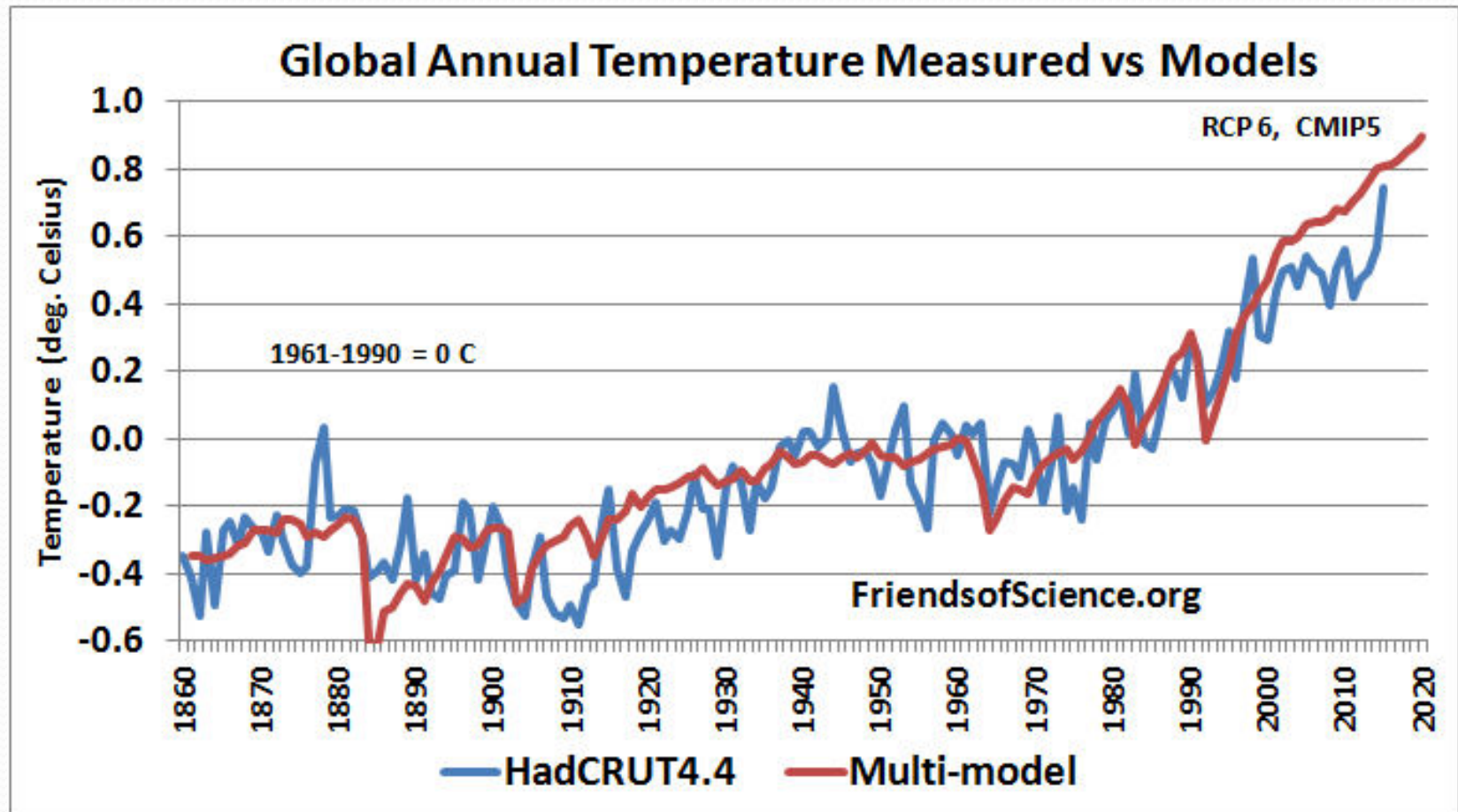
Ken Gregory

- Retired professional engineer
- Studied climate science for 10 years
- Operates Website; FriendsOfScience.org
- CliSci Newsletter editor
- Science News, Quarterly newsletters

Global Air Temperatures



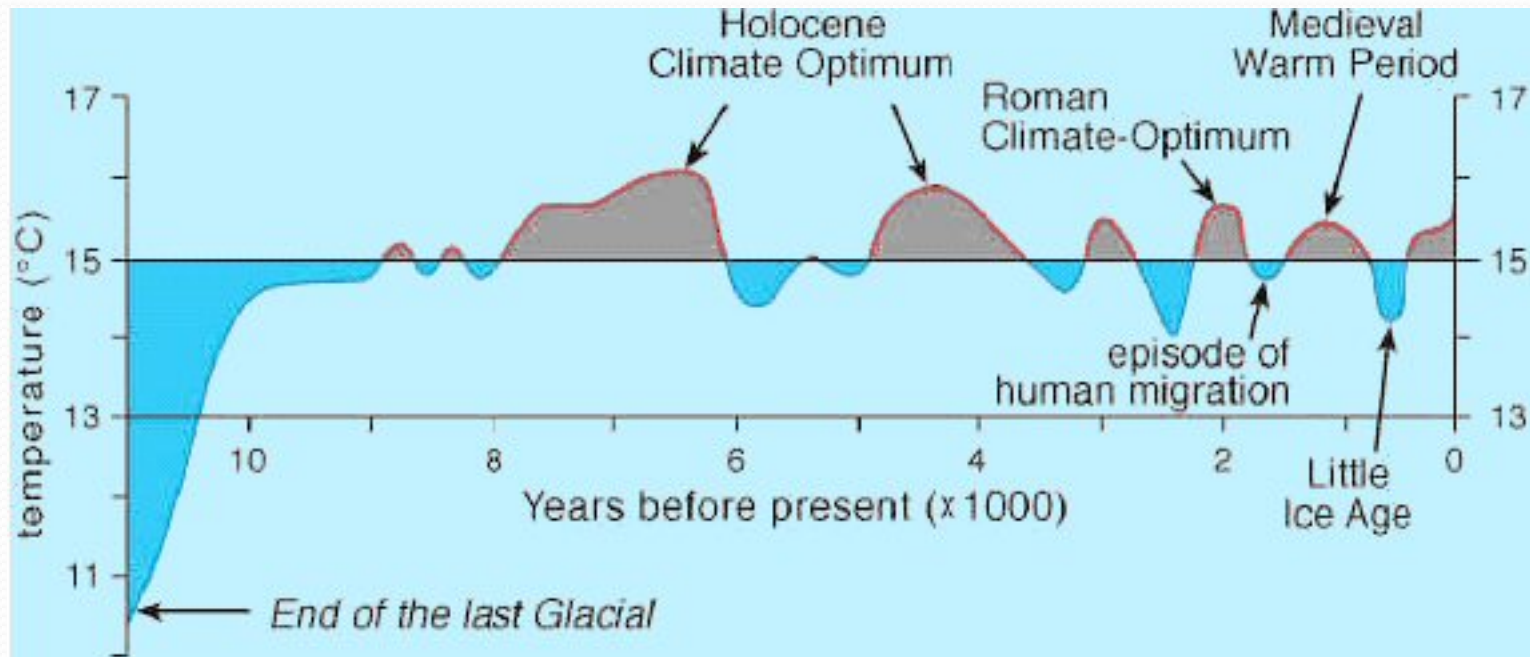
Surface Temperature vs Models



No match before 1960 or after 1995

Previous Warm & Cold Periods

Climate always changes with no help from Man.



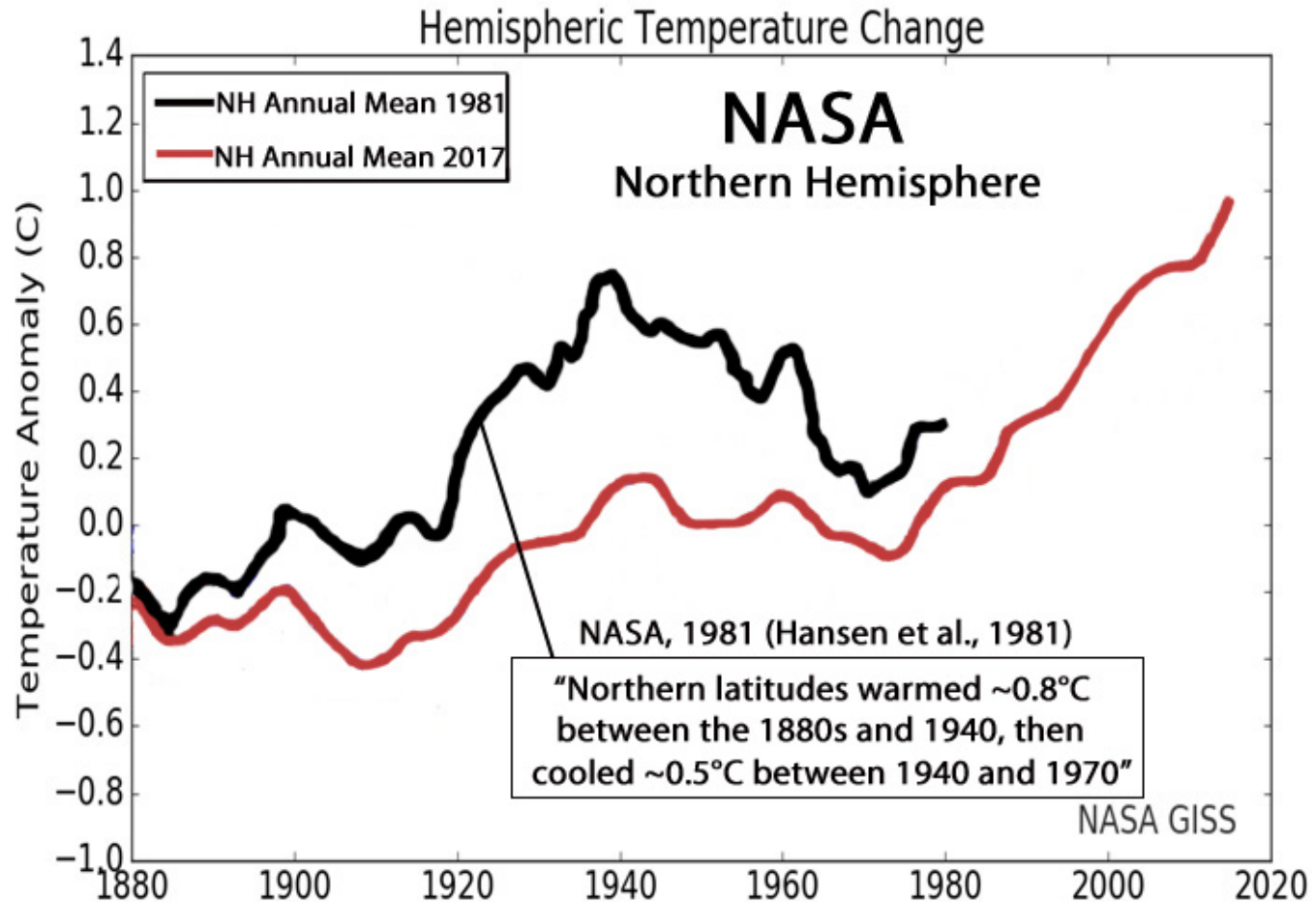
Average near-surface temperatures of the northern hemisphere during the past 11,000 years (after Dansgaard et al., 1969, and Schönwiese, 1995)

IPCC - Intergovernmental Panel on Climate Change

- Write reports on human-causation of climate change
- Reports to support Rio Summit – UNFCCC 1992
- Ignores natural climate change
- Based on models that do not include natural causes
- Charney report 1979 ECS 1.5-4.5 °C per double CO₂
- IPCC AR5 report 2013 ECS 1.5-4.5 °C per double CO₂
- Distribute \$100 billion a year from industrial countries to others

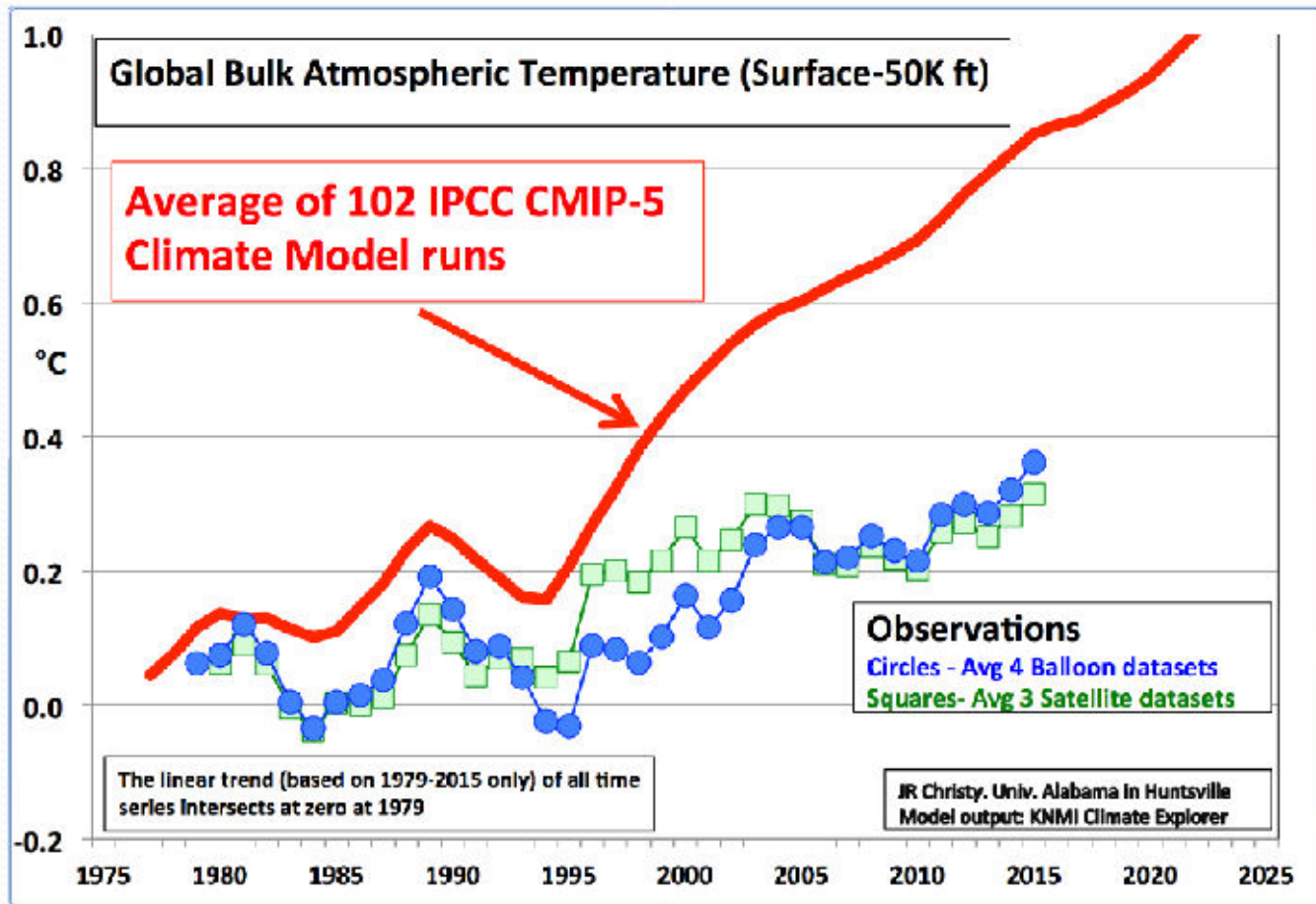


NASA - GISS Temperature Adjustments



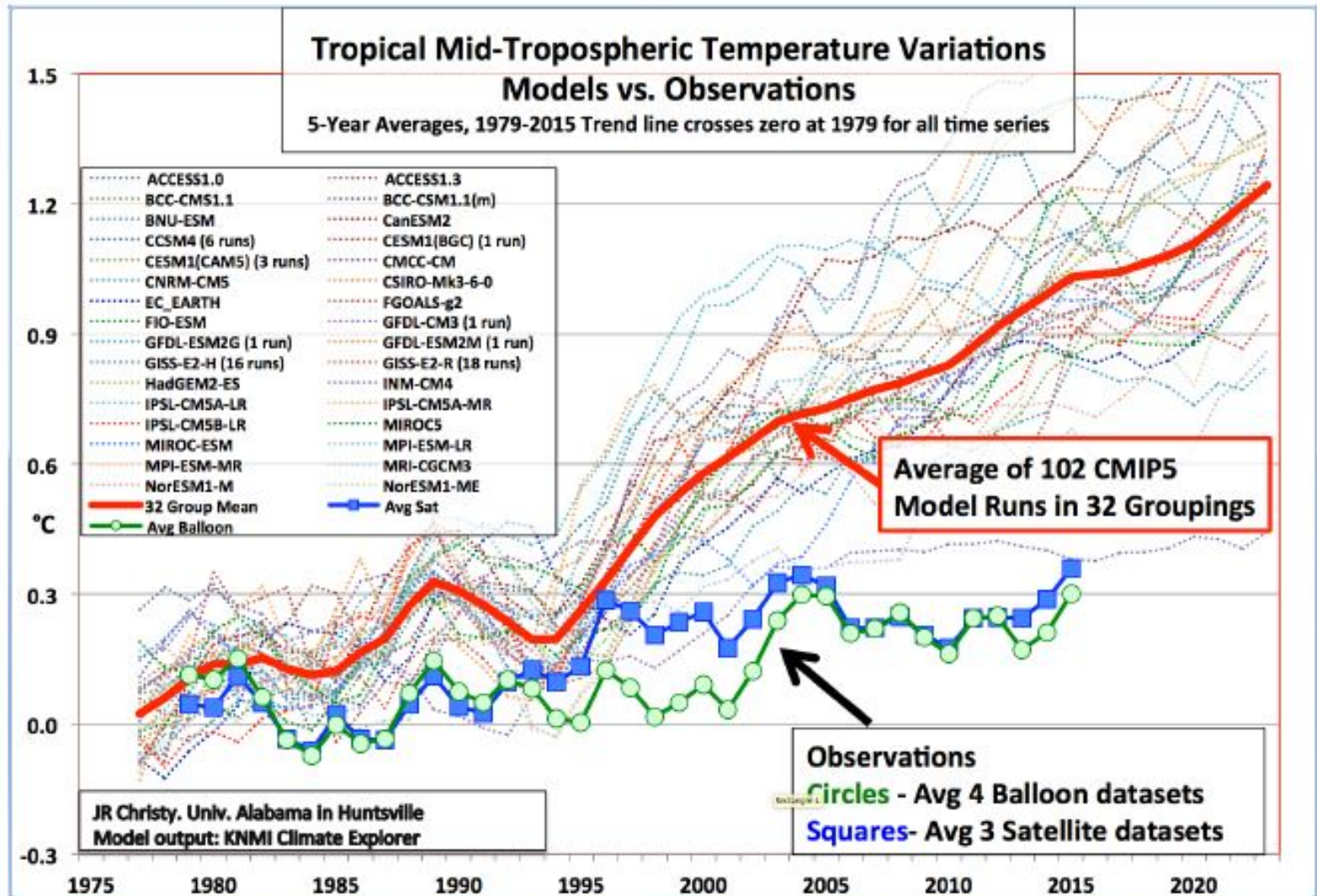
GISS adjusted temperatures to better match climate models.

Climate Models vs Reality

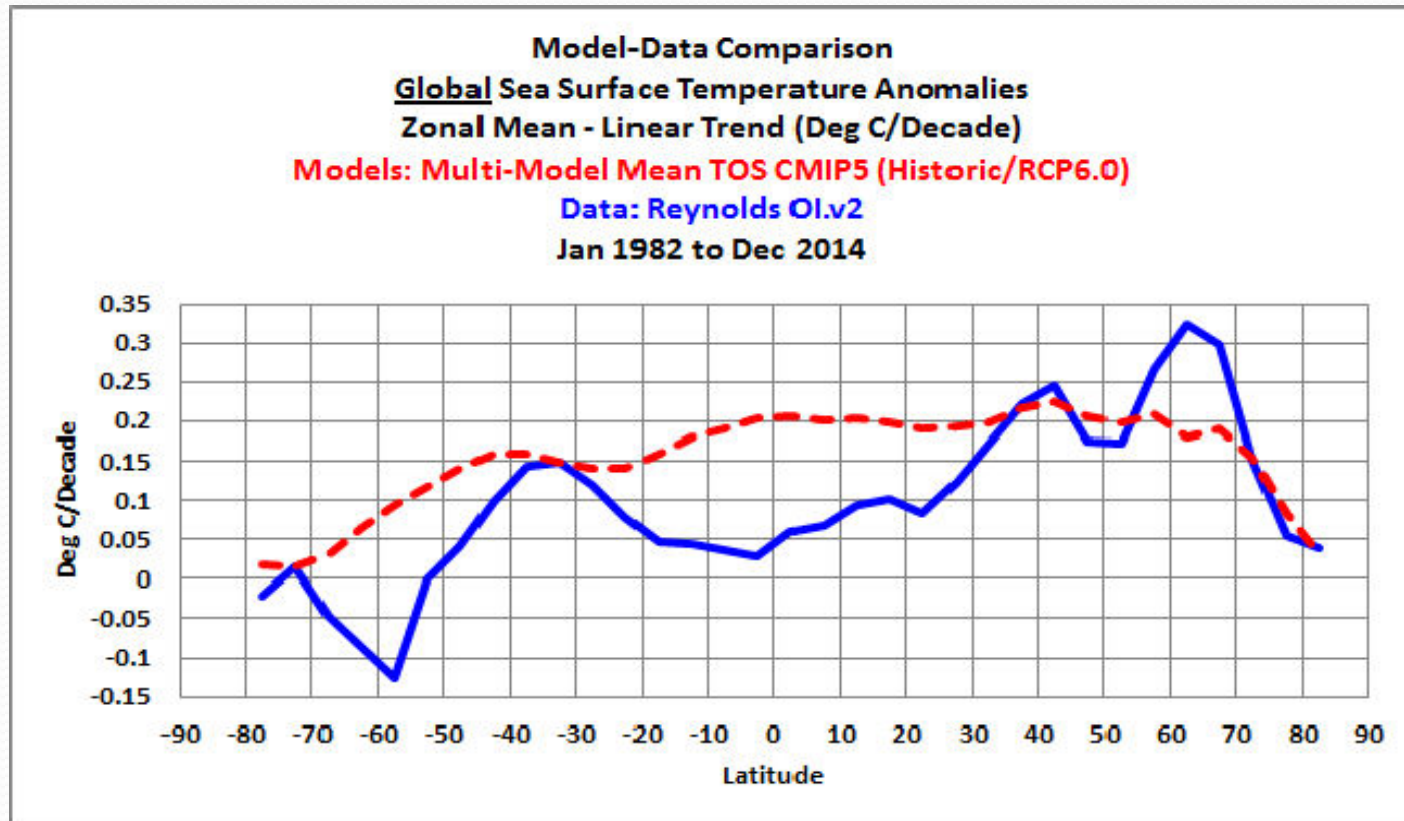


Data points are 5-year averages, surface to 15 km.
Model trend is 2.5 X reality

Tropical Mid-troposphere Models vs Observation



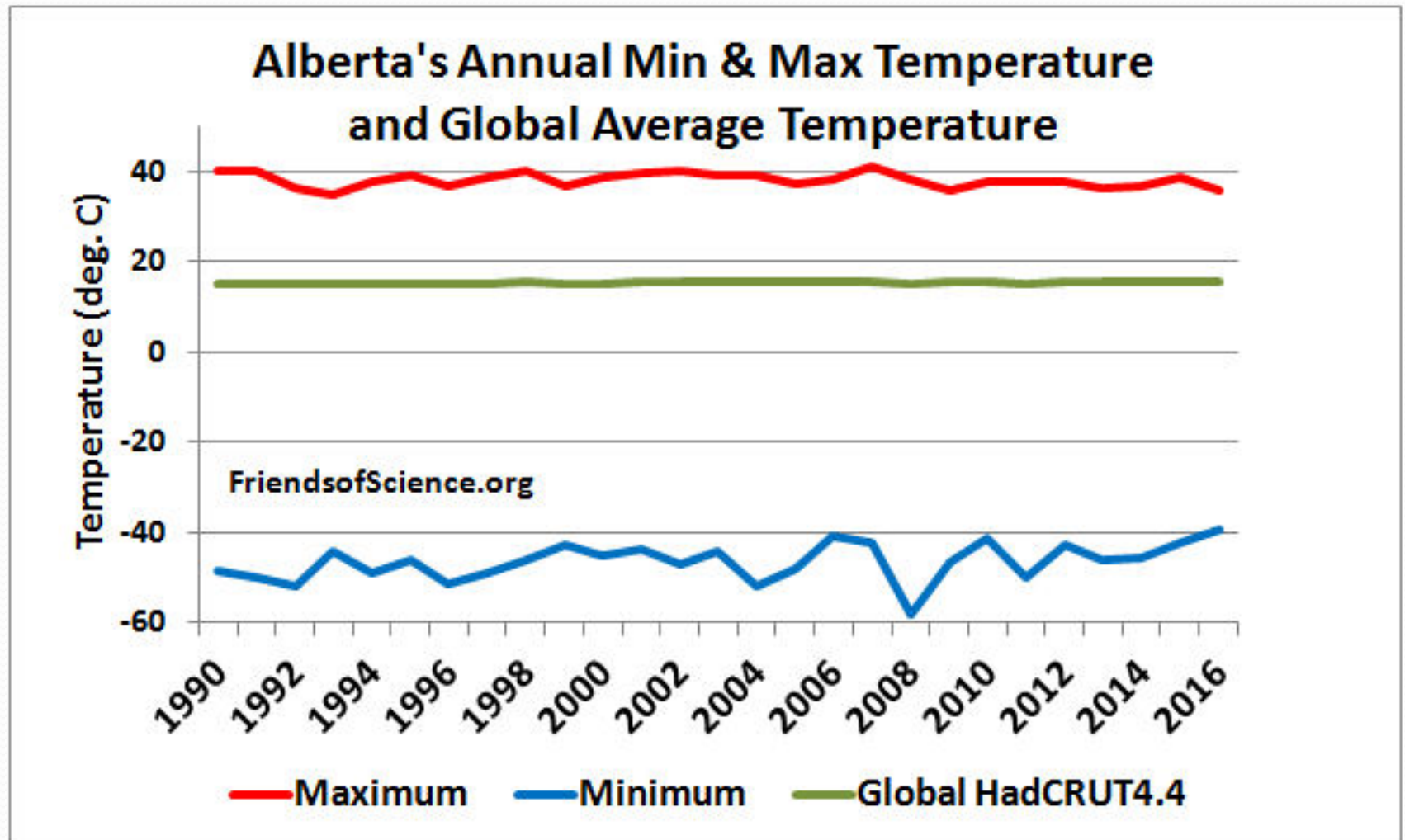
Global Sea Surface Temperature by Latitude



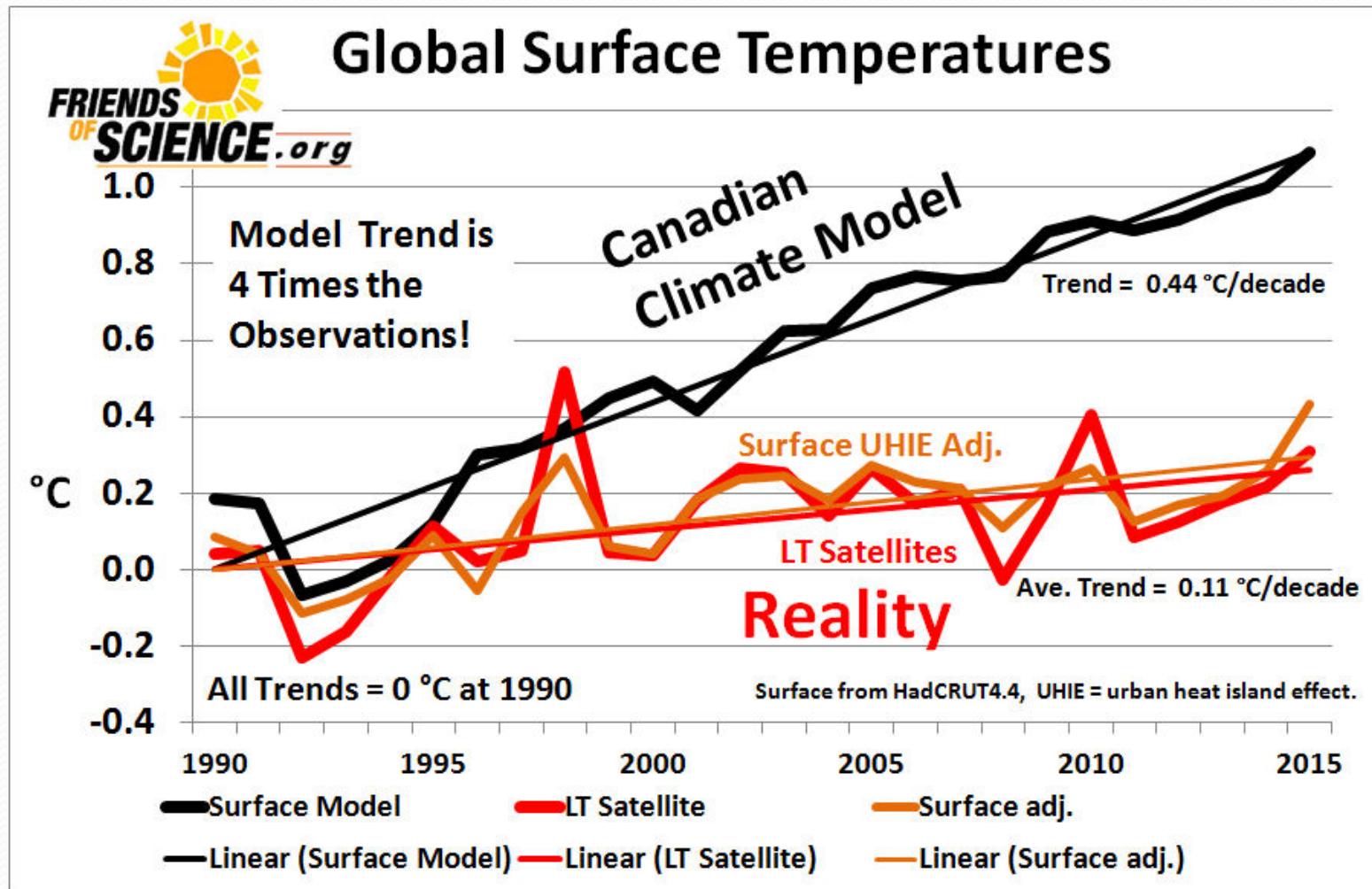
Bob Tisdale

Models' warming rate by latitude region is far from reality. There has been little warming in the tropics, cooling in southern oceans.

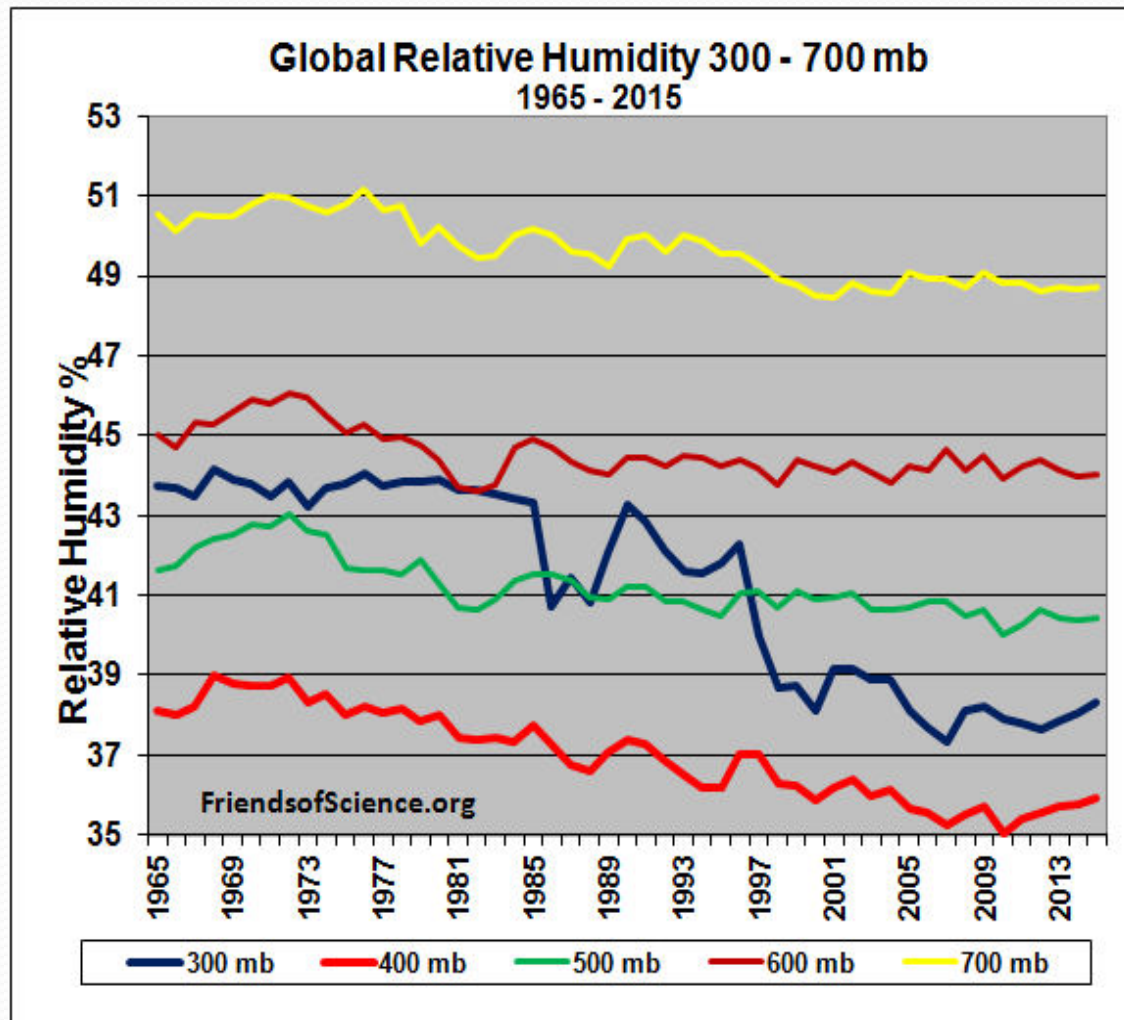
Alberta and Global Temperatures



Canadian Model – Global Surface



Upper Relative Humidity Declines



- Climate models all assume relative humidity stays constant.
- Radiosonde data show that upper atmosphere relative humidity declines with warming.
- 300 mbar pressure level is about 9 km altitude.
- The Water vapor effect at 11 km is 80 times that at the surface.

Black Soot on Snow



- Greenland's and the Arctic's snowy surfaces have been getting darker over the past two decades.
- “the Arctic has warmed about 1.6 degrees. Dirty snow caused 0.5 to 1.5 degrees of warming, or up to 94 percent of the observed change”

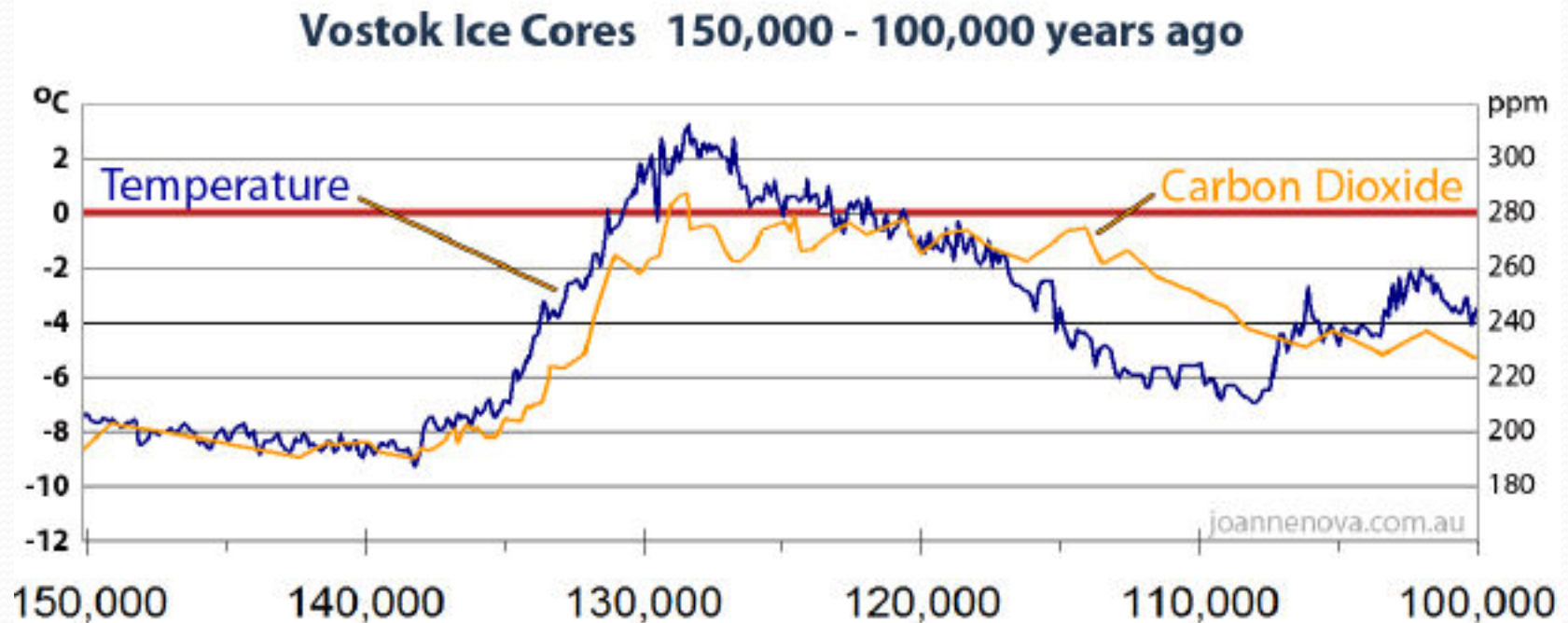
Feedbacks: Models vs Reality

- The direct affect of a CO₂ doubling → 1.1 °C
- Models With feedbacks → 3.2 °C (2500 years)

	Models	Reality
Feedback	°C	°C
Water Vapor	1.14	0.37
Clouds	0.34	-1.09
Surface Albedo	0.34	0.34
CO ₂	0.28	0.28
Total	2.10	-0.10

Water vapor includes the direct radiative effect and lapse rate effect.

CO₂ Lags Temperature Changes



On average CO₂ rises and falls hundreds of years after temperature does.

Temperature leads CO₂ changes by about 800 – 1000 years.
CO₂ cannot be a main cause of climate change.



Alberta Climate Plan

- Early Phase-out coal-fired power plants by 2030
- Cap oil sands CO₂ emissions at 100 MtCO₂/year
- Cut CH₄ emissions by 45% by 2025
- Carbon tax
 - \$20/tCO₂ in 2017
 - \$30/tCO₂ in 2018
 - 2018: 1.52 \$/GJ on natural gas, 6.73 ¢/L on gasoline
- \$9.6 billion revenue over 5 years
- \$3.4 billion over 5 years, \$2.2 billion/yr by 2032 in subsidies to wind and solar



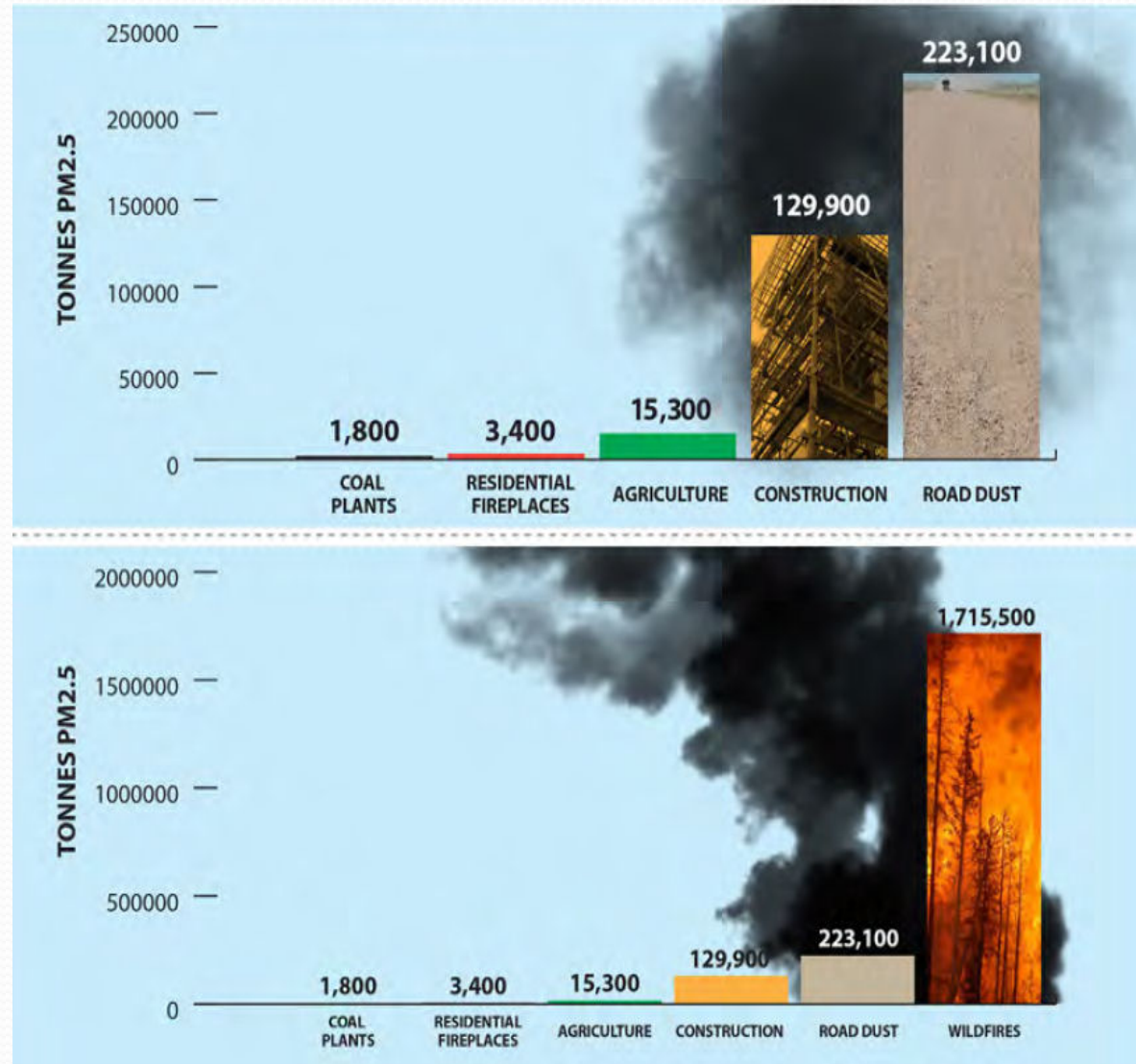
Coal-fired Power Plant Phase-out

- Cost about \$31 billion
 - \$10 billion for replacement gas-fired power plants
 - \$1.4 billion for coal plant compensation
 - \$16 billion for renewables (mostly wind)
 - \$4 billion for transmission lines
- Cumulative electricity costs increase \$3.3-5.9 billion, then \$1.5 billion/yr for 8 years.
- Add 7200 MW renewable; 14,700 MW total new capacity
- EDC Associates Ltd. report

Particle Emissions in Alberta

Forest fires create ~1000 times the particulate emissions of coal-fired plants.

Fabric filters stop 99.8% of particle emissions.

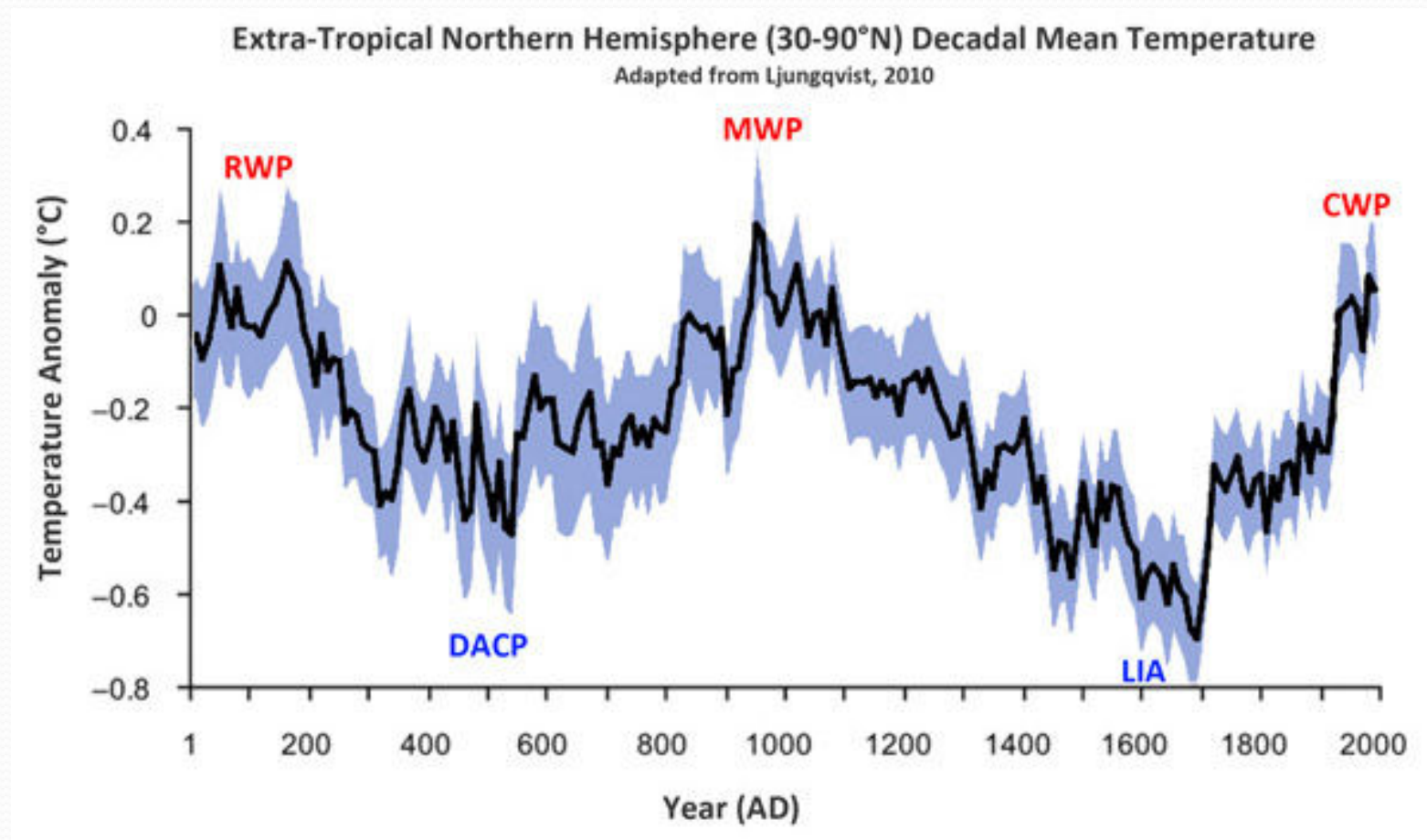




Climate Sensitivity – Energy Balance

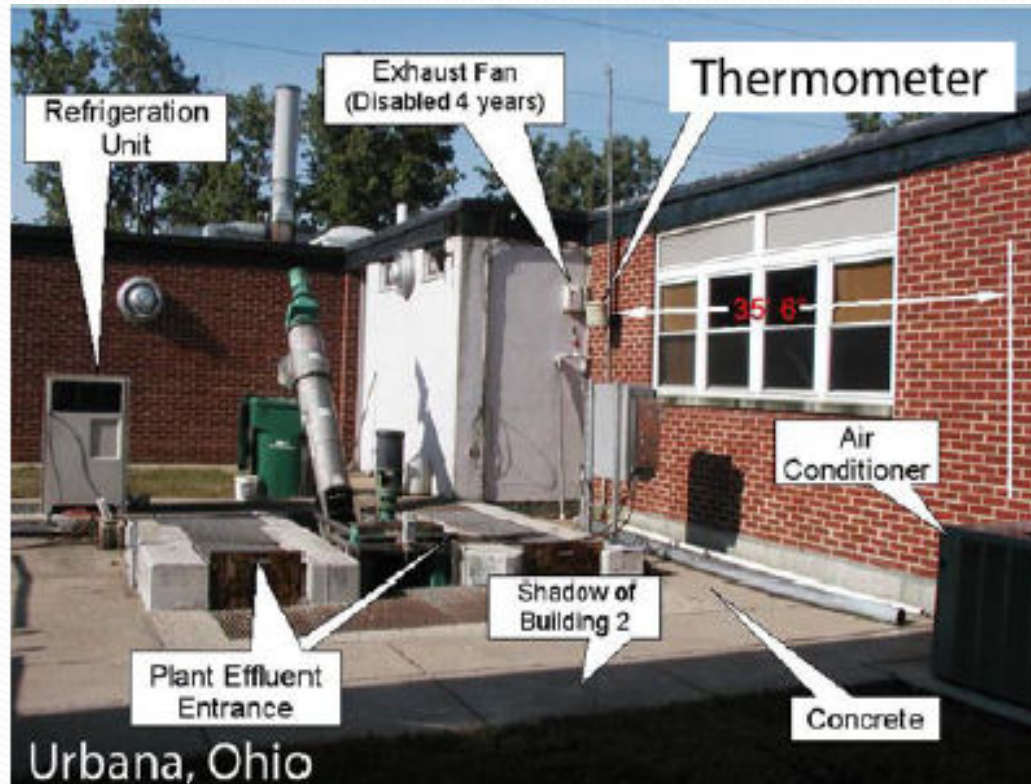
- Transient Climate Response, double CO₂, exponential growth → 125 yrs.
- Use IPCC AR5 greenhouse gas forcing
- New aerosol forcing estimates
- Evaluation over 153 years, averages over AMO.
- TCR = 1.21 °C ignoring millennium cycles and urban warming.

Northern Hemisphere Temperatures

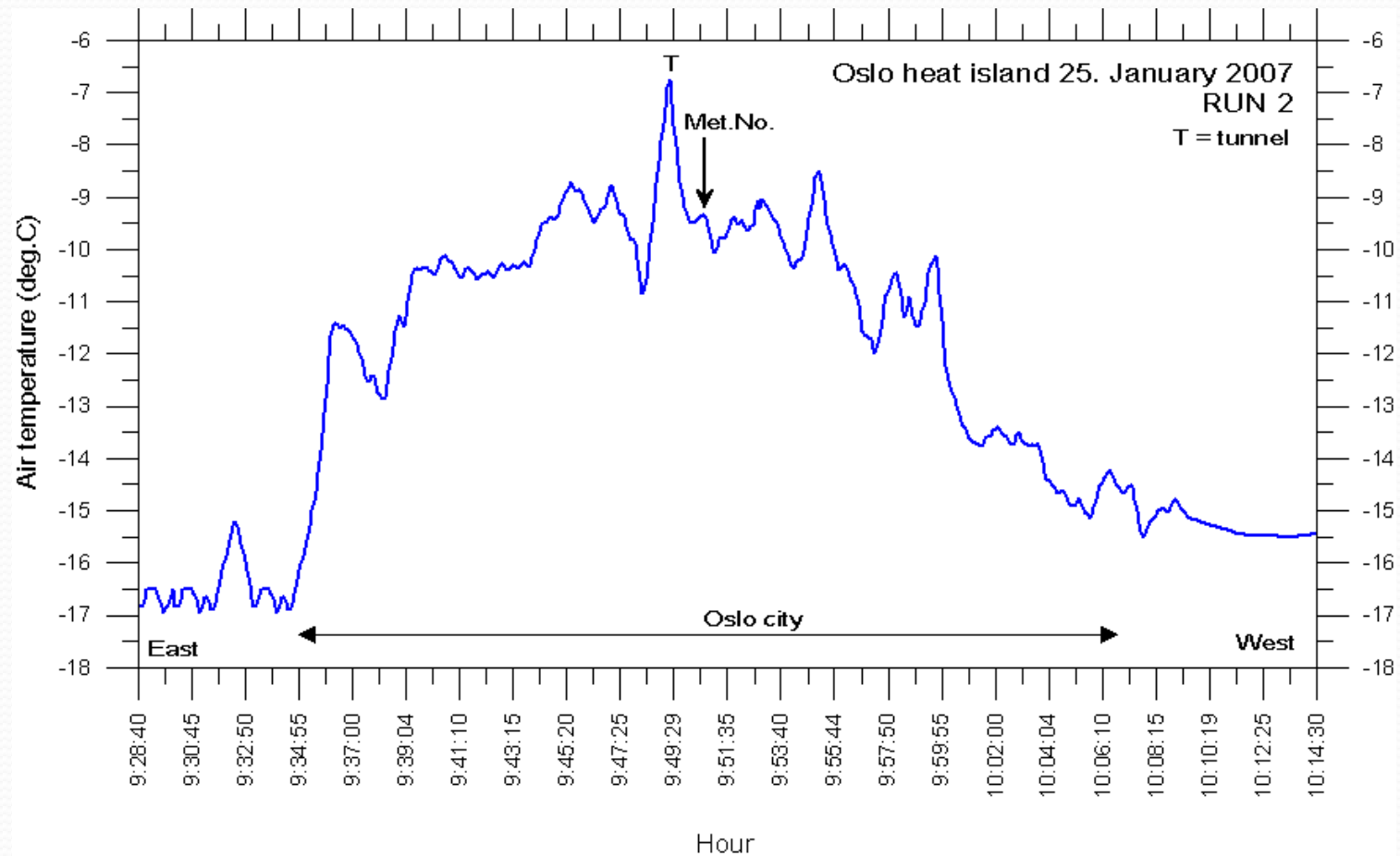


Urban Heat Island Effect

- In the USA, only 11% of stations are in suitable locations, 69% are within 10 m of an artificial heat source.



Urban Heat Island – Oslo, Norway





Urban Heat Island Effect

- McKittrick and Michaels 2007: Almost half of warming over land is due to urban development
- GISS index: 45% of adjustment increase the warming trend
- IPCC Nonsense: “the locations of greatest socioeconomic development are also those that have been most warmed by atmospheric circulation changes.”
- Reduces trend from 1980 by 0.042 °C/decade.



Summary Transient Climate Response Estimates

	TCR BE	TRC 5-95%
UN IPCC AR ₅	1.75	0.90 – 3.00
IPCC AR ₅ Forcings	1.33	0.90 – 2.50
Stevens Aerosol Forcing	1.21	0.90 – 1.65
With Natural Warming & UHIE	0.85	0.55 – 1.30

IPCC high 95% estimate of TCR is 2.3 times too high!

BE = Best Estimate

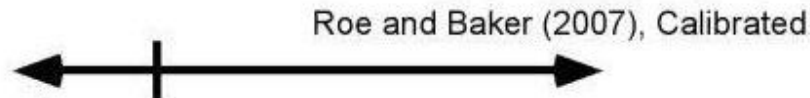


AGW by 2100

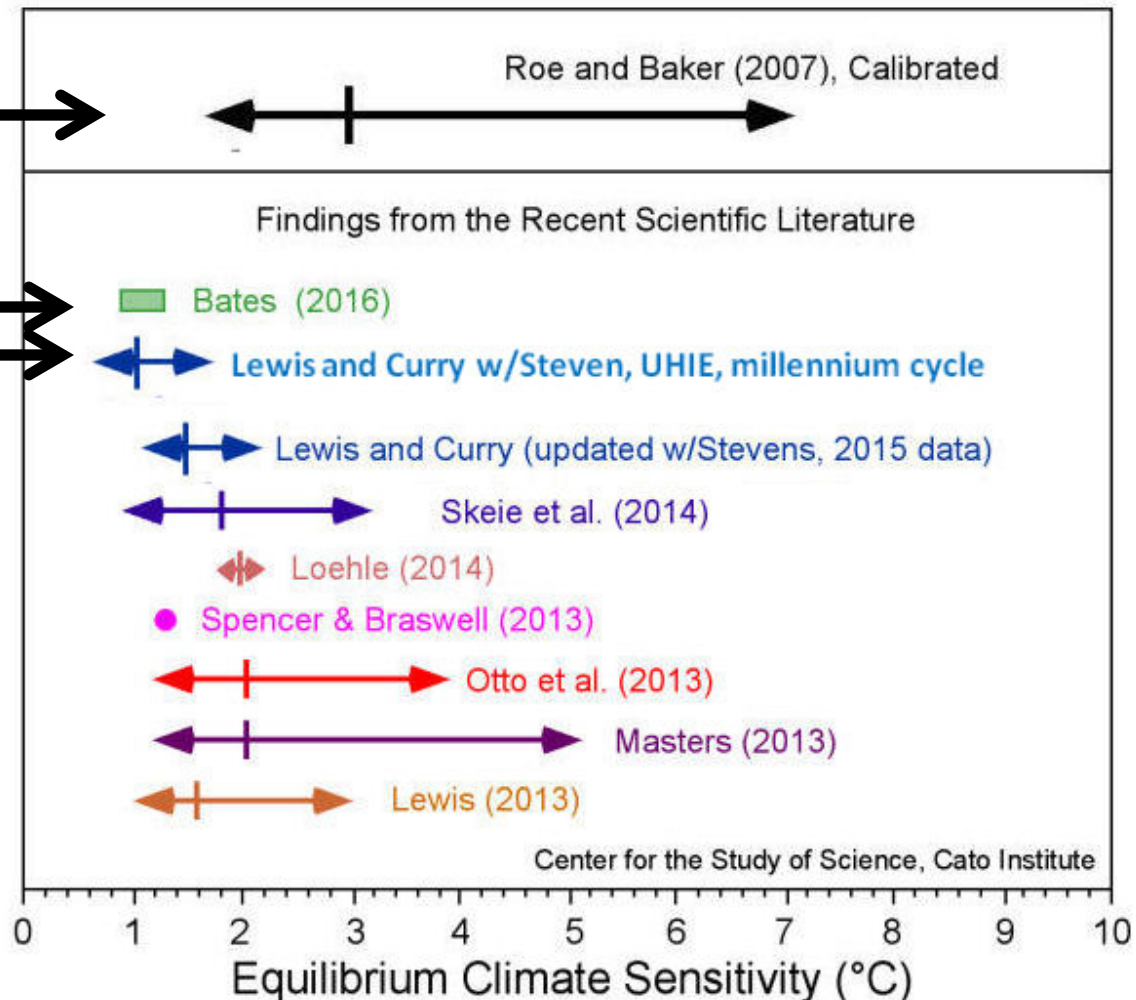
- TCR of 0.85 °C gives 0.57 °C 2016 to 2100
 - Assuming exponential CO₂ increase
- IPCC RCP8.5 HIGH forecasts 3.5 °C 2016 to 2100
 - Extremely High forecast
 - CO₂ change 0.55%/yr to 1.2%/yr by 2070
 - 10 fold increase in coal use by 2100
 - Population growth accelerates
 - The ability of oceans to absorb CO₂ fails
 - It is a “barking mad scenario” sold as “business as usual”;
Mat Ridley

Recent Studies of Equil. Climate Sensitivity

SCC based on →



Reality is ⇒

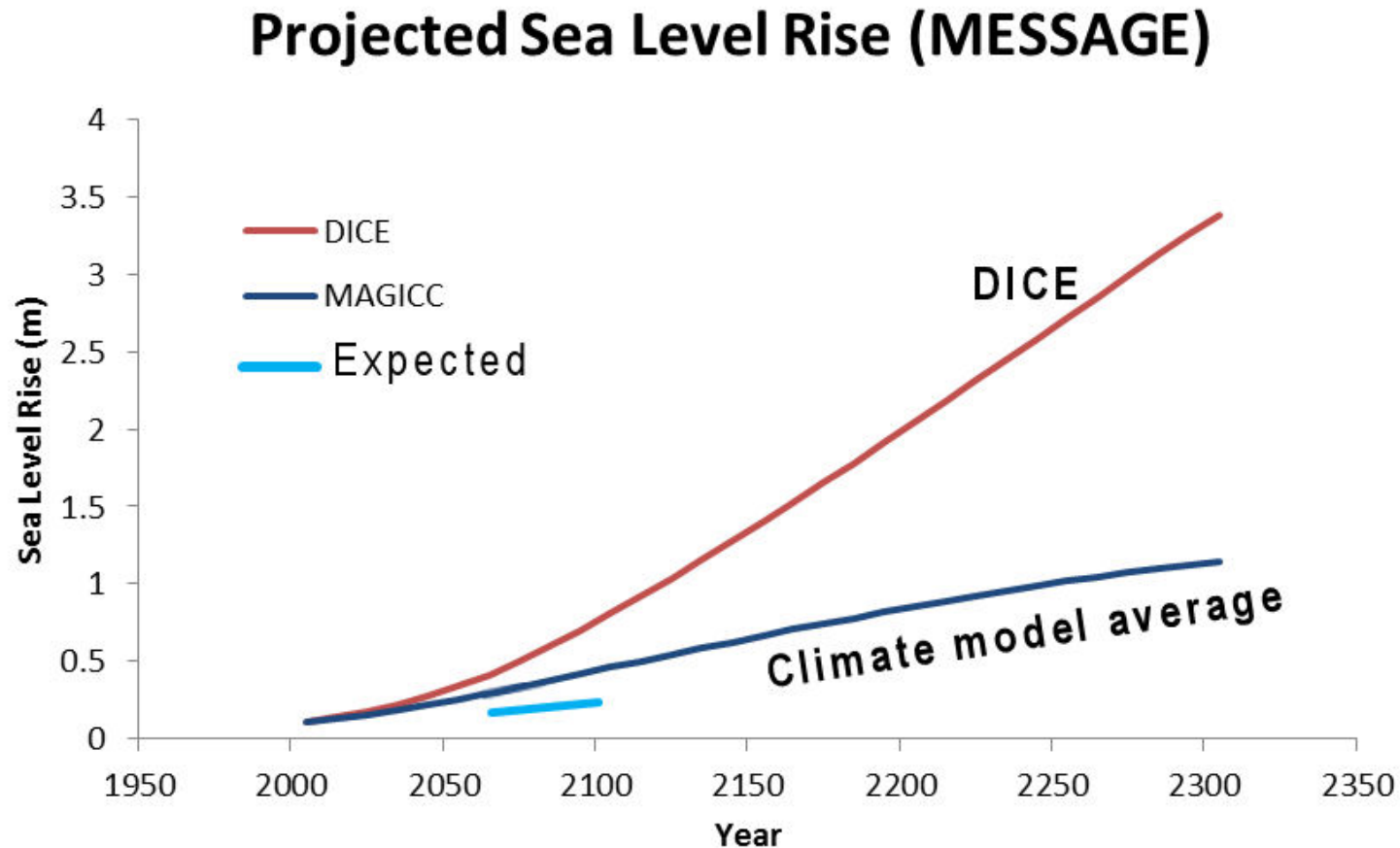




Social Cost of Carbon (Dioxide) Models

- The IWG uses three economic models:
 - FUND, PAGE and DICE
- PAGE and DICE have no CO₂ fertilization effect
- The DICE model assumes that the optimum climate at 1900, near end of Little Ice Age.
- Dr. Robert Mendelsohn: PAGE has “uncalibrated probabilistic damage function”.
- PAGE “explicitly does not include adaptation”

Sea Level Rise: DICE vs Climate Models



Social Cost (Benefit) of CO₂ using FUND

Transient Climate Response: 0.85 °C [0.55 – 1.30 °C]

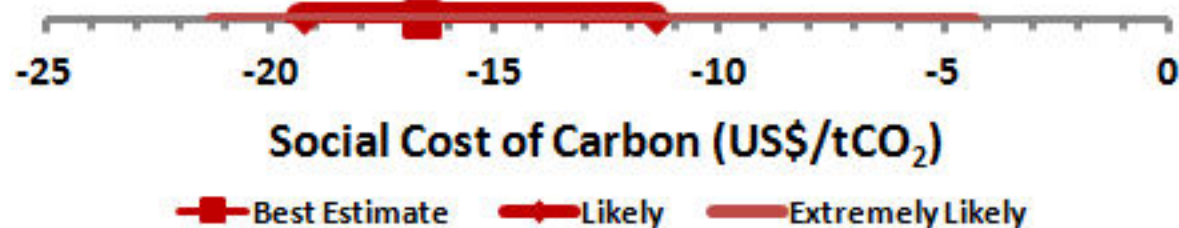
SCC best estimate US\$ -16.6 /tCO₂

likely US\$ -19 to -12 /tCO₂

extremely likely US\$ -21 to -4 /tCO₂

VERY BENEFICIAL!

Using 3% real discount rate





Net Benefit to Canada of CO₂ Emissions

- In Canada, net benefits of CO₂ increase throughout the 21st century.
- FUND: Canada net benefits \$101 billion/yr by 2100. (\$2016)
 - At 1.8 °C TCR
 - FUND default parameters

Transfer Wealth to the Wealthy

- IWG: world's income/person in 2100 will be 5 X today despite warming.
- Carbon taxes and trading transfers wealth from us to the very wealthy.
- Carbon taxes increases costs of all goods & services
 - Regressive, hurts the poor
 - Benefits crony capitalists.



Affect of Alberta's Climate Plan

- Compared to business-as-usual;
 - Reduce CO₂ by 0.026 ppm by 2030
 - Reduce global temperatures by 0.00007 °C
 - Insignificant and undetectable



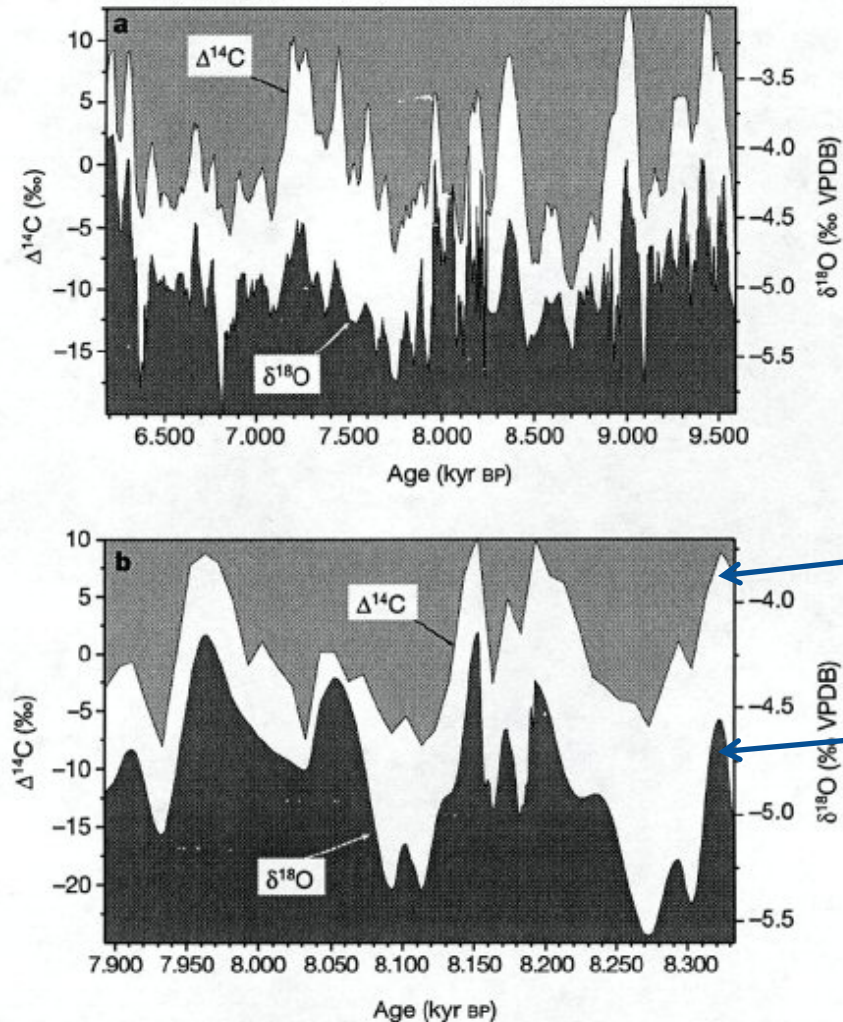
IPCC 5th Report – Ignores the Sun

- 1030 scientific papers published 2004-2016 skeptical of IPCC position. Sun, ocean oscillations, low CS.
- The IPCC ignored 123 peer-reviewed article published 2008 – 2012 that show the Sun is a major climate driver.
- Also, 320 papers in 2014, 2015, 2016 show sun-climate link
- IPCC: “The forcing from changes in total solar irradiance alone does not seem to account for these observations, implying the existence of an amplifying mechanism”
- Then, ignores solar effects.

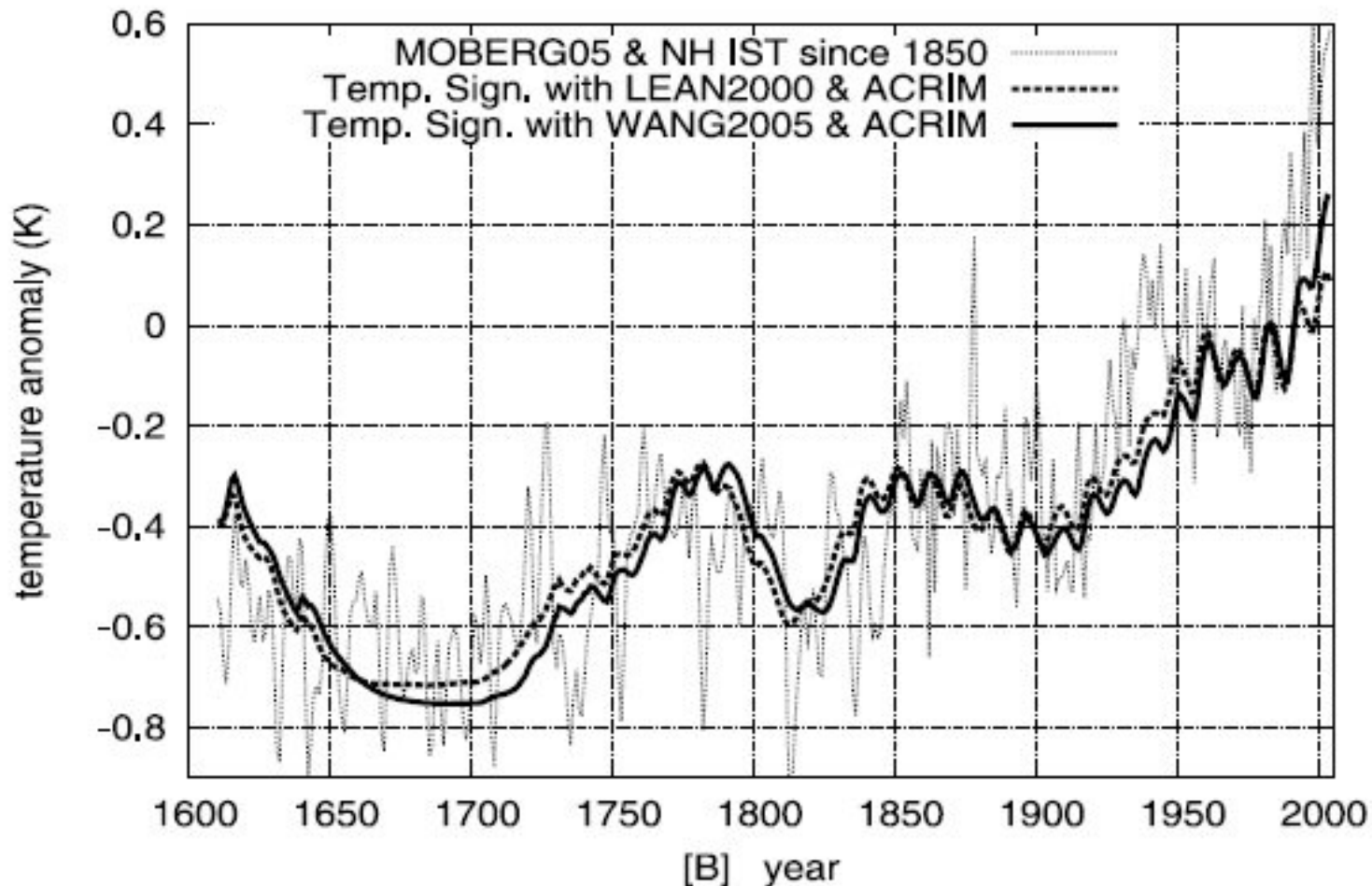
The Sun and Temperature Proxies

Solar proxy $\Delta^{14}\text{C}$
vs temperature
 $\delta^{18}\text{O}$ over 3000
years.

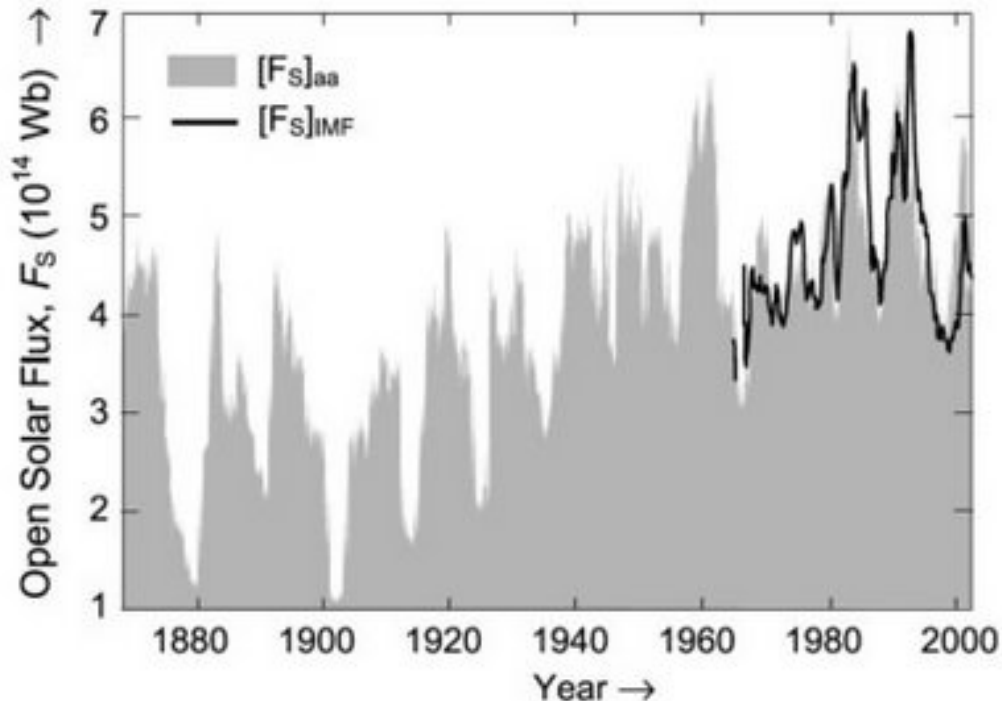
Solar Activity and Climate (as seen by proxies)



NH Temperatures & Solar Activity



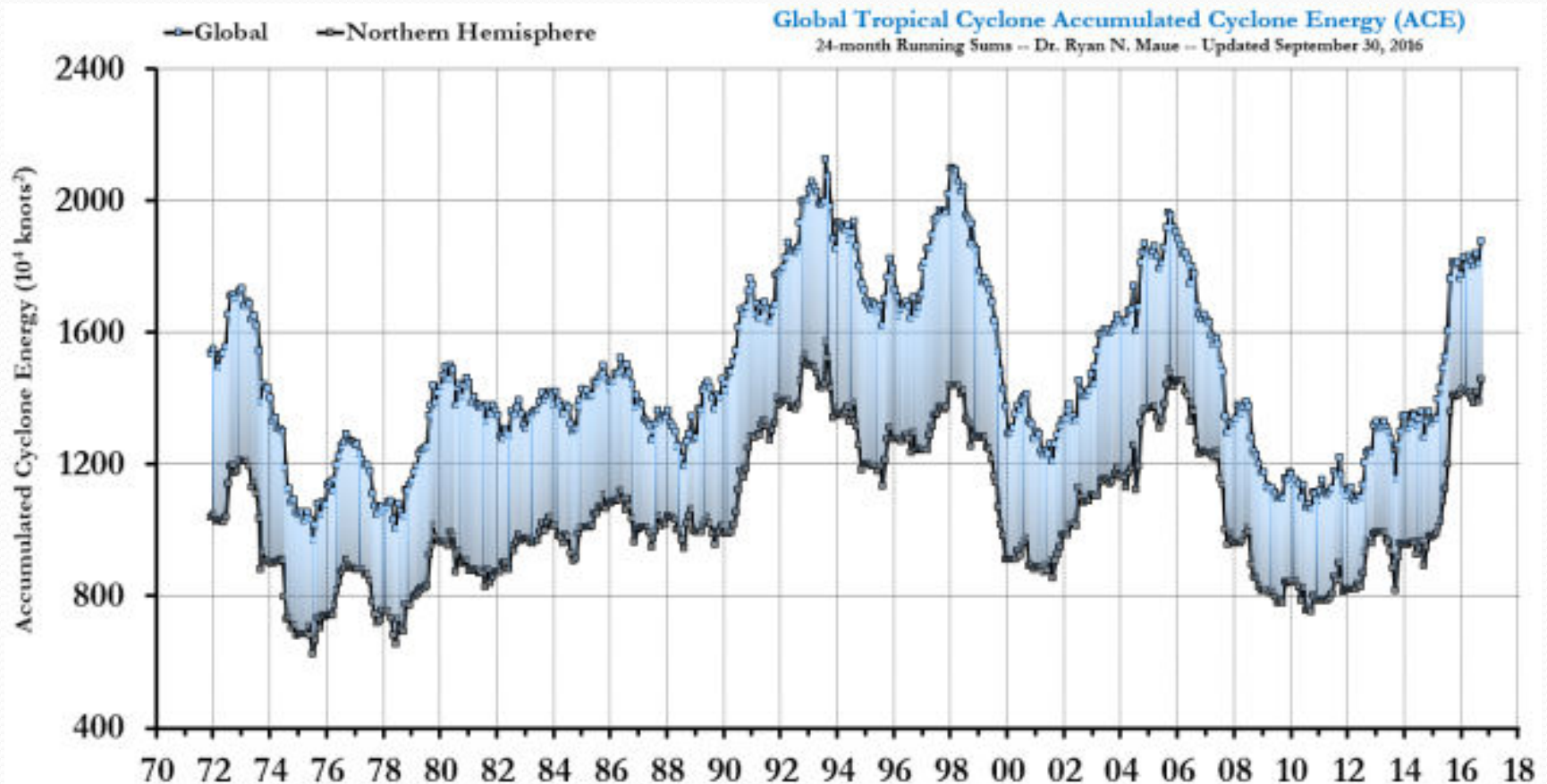
Solar Magnetic Flux



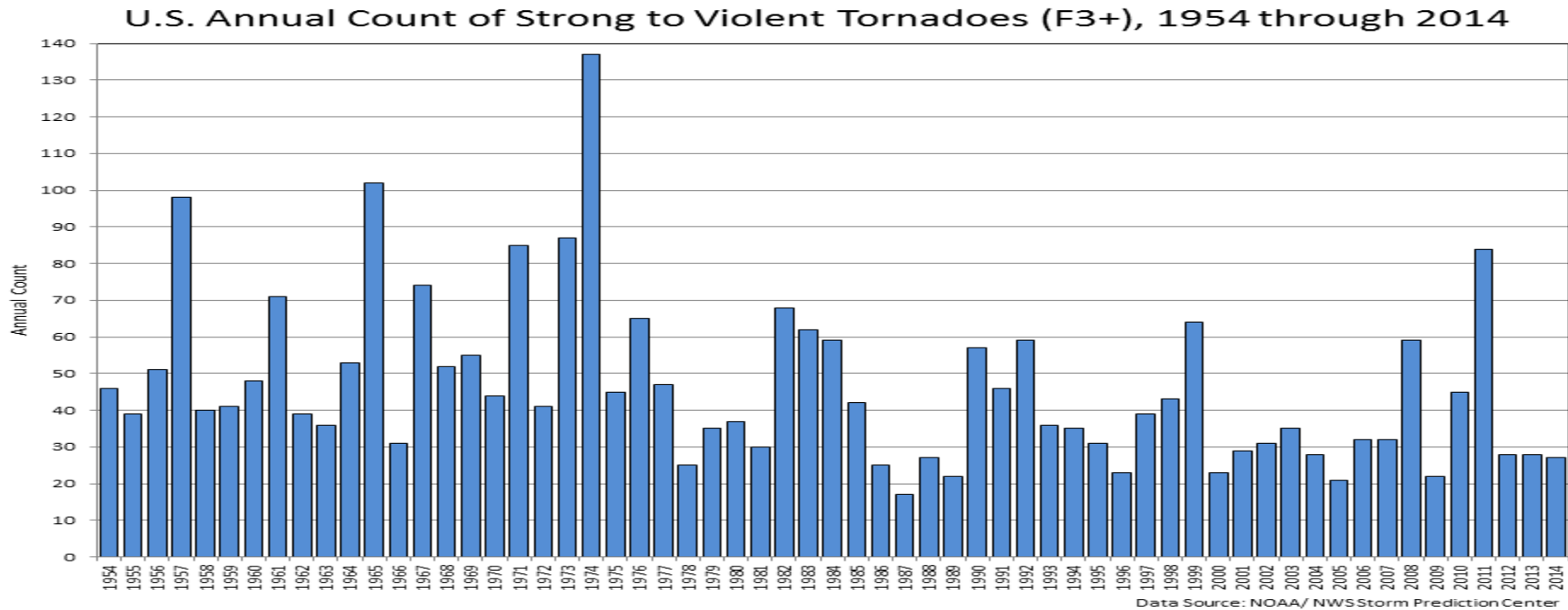
More active Sun → more solar wind → more magnetic flux → less cosmic ray → less aerosols → less low clouds → more sun light to the surface → global warming.

Hurricanes: No Relation to Temperature

No significant trend of hurricane energy



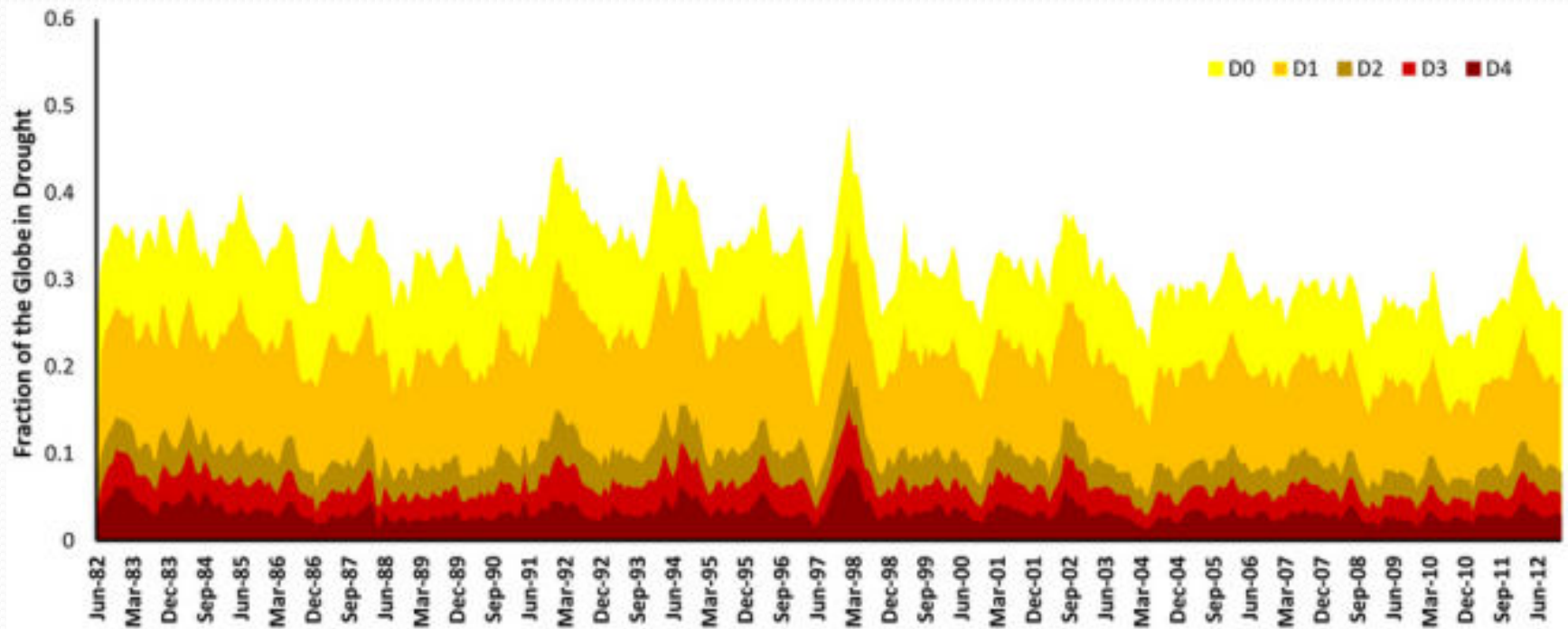
Tornado Trend Declines with Warming



Tornadoes require a cold front colliding with warm air. Northern warming makes tornadoes less likely.

Global Drought Declining

Global Integrated Drought Monitoring and Prediction System
There is a small declining trend of total drought throughout the period



Benefits of Warming

- Longer growing season
- Greater area of arable land
- Lower heating costs
- Fewer cold-related deaths and illness
- Lower cost of outdoor activity
 - Lower construction costs
 - Lower road maintenance costs
- Reduced tropics to pole temperature gradient
 - Fewer severe storms

CO2 is Plant Food

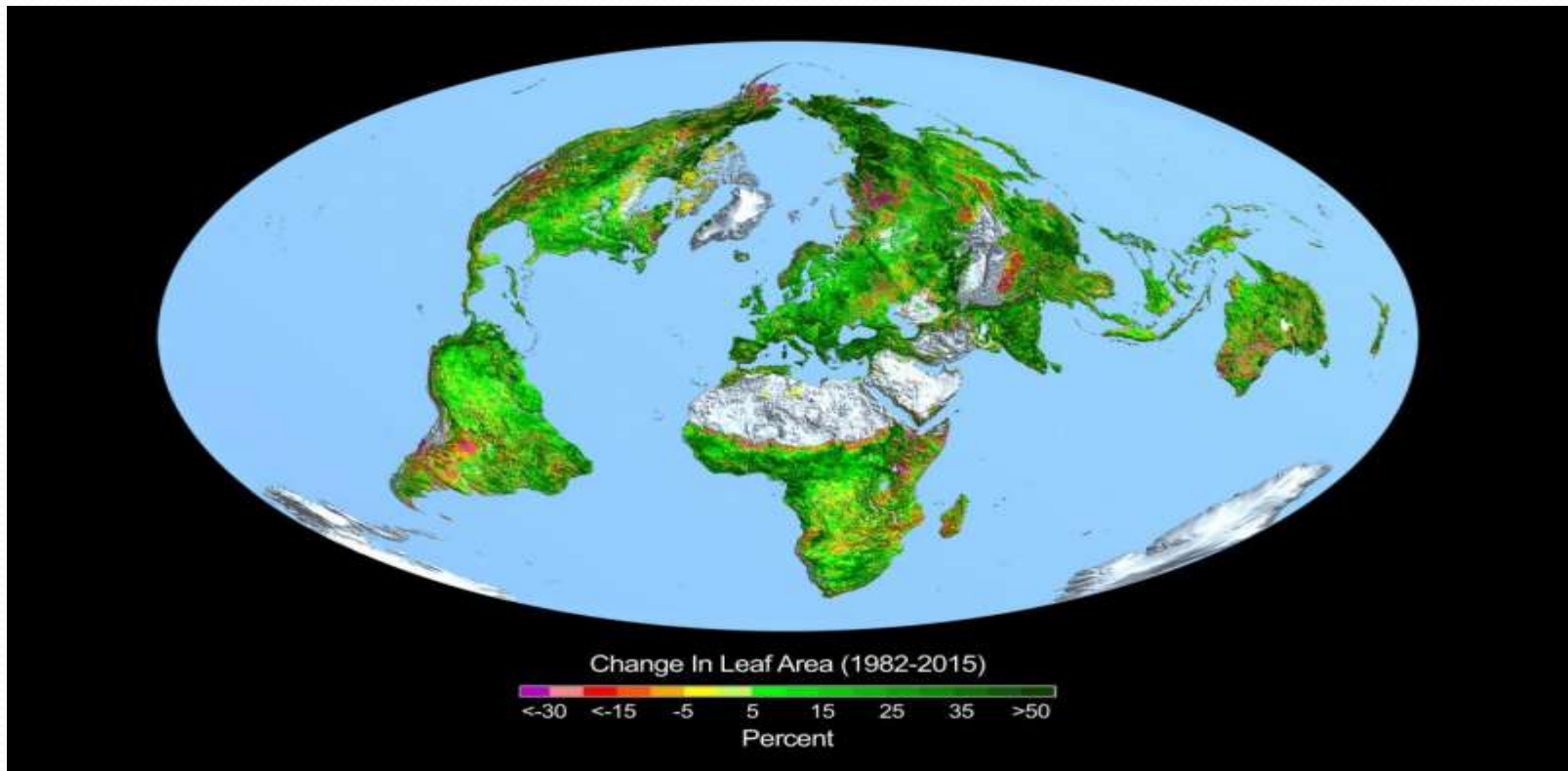
- CO₂ increases since 1950 have enhance crop yields by 16%.
- A 300 ppm CO₂ increase would raise the productivity of woody plants by about 50%.
- CO₂ fertilization added \$3.8 Trillion to global crop yields 1961 to 2011.



Canada's GDP = \$1.8 Trillion

CO2 is Greening the Planet

- CO₂ fertilization caused 70% of leaf area greening trend from 1982 to 2014. Greening was 11% over 33 years. (April 2016)
- The greening over the past 33 years ... is equivalent to adding a green continent twice the size of mainland USA (18 million km²)

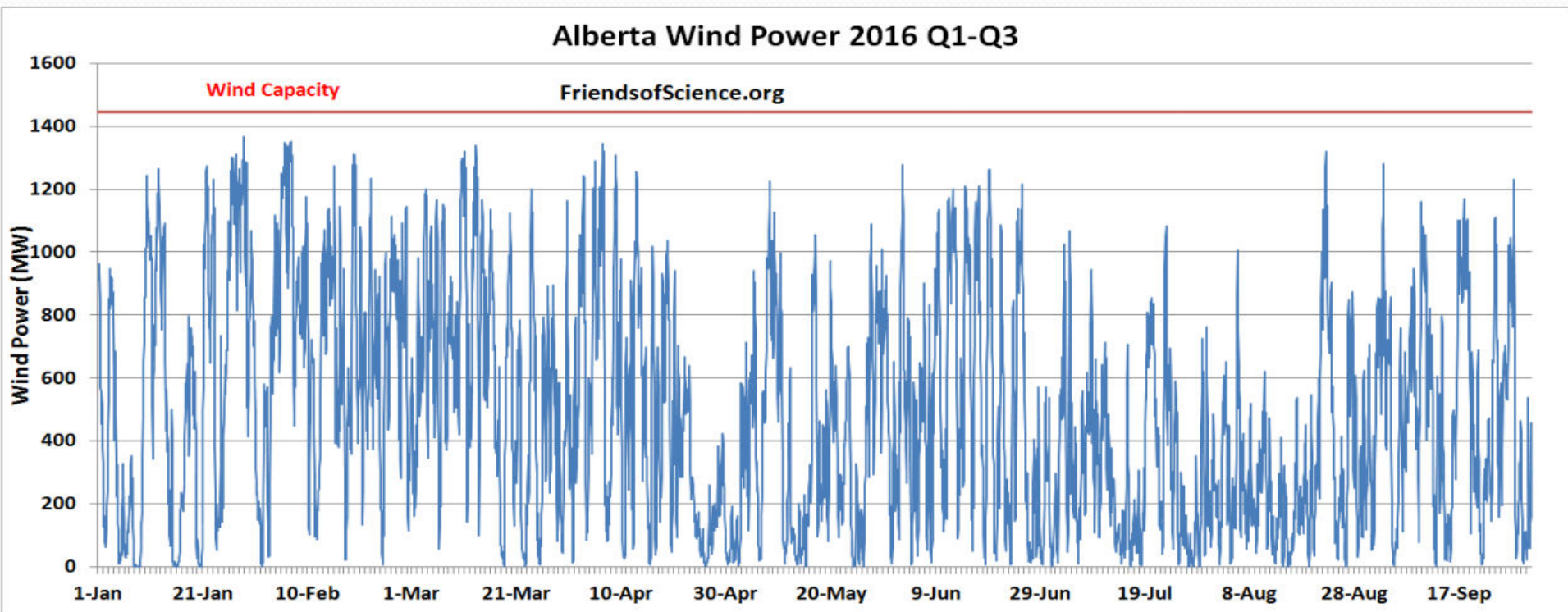




Warming Reduces Deaths

- In U.K., death records show cold kill 10X as many as heat.
- Death rate in Canada is 100 deaths/day greater in January than July.
- Study of 13 countries: Cold weather kills 20 times as many people as hot weather.

Alberta Wind Power – Extreme Variability



Average load factor: 34%



Wind Power

- Alberta 2015 average Wind capacity factor: 33%
- Southern Alberta Transmission Reinforcement (for wind power) cost: \$2.5 billion.
- Wind transmission costs are 2 – 3 time greater than for conventional power.
- Ontario Feed-in tariffs 12.8 ¢/kWh
- My Enmax Dec. charge 4.3 ¢/kWh

Wind Turbines Kill Birds and Bats

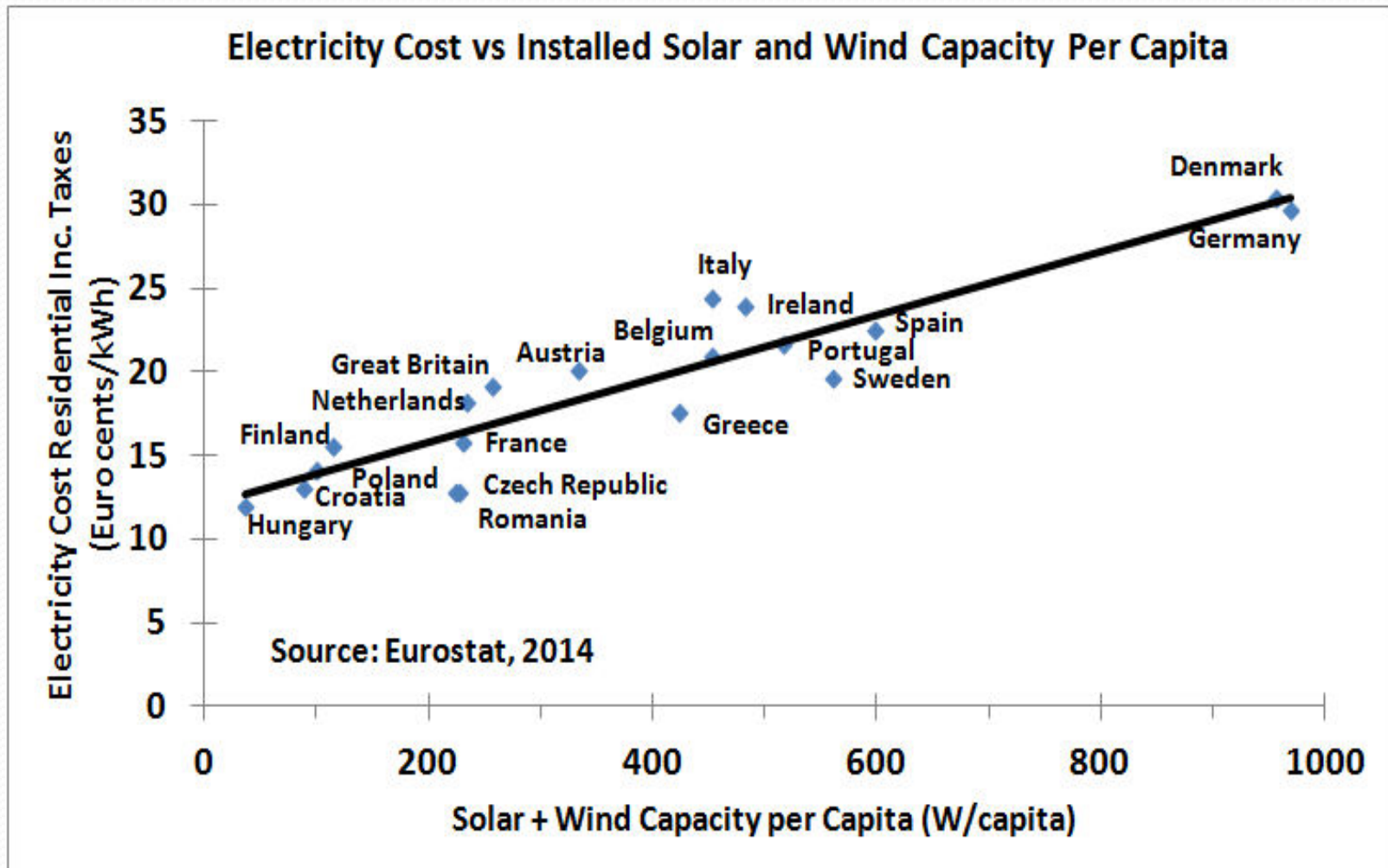


- Windfarms kill 1.5 million birds and bats annually in the USA.
- In Altmont Pass, Calif., 4000 birds killed annually.
- Half of bat fatalities caused by direct blade contact, half by exploding lungs due to rapid pressure decline.

Ontario Solar Feed-in Tariffs

Type	Price (¢/kWh)
Solar (PV) Rooftop	29.4 – 24.2
Solar (PV) Non-Rooftop	20.9 - 21.4
ENMAX energy charge Dec 2016	4.3
Ontario solar FIT costs up to 9 times the cost of Alberta electricity.	
Ontario recently approved a 20-year contract at 45.7 ¢/kWh for a new solar project – 11 X Enmax!!	

Electricity Prices vs Solar+Wind Capacity



Summary

- Carbon dioxide is a wonderful by-product of fossil fuel use.
- Social net benefit of CO₂ is about CDN\$22/tCO₂.
- Expected warming by 2100 is trivial 0.6 °C or less.
- Don't subsidize wind or solar.
- Alberta climate plan to cost \$31 billion for unreliable power to reduce temperatures by 0.00007 °C
- Alberta's climate plan will be a burden with no benefit.

Friends of Science Event May 9, 2017

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Climate Dogma Exposed

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Friends of Science

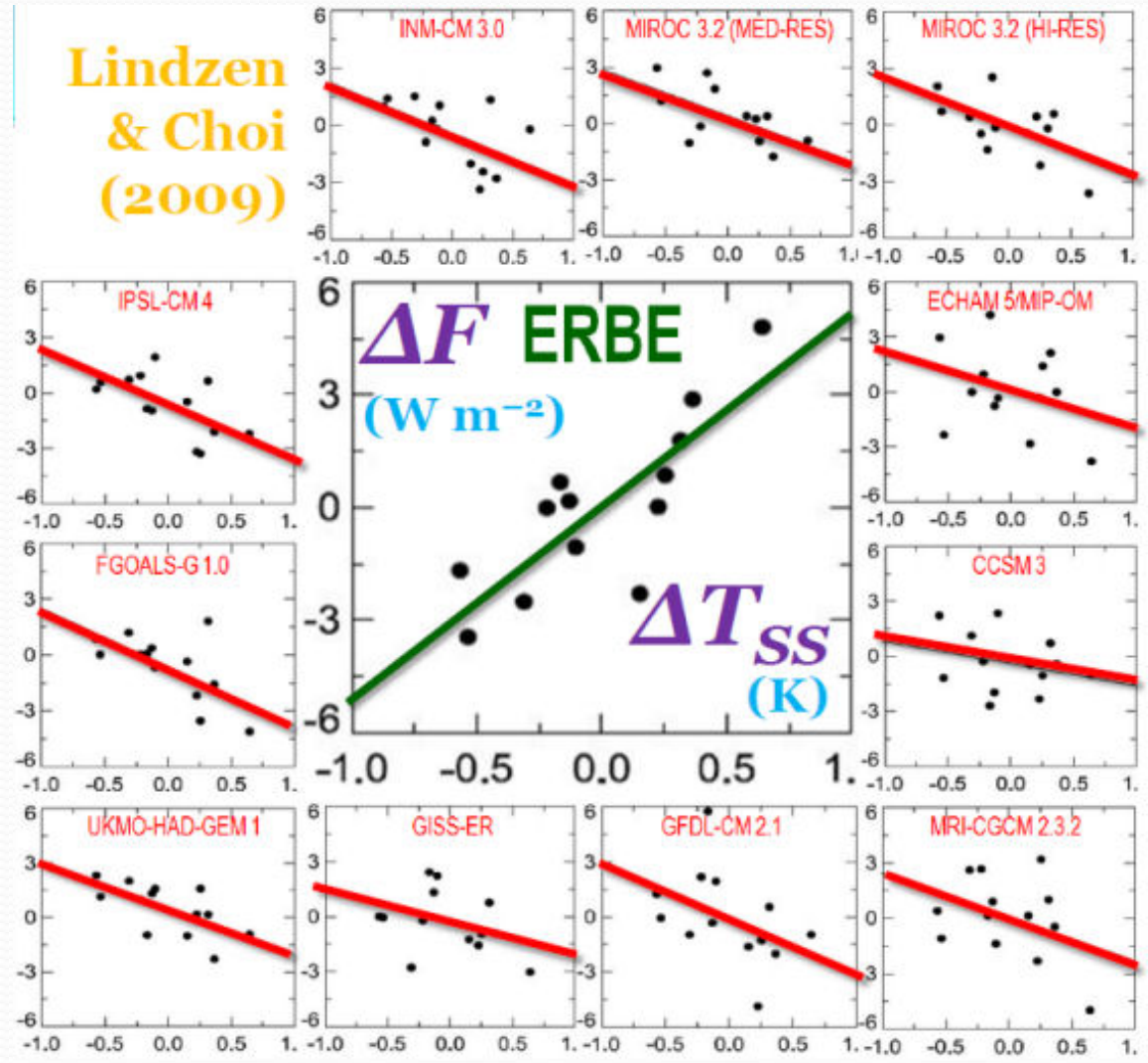
- Visit FriendsOfScience.org for more information
- Our objective is to educate and share information.
- Toll-free Telephone: 1-888-789-9597
- E-mail: contact@friendsofscience.org
- Become a Member; \$60/3-years
- Major Event; **May 9, 2017**

• **DONATE**



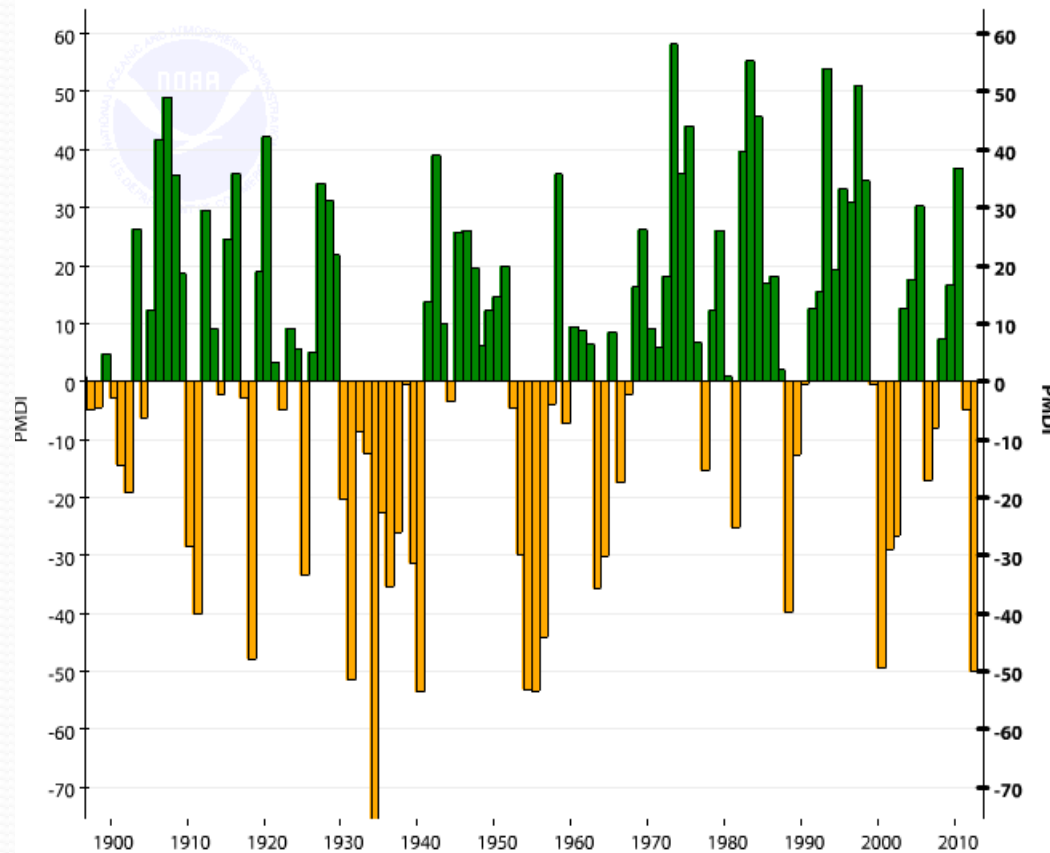
Satellite vs Predicted Outgoing Radiation

ERBE satellite shows when tropical sea surface temperature (SST) increase outgoing radiation increases, but 11 climate models show outgoing radiation decreases.



U.S. Drought

Contiguous U.S., PMDI, January-December



- No correlation of temperature to drought.
- The most severe droughts in U.S. were in the 1930s and 1950s.

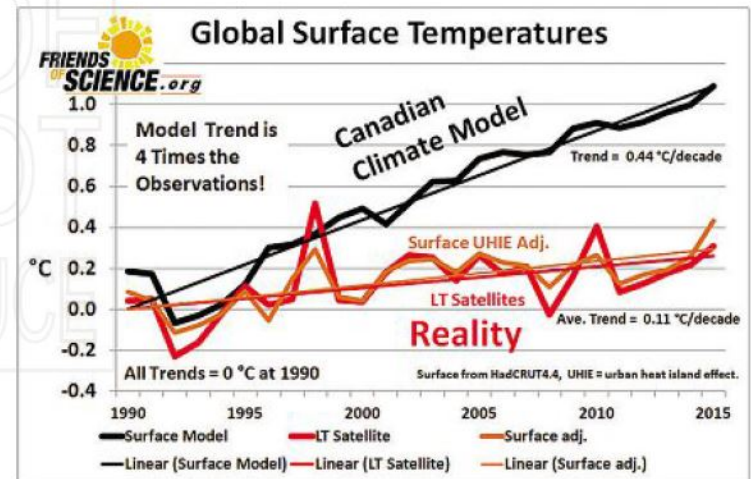
Calgary Herald and Calgary Sun Ad



PRESENTATION ON ALBERTA'S CLIMATE PLAN

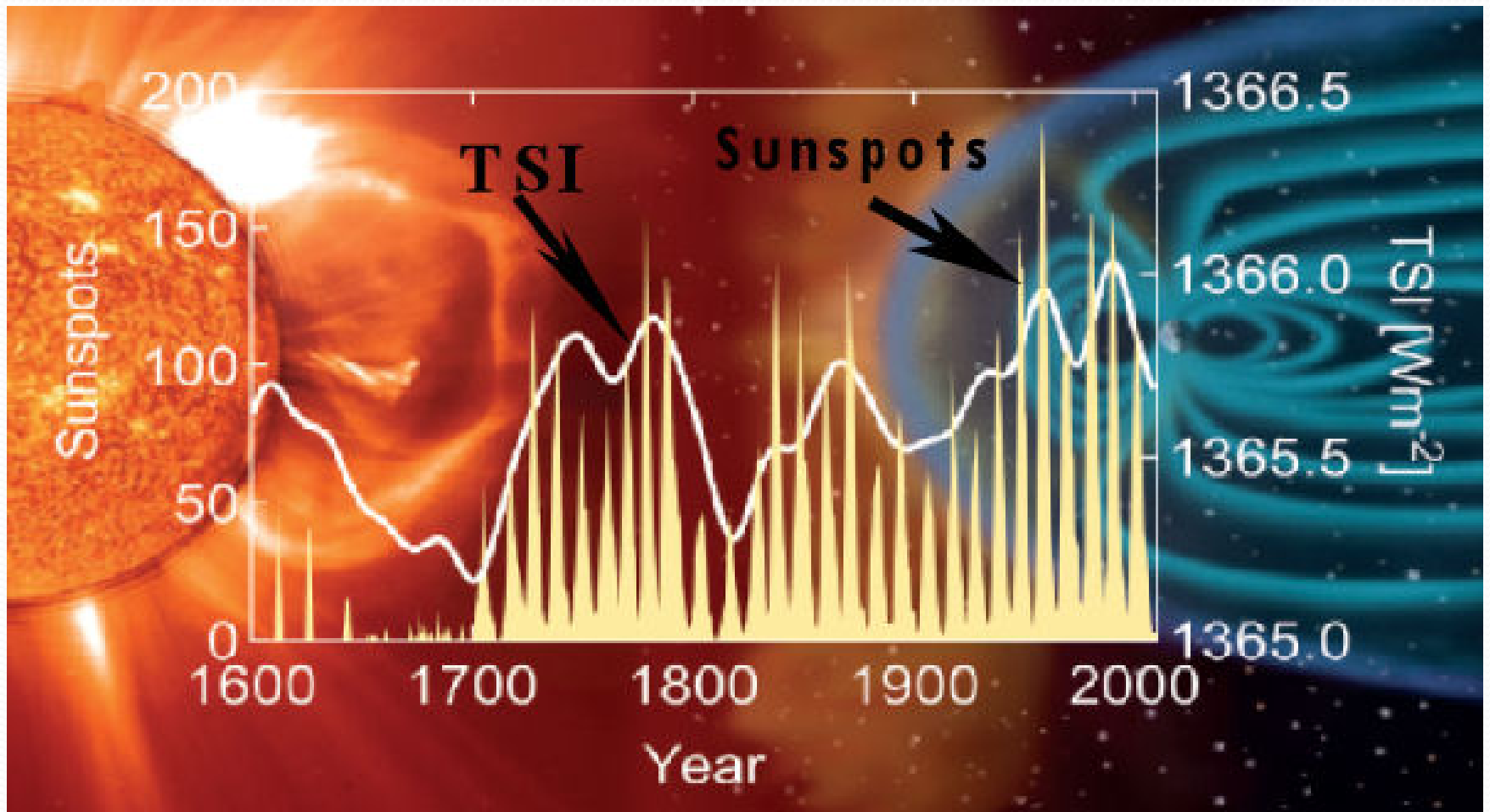
Ken Gregory has been studying climate science and policy for over 10 years. Invite Ken Gregory, B.App.Sc., a Friends of Science Speaker, to your club or organization to explain:

- How the Alberta Climate Plan will affect you.
- Why the climate panel didn't consider the benefits of warming and CO2 fertilization.
- Why the climate plan may reduce temperatures by only 0.00007 °C by 2030.
- Why human-made emissions will warm the earth by no more than 0.6 °C by 2100.
- Why natural climate change may cause global temperatures to decline.
- Why the Canadian climate model shows a 1990 - 2015 global temperatures rise of 4 Times the actual measurements.
- Why the net social benefits of CO2 emissions are about CDN\$22/tonneCO2.
- Why the net Canadian benefits of CO2 emissions increase throughout the 21st Century.
- Why we should never subsidize solar and wind power.
- Why phase-out coal will cost us over \$29 billion.



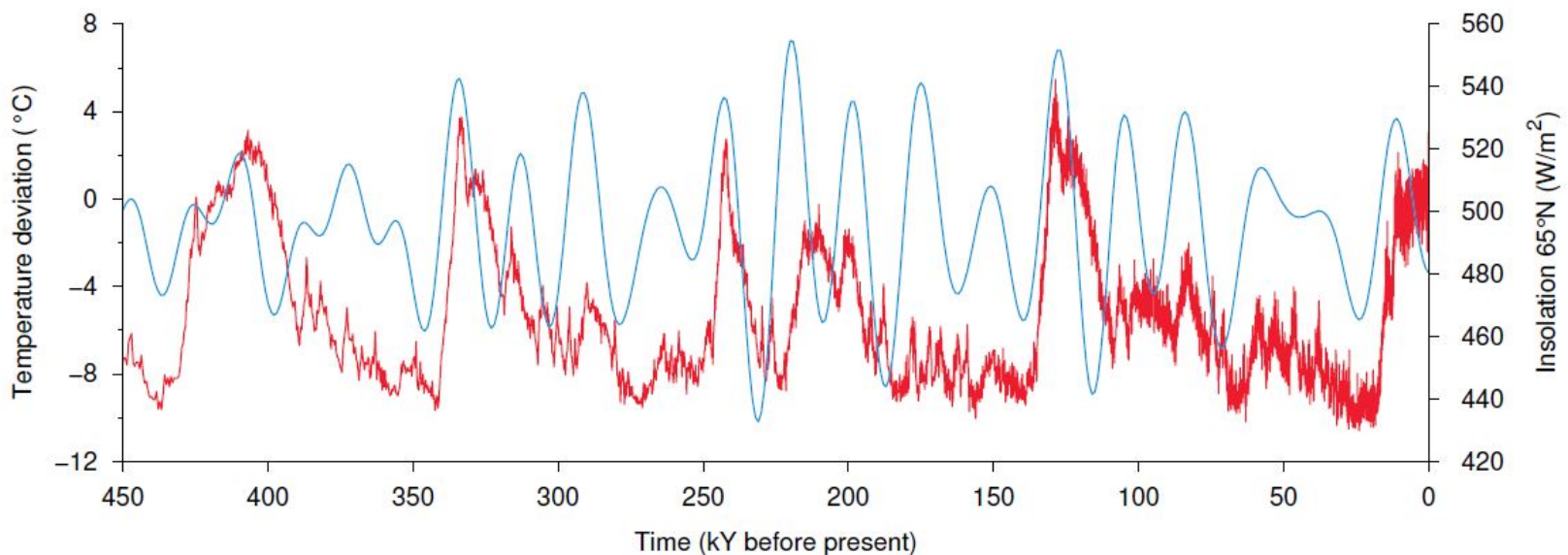
Contact Ken toll-free: 1-888-789-9597 | E-mail: contact@friendsofscience.org
A speaker fee is not required. www.FriendsofScience.org

Solar Irradiance vs Sunspots

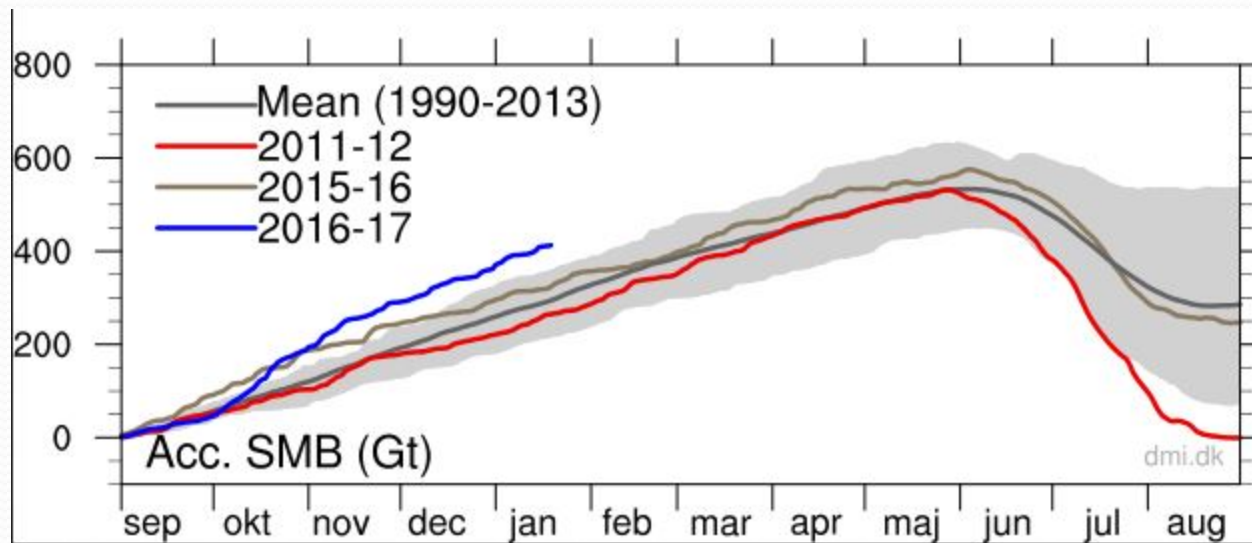


Declining CO₂ Cause Warming from Ice Ages

- CO₂ concentrations slowly falls during ice ages
- Plants die due to low CO₂ creating sand deserts
- Large dust storms deposited dust on the ice sheets
- The earth's precession causes solar warming 22,200 years
- Ice ages end after 4 or 5 cycles
- “The greenhouse-gas attributes of CO₂ play little or no part in this complex feedback system.”

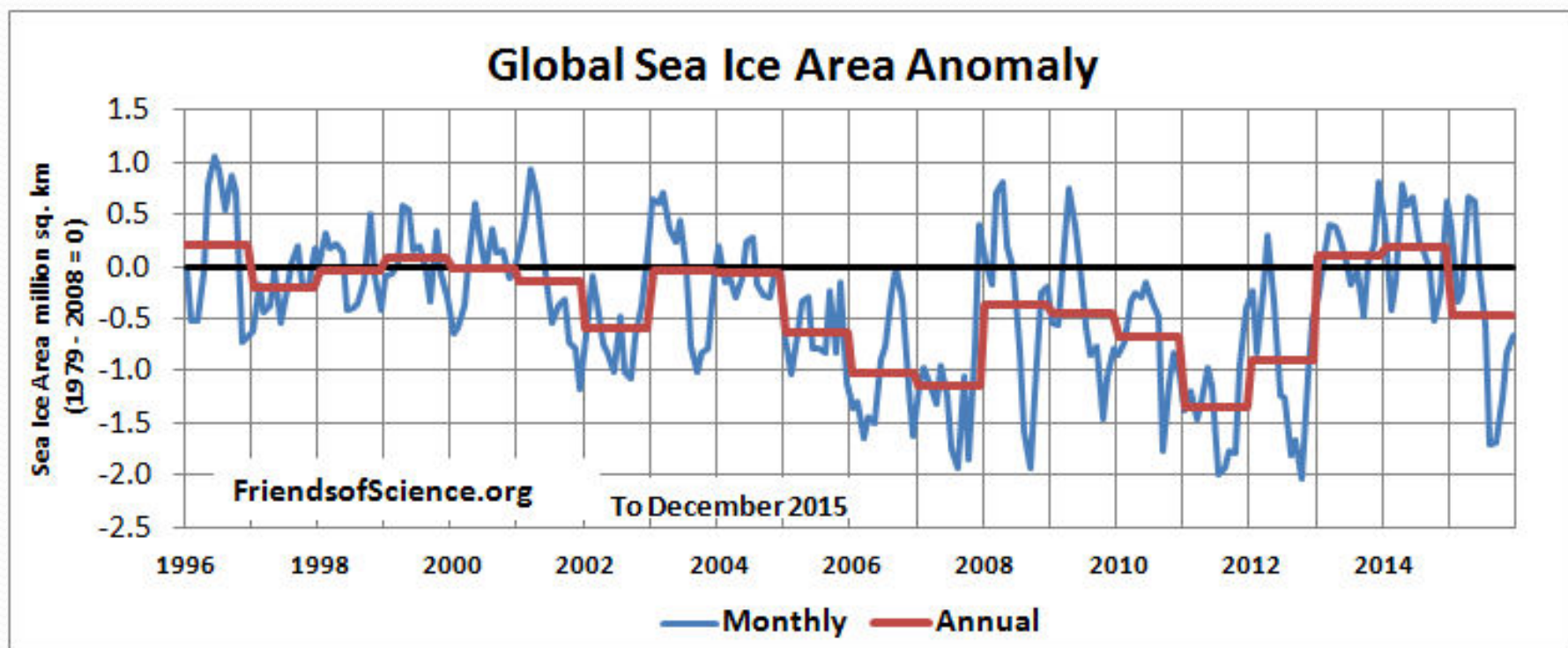


Greenland Surface Mass Balance

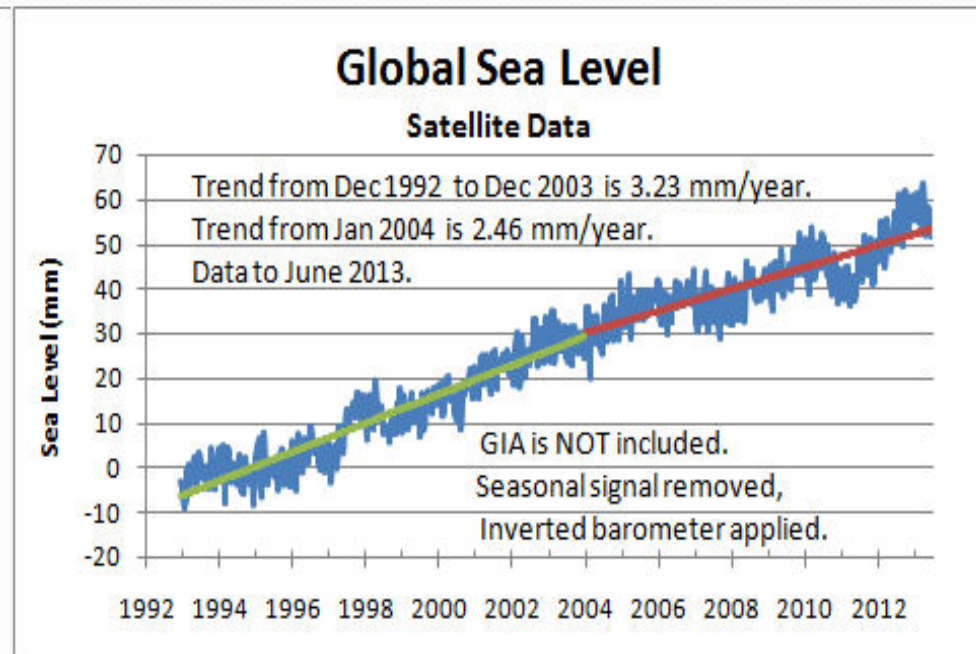
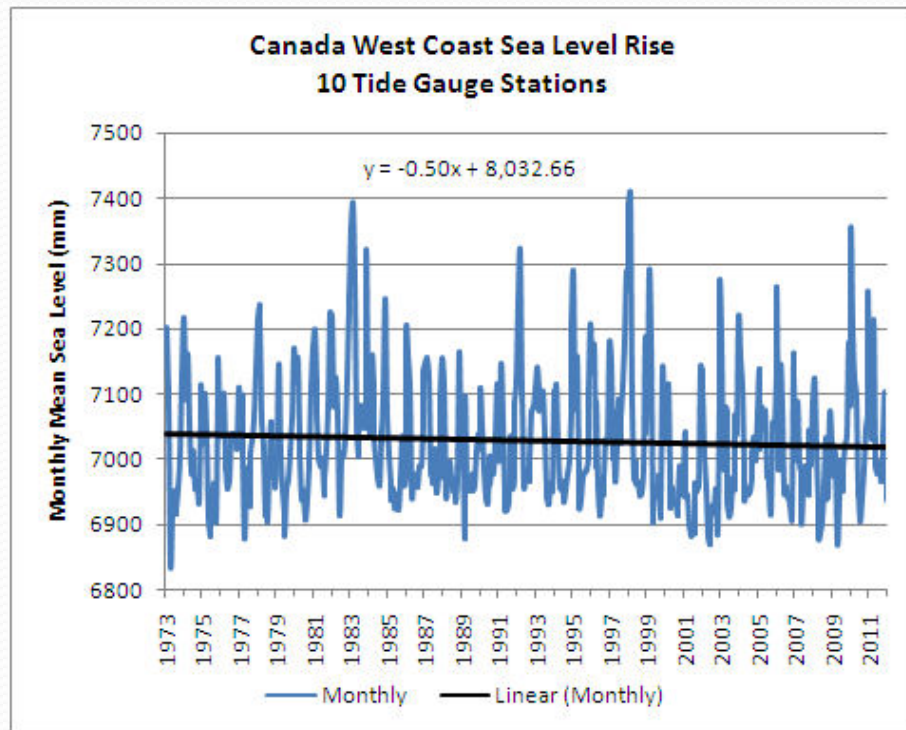


- Greenland surface snowfall exceeds melting & sublimation, offset by glacier calving.
- Lower sea ice caused increasing snowfall

Global Sea Ice Area Anomaly

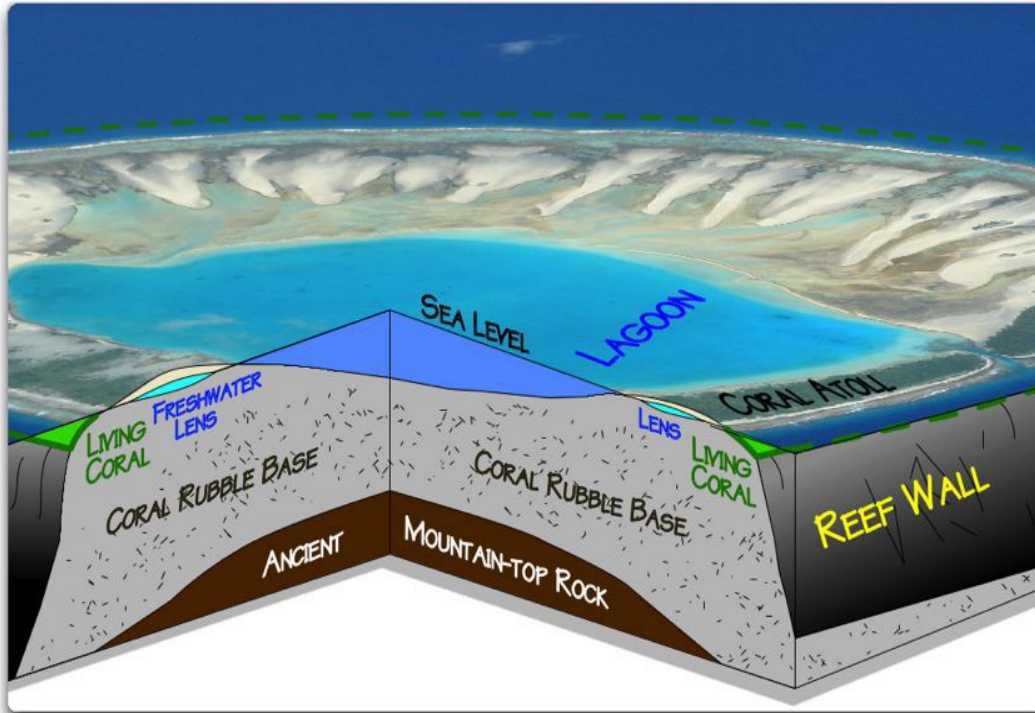


Sea Level Rise: Little Impact



- No sea level rise on Canada's west coast in 40 years.
- Global sea level rise by satellite data is 2.5 mm/yr before GIA.

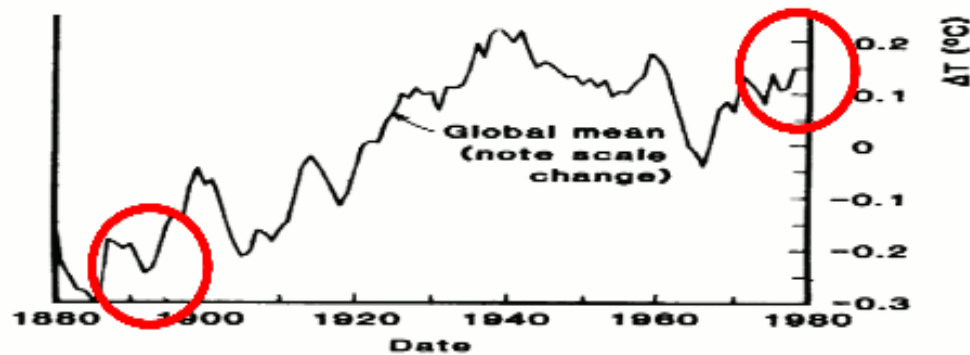
Tropical Coral Islands Not at Risk from SLR



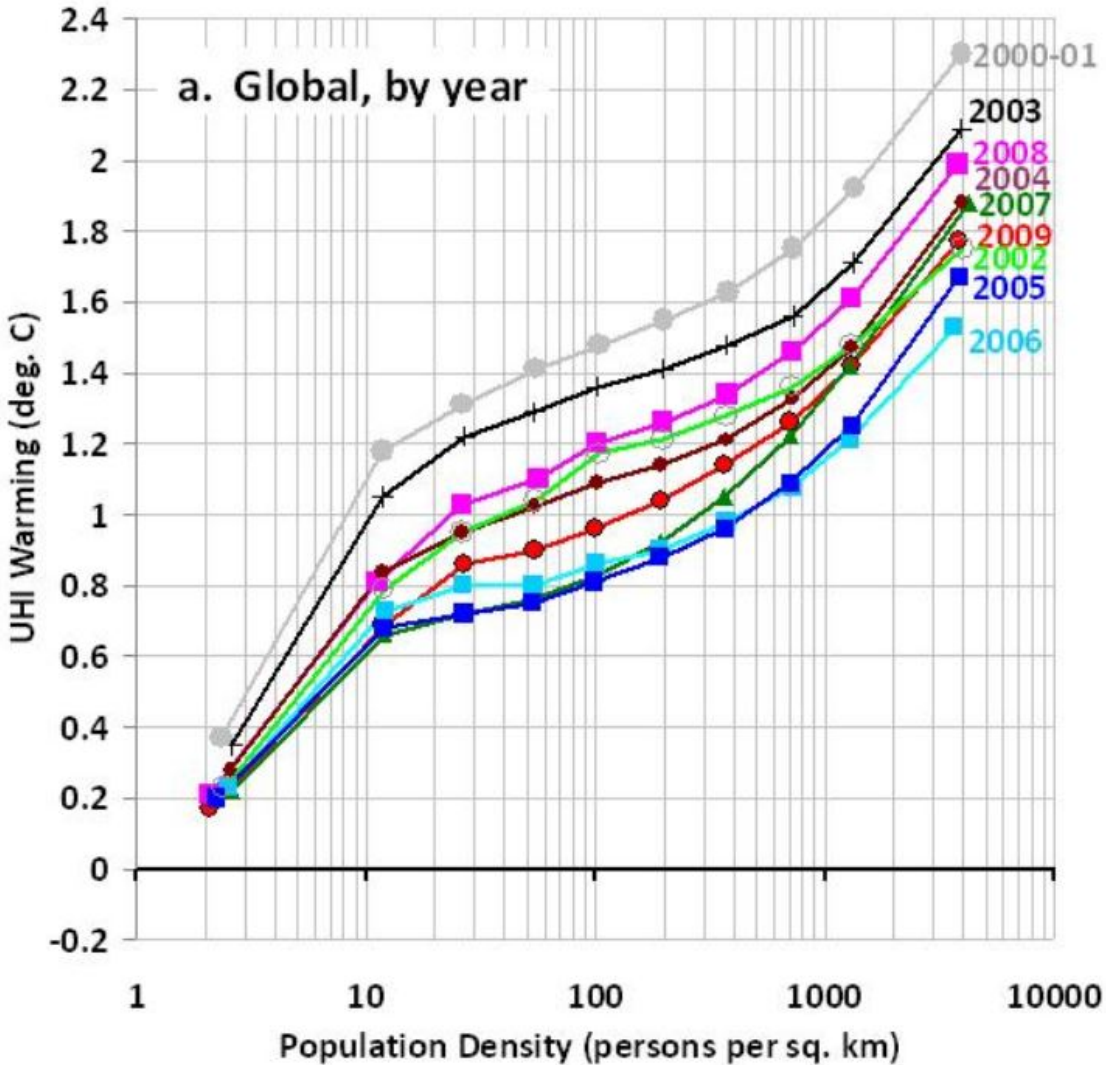
- Tropical coral islands grow as fast as SLR.
- Aerial photos show that 23 of 27 islands grew or stayed the same area since 1950.
- Island atolls rise with sea levels.

Undocumented Temperature Adjustments

Hansen 1981

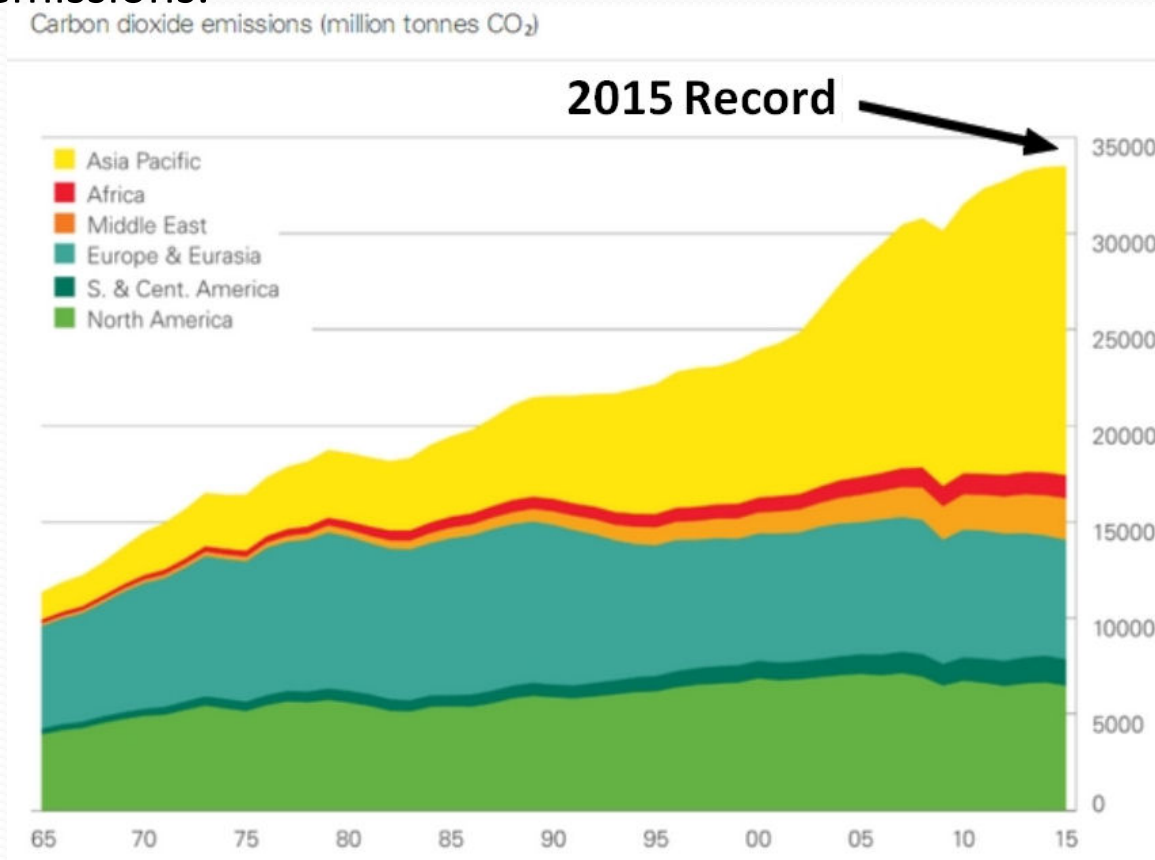


Urban Warming by Population Density

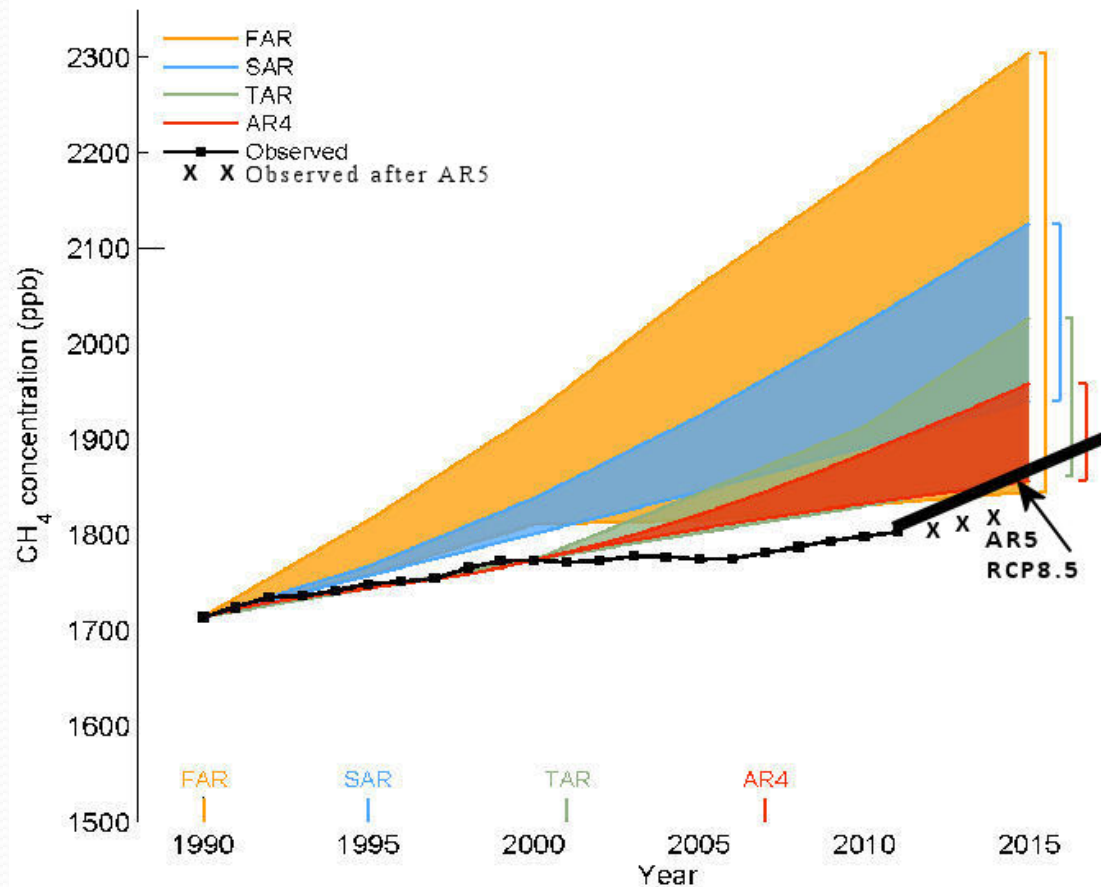


CO2 Emissions (million tCO2)

13 UN climate conferences have not led to any reduction in CO2 emissions.

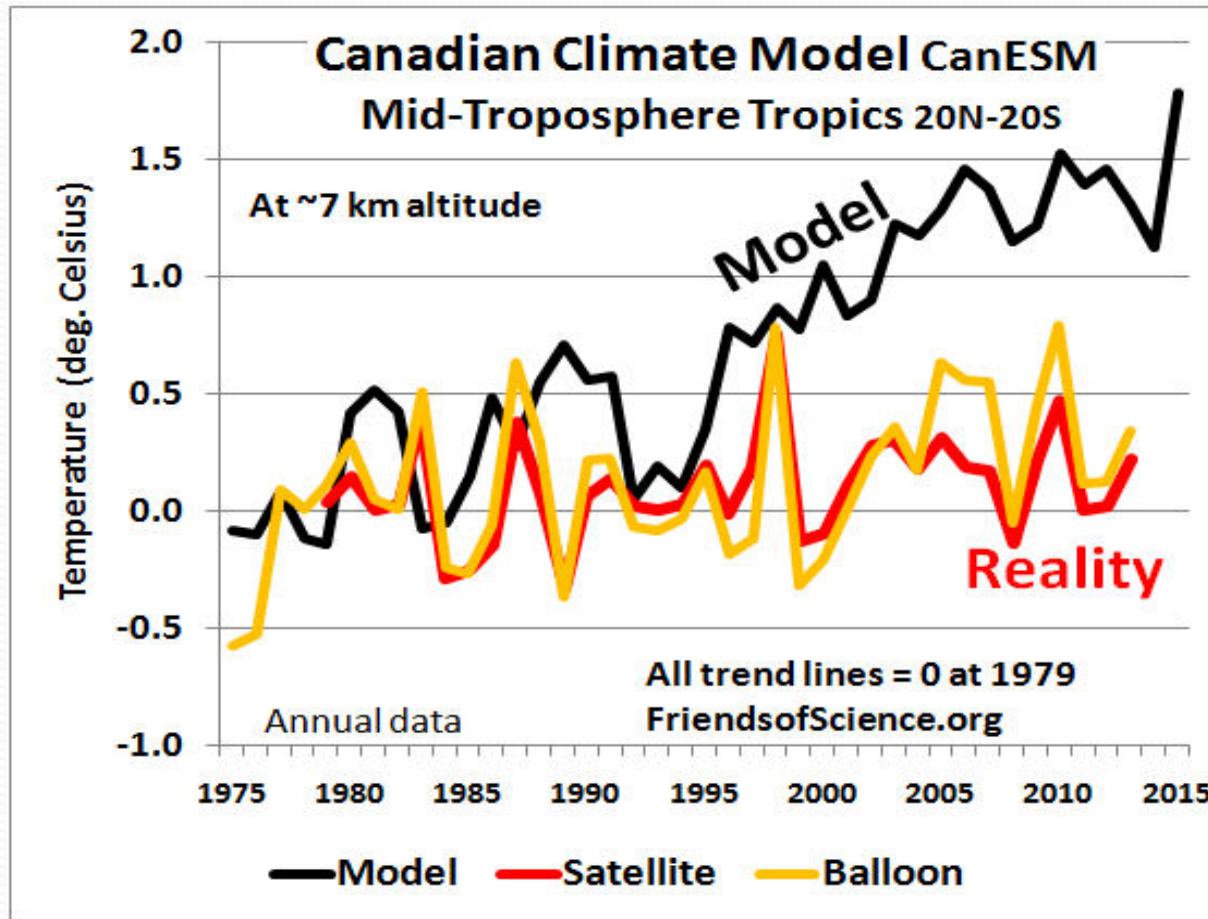


IPCC Methane Forecasts vs Reality



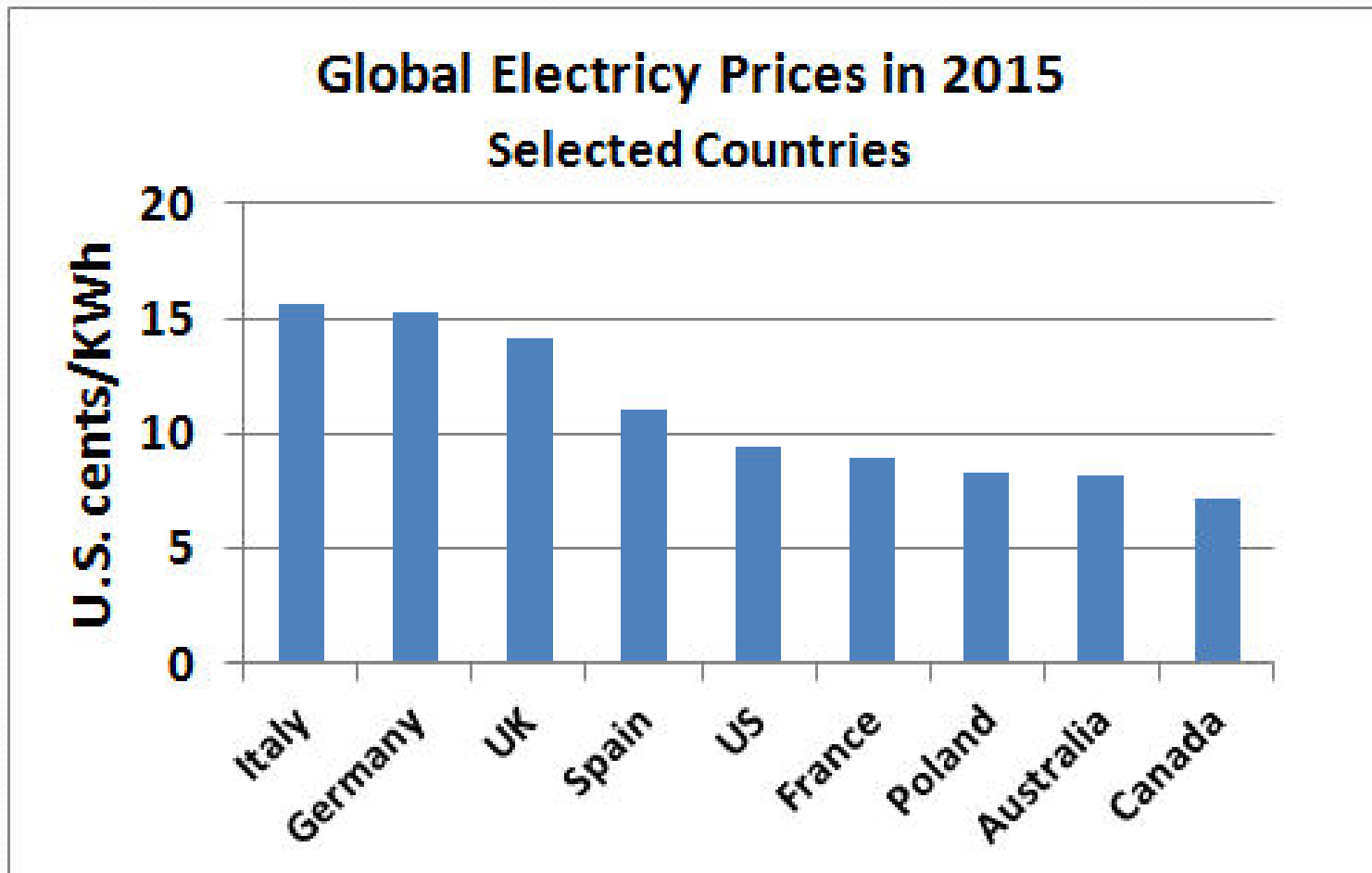
Measurements are below all the lower bound of the forecasts.

Canadian Model – World's Worst



In the tropics the model trend is six times reality

Electricity Prices

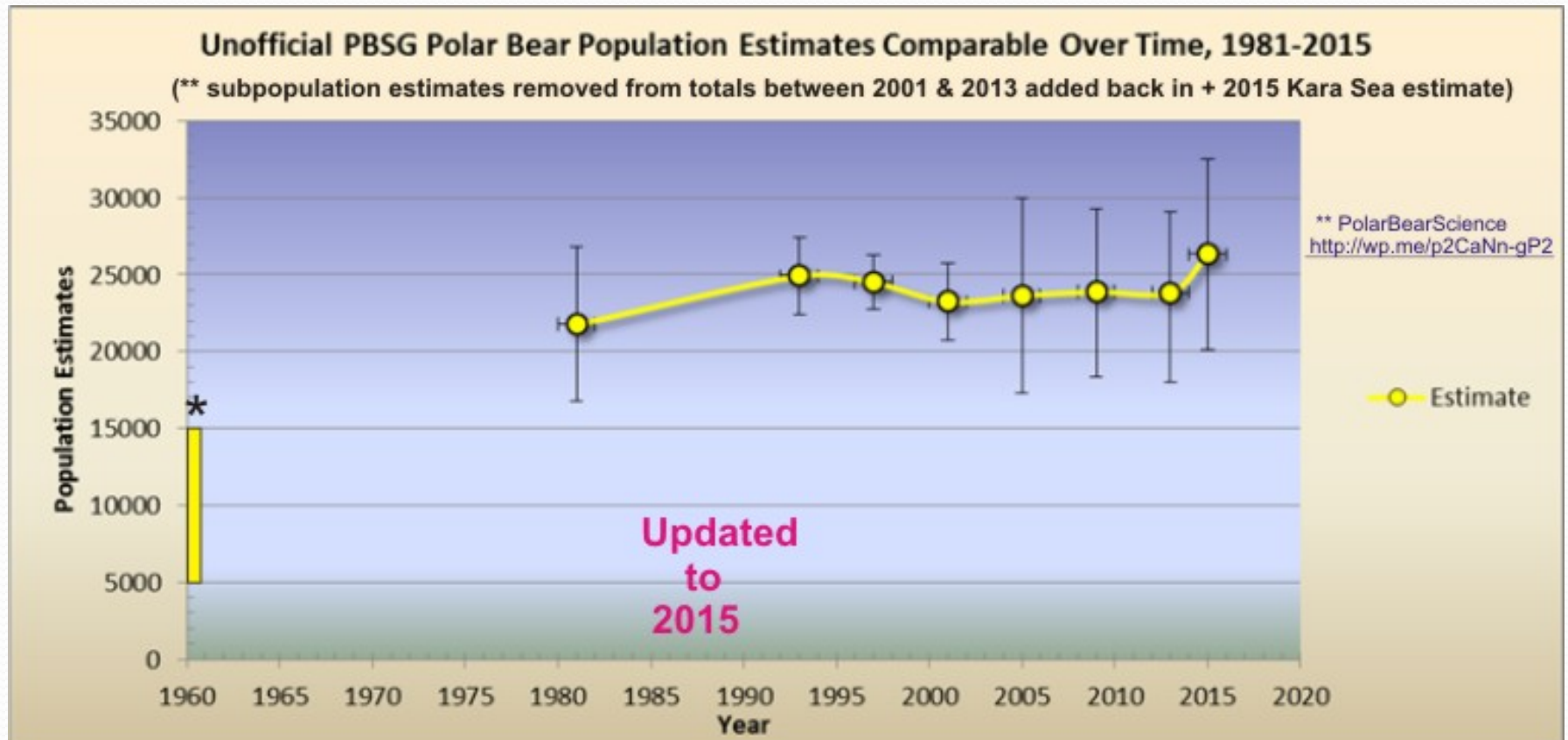




Wind Power Doesn't Reduce Fuel Usage at High Wind Penetration

- Studies for the Netherlands and U.K.; wind power causes extra fuel usages compared to gas turbines.
- Cycling of back-up generators reduces efficiency
- Replacement of efficient generators with low-efficiency fast reacting open-cycle gas turbines (OCGT).
- OCGT consumes 40% to 70% more fuel than CCGT.
- If wind capacity is small, extra wind power will cause a small fuel savings.

Polar Bear Numbers Stable Since 1980

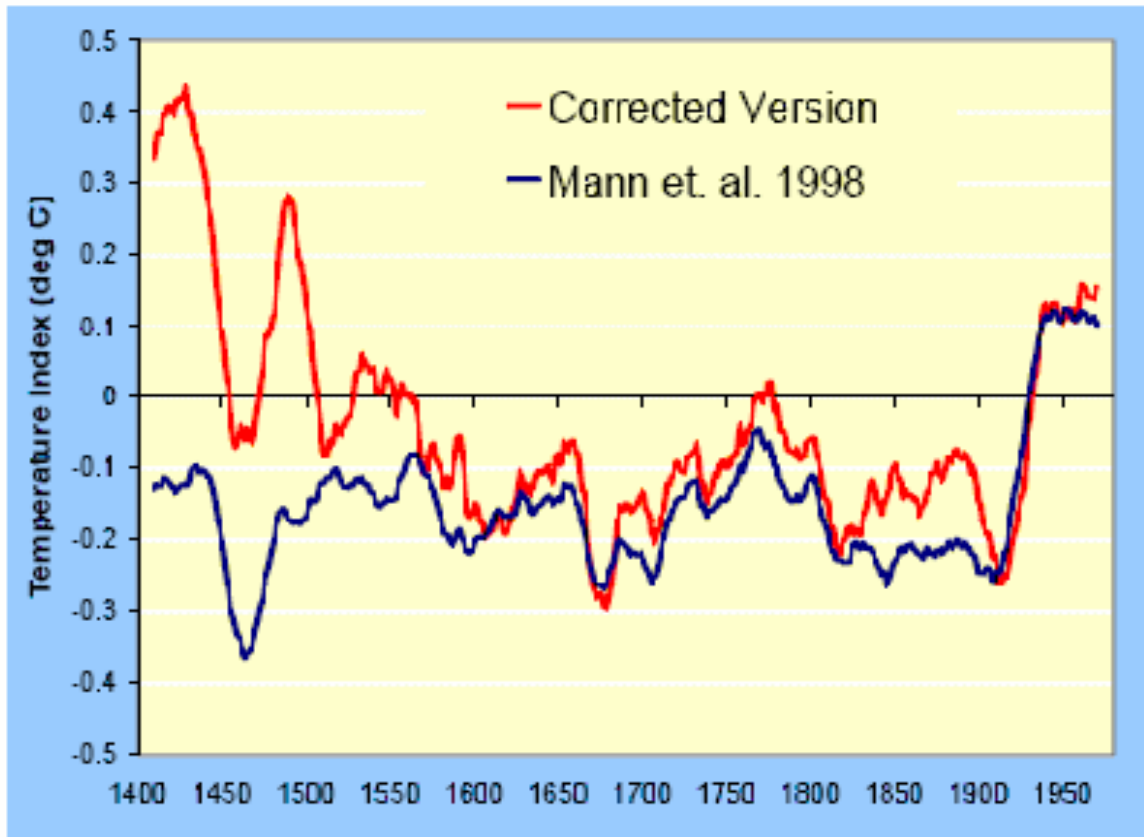




The 97% Consensus Fraud

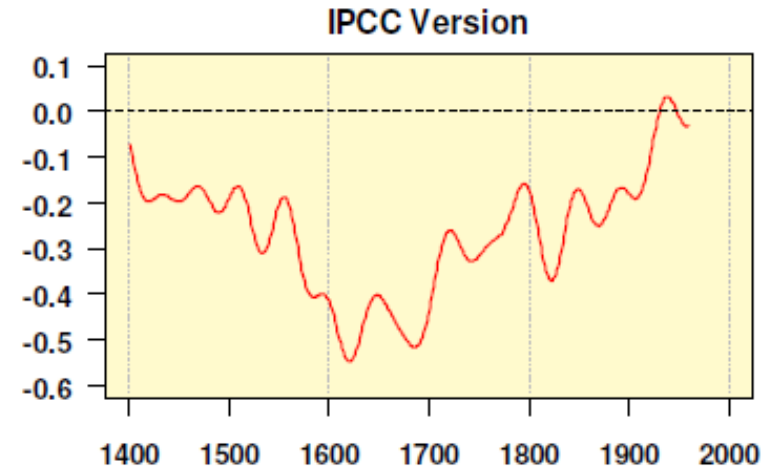
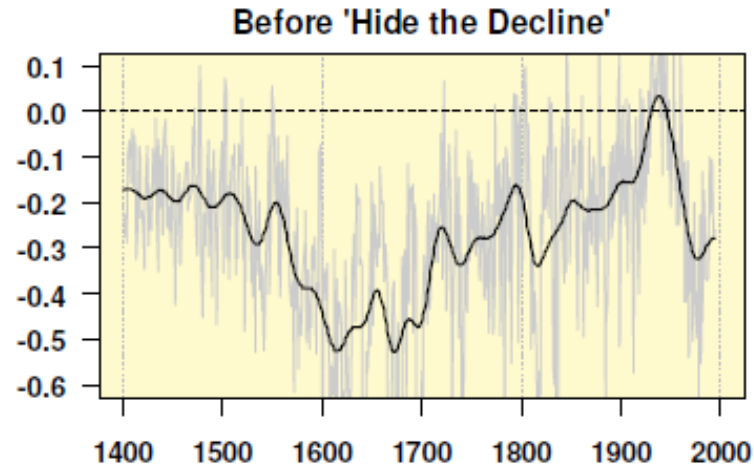
- Cook et al: Reviewed 11900 abstracts
- Found 0.54% (64) explicitly endorsed that over 50% of warming since mid-20th century was caused by mankind.
- The 97% includes explicitly and implicitly endorsed that man has caused **some** warming.
- Dangerous warming was never mentioned.
- Doran & Zimmerman: Survey 3,146 scientists responded
- Selected 79, 75 said man is a “significant factor” in warming.
- Survey of American Meteorological Society (AMS) 4,092 members show that 1/3 believe that warming is not more than 50% man-made.

Mann Hockey Stick



- The Mann hockey stick graph got rid of the pesky medieval warm period and the little ice age.
- Assigned 390 X more weighting to hockey stick tree cores
- Investigated and corrected by Canadians Dr. McKittrick and McIntyre

Hide the Decline



The IPCC “trick” was the deletion of inconvenient data after 1960. The divergence between proxy and instrument readings reveals that the proxy reconstructions and/or temperature indexes are seriously flawed.

Climategate

- Emails, data and computer code released 2009, 2011
- Rewrite history to eliminate natural climate change
- Hide the decline by deleting proxy temperature data
- Apply arbitrary fudge factors to increase warming
- Block scientific paper that don't support AGW
- Interfered with journals and editors that publish papers critical of AGW
- Illegally refused Freedom of Information requests
- Illegally conspired to obstruct FOI by deleting emails.



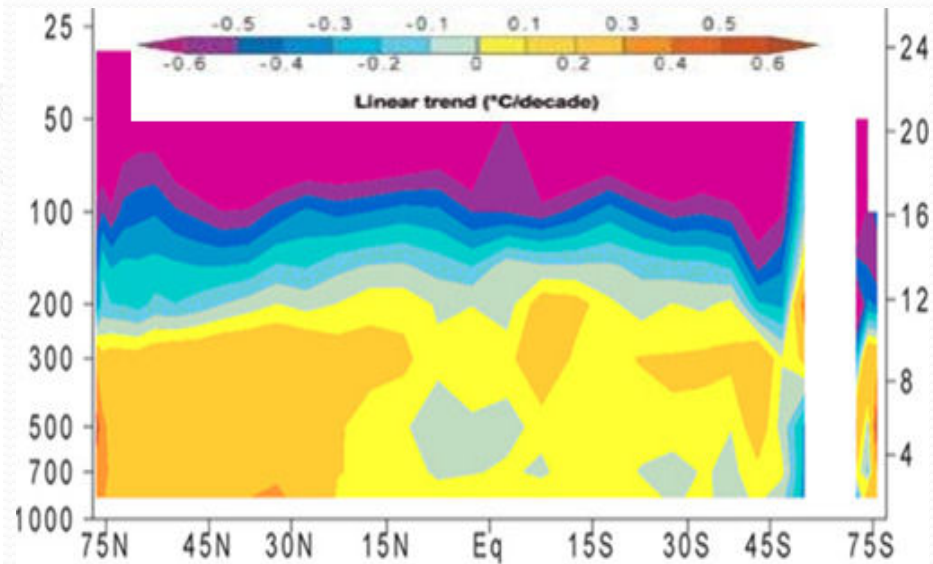
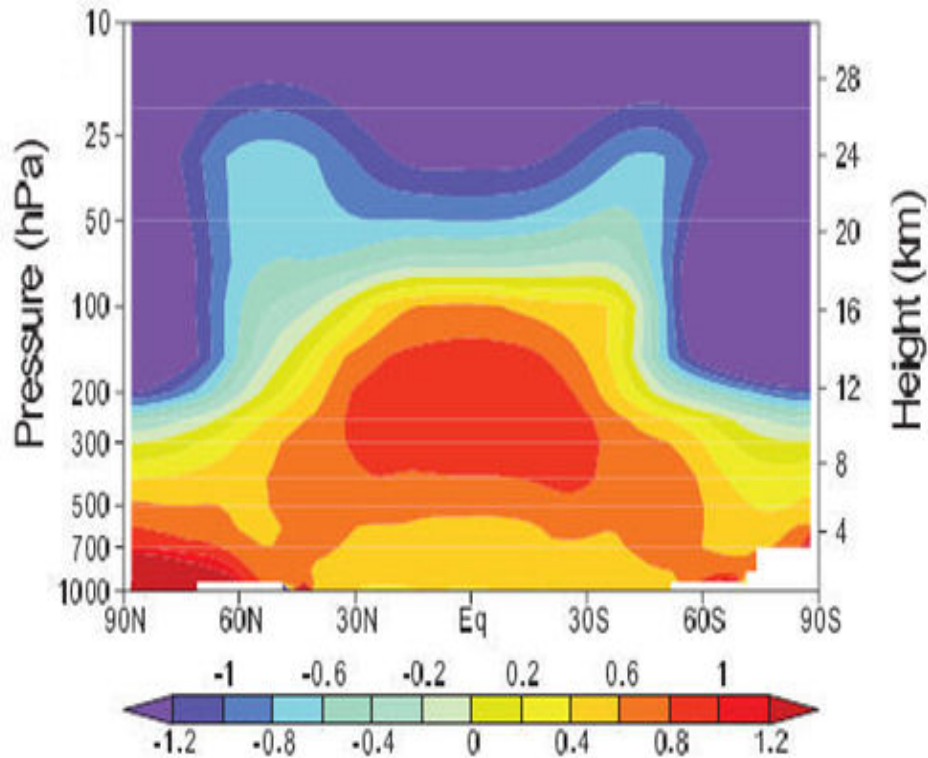
Climategate Investigations

- Penn State University investigates Michael Mann (creator of the "hockey stick" graph) Mann brings in \$\$ million of grants
- Oxburgh Report: reviewed 11 article, none of the hockey stick articles, interviewed no skeptics, considered none of the issues. Blames "trick to hide the decline" on IPCC. Oxburgh is chair of Falck Renewables, multi-national wind-farms.
- Boulton-Russell Inquiry: Appointed Geoffrey Boulton who worked for UEA for 18 years. The claim the CRU was "discarding data known to be erroneous" is simply absurd. The tree ring data goes down instead of up – means that the data is a bad proxy – mislead IPCC readers.
- The Committee says it is common practice in the climate science not to share raw data.

IPCC 5th Report - Extremes

- **complete reversal from AR4 on trends in drought, hurricanes, floods.**
- no significant trend in global tropical cyclone frequency.
- No trend in the magnitude and/or frequency of floods.
- no trends in droughts.

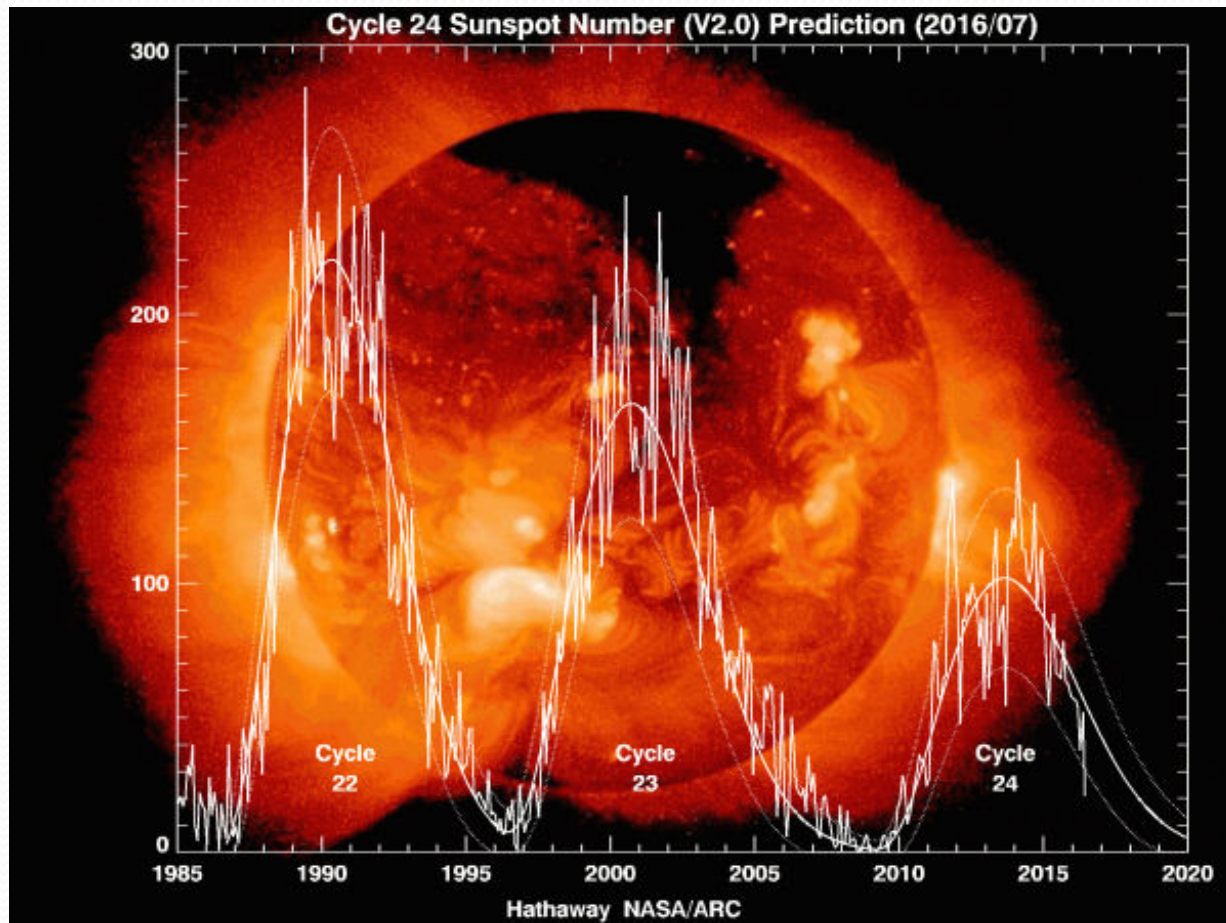
Missing Upper Atmosphere Hotspot



Models predict an enhanced warming rate over the tropics 8-14 km altitude due to predicted increase in water vapour. The radiosonde and satellite data show no enhanced warming at all.

Sunspot Number

A new model predicts that solar activity will fall from cycle 24 activity by 60% during the 2030s to conditions last seen during the Little Ice Age.





Clouds

- Clouds are very poorly represented in models.
- Modelers assume clouds change only by temperature changes.
- Clouds change due to ocean circulation changes, including ENSO, Pacific Decadal Oscillation etc.
- Cloud fraction declined in 20th century due to forcing, not only temperature change.