APGA

Climate and Food Production

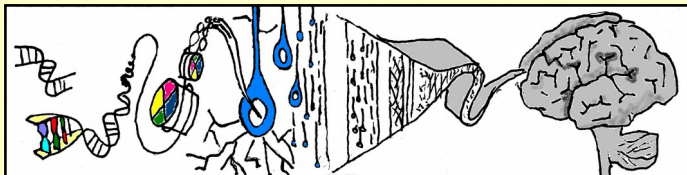
Alberta Potato Growers Association

www.BillHowell.ca, Calgary, 13 November 2007

Disclaimer

While I am presenting on behalf of the Friends of Society (FOS), the views expressed in this presentation are my own, and do not necessarily reflect those of the FOS nor my past or current employers, nor do they reflect any official policies or plans.

During the original presentation, I only showed slides that are labelled "APGA" in the lower left corner.
Updates - The new Perry & Loehle graphs were added.
Several slides from previous presentations added.
Unfortunately, comments have not yet been provided.



Outline

1) Introduction
2) BIG climate drivers - astronomy, geology, biology
3) Kyoto Premise - science fashion->cult->religion
4) Canadian Prairies - climate & food production
5) Summary, conclusions, questions

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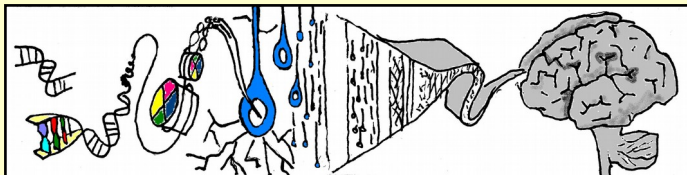


I. Introduction

Climate Trends in Modern Times

A New York Times-line

"MacMillan Reports Signs of New Ice Age"

Sept. 18, 1924

"America in Longest Warm Spell Since 1776; Temperature Line Records a 25-Year Rise"

March 27, 1933

"Scientists Ponder Why World's Climate is Changing; A Major Cooling Widely Considered to Be Inevitable"

May 21, 1975

"Past Hot Times Hold Few Reasons to Relax About New Warming"

Dec. 27, 2005

A Time Magazine Time-line

"The discoveries of changes in the sun's heat and the southward advance of glaciers in recent years have given rise to conjectures of the possible advent of a new ice age."

Sept. 10, 1923

"Gaffers who claim that winters were harder when they were boys are quite right... weather men have no doubt that the world at least for the time being is growing warmer."

Jan. 2, 1939

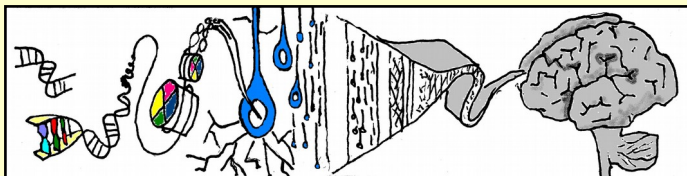
"Climatological Cassandras are becoming increasingly apprehensive, for the weather aberrations they are studying may be the harbinger of another ice age."

June 24, 1974

"[S]cientists no longer doubt that global warming is happening, and almost nobody questions the fact that humans are at least partly responsible. "

April 9, 2001

?Reference



Subtitle:

Are we ready for Global Cooling?

(as I presented Jun04, 14Mar06, etc etc)

I. Introduction

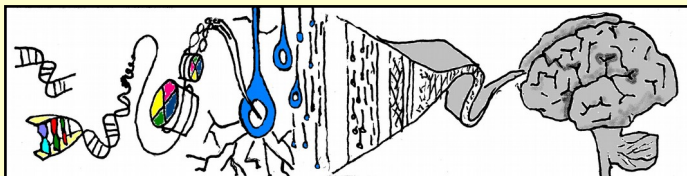
Definitions

<u>Climate Change</u> - is the science of studying climate and the factors that influence it, over all time scales and geographies.

"The climate has been changing for billions of years, it is changing now, and it will continue to change for billions of years into the future.

Furthermore, natural changes in the climate far, far exceed anything that we are speaking of now, both in magnitude and rapidity." [Howell]

Tim Patterson - *"The ONLY constant of climate IS change!"*



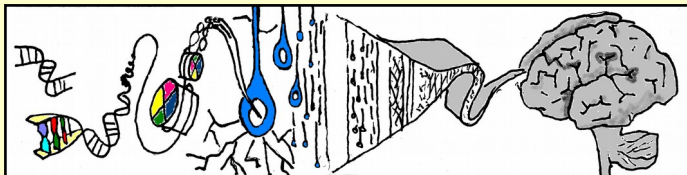
Definitions (cont'd)

The **Kyoto Premise** is

> *"...the presumption that man-made GreenHouse Gases (GHGs) will drive temperatures drastically higher, and will thereby have a catastrophic impact on the environment and mankind."* [Howell]

In my view, this is the essence of what the public has been led to believe, and the focus is especially strong on CO_2 emissions.

A common problem with scientists - is that many fail to distinguish between the concepts "Climate Change" and the "Kyoto Premise". In other words they often trip up at the very simple, initial stages of analysis.



Outline

1) Introduction
2) BIG climate drivers - astronomy, geology, biology
   A focus on the sun and its "climate mediators"
3) Kyoto Premise - science fashion->cult->religion
4) Canadian Prairies - climate & food production
5) Summary, conclusions, questions

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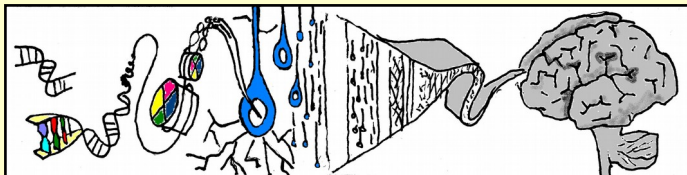
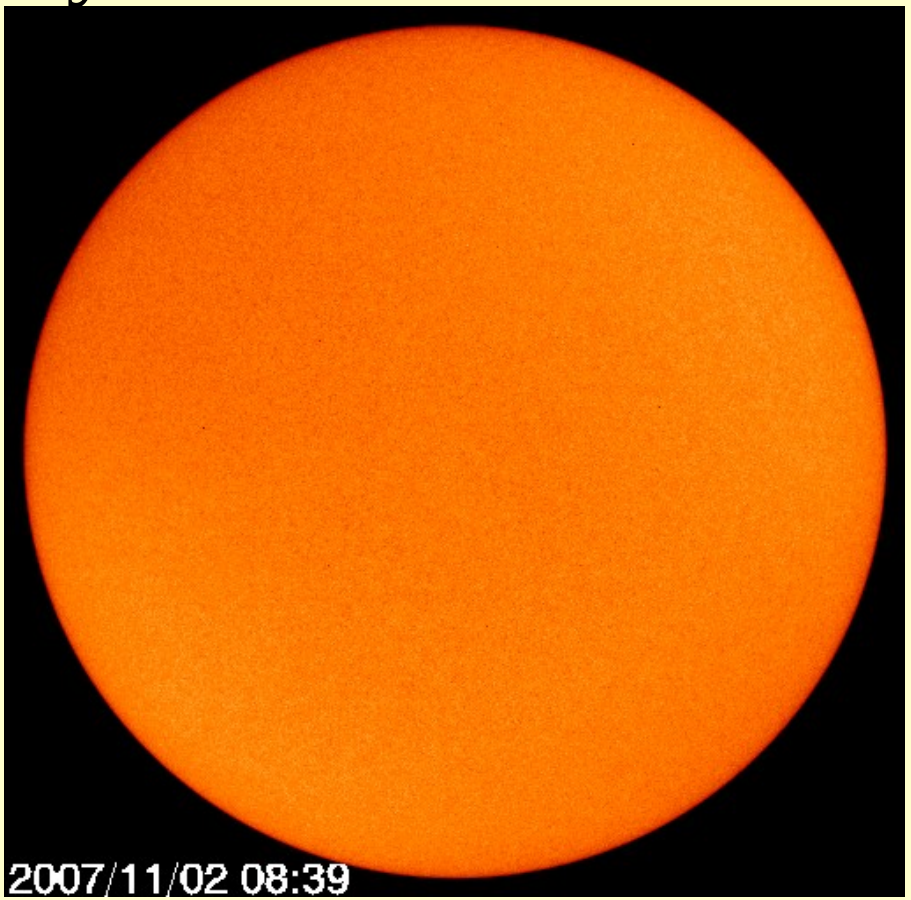


The Sun

There is only ONE primary driver of climate and climate change:



...the Sun!

We've known this for thousands of years. But we **still** don't know how the sun behaves!!

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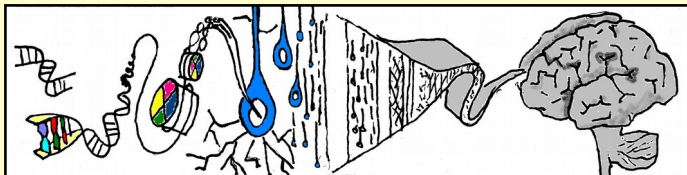
http://www.solarcycle24.com/
originals at SOHO website http://sohowww.nascom.nasa.gov/



Solar variability on all timescales

SOHO - Dazzling active region crossing disk (Jun. 2 - 12, 2003)

Note - if you click on the movie at right, it takes a long time to load!! (> 7Mb file length).

http://www.billhowell.ca/Climate and sun/SOHO - Annual increase in solar activity from 1996 to 2001.mpg

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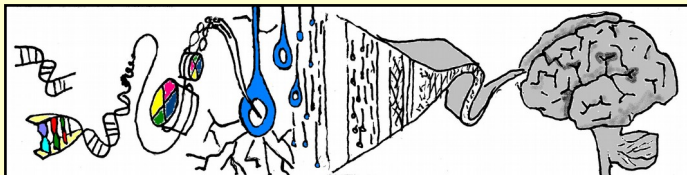
http://sohowww.nascom.nasa.gov/gallery/Movies/sunspots.html



II. Climate Basics - Astronomy, Geology, Evolutionary Biology

Now this is a BUTTERFLY!

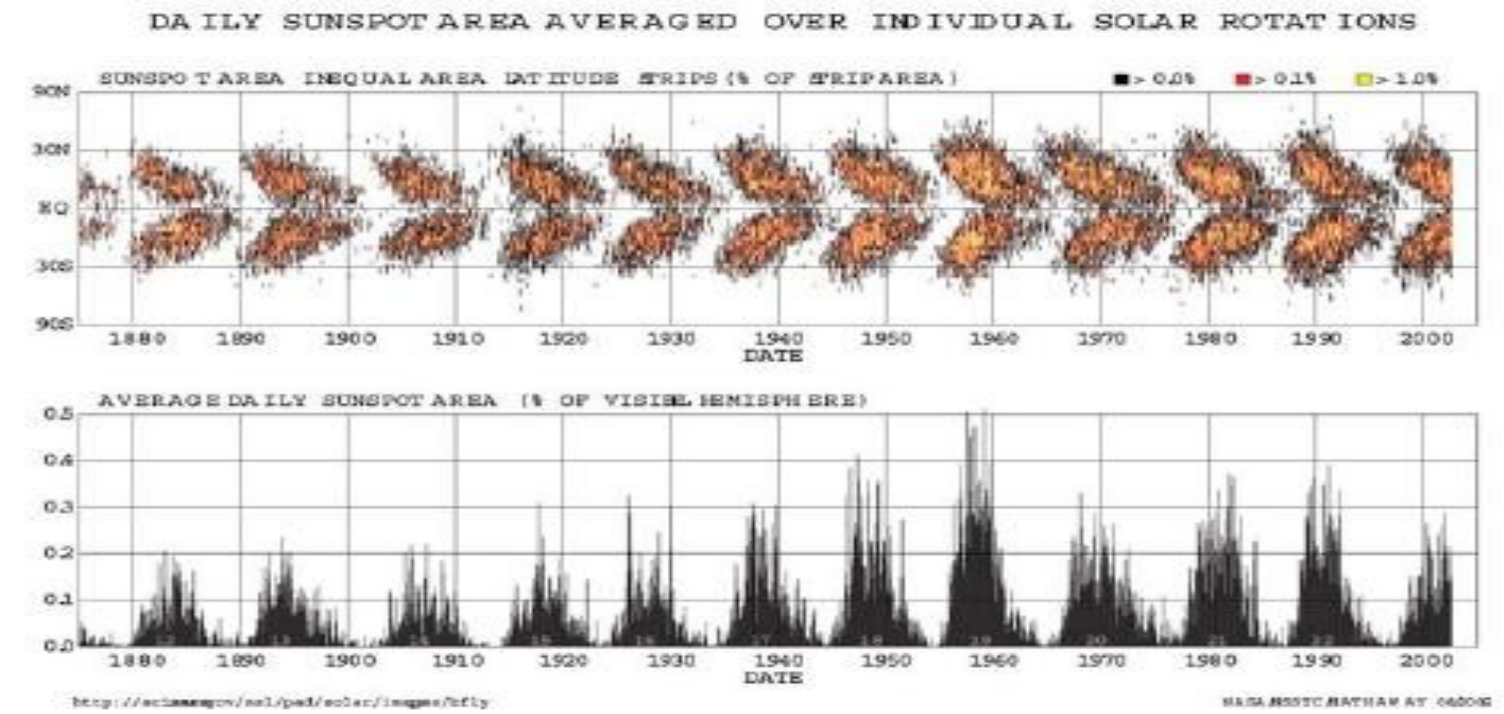
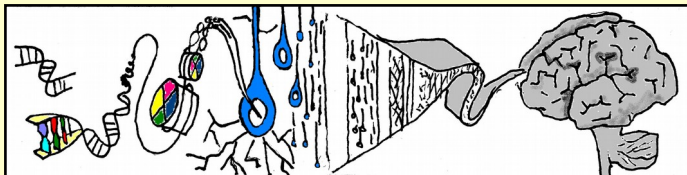


Fig. 2.1. Butterfly diagram (*upper panel*) and record of relative solar surface area covered by sunspots (*lower panel*). *Upper panel*: the vertical axis indicates solar latitude, the horizontal axis time. If a sunspot or a group of sunspots is present within a certain latitude band and a given time interval, then this portion of the diagram is shaded, with the colour of the shading indicating the area covered by the sunspots. (Figure courtesy of D. Hathaway, http://science.nasa.gov/ssl/pad/solar/sunspots.htm).

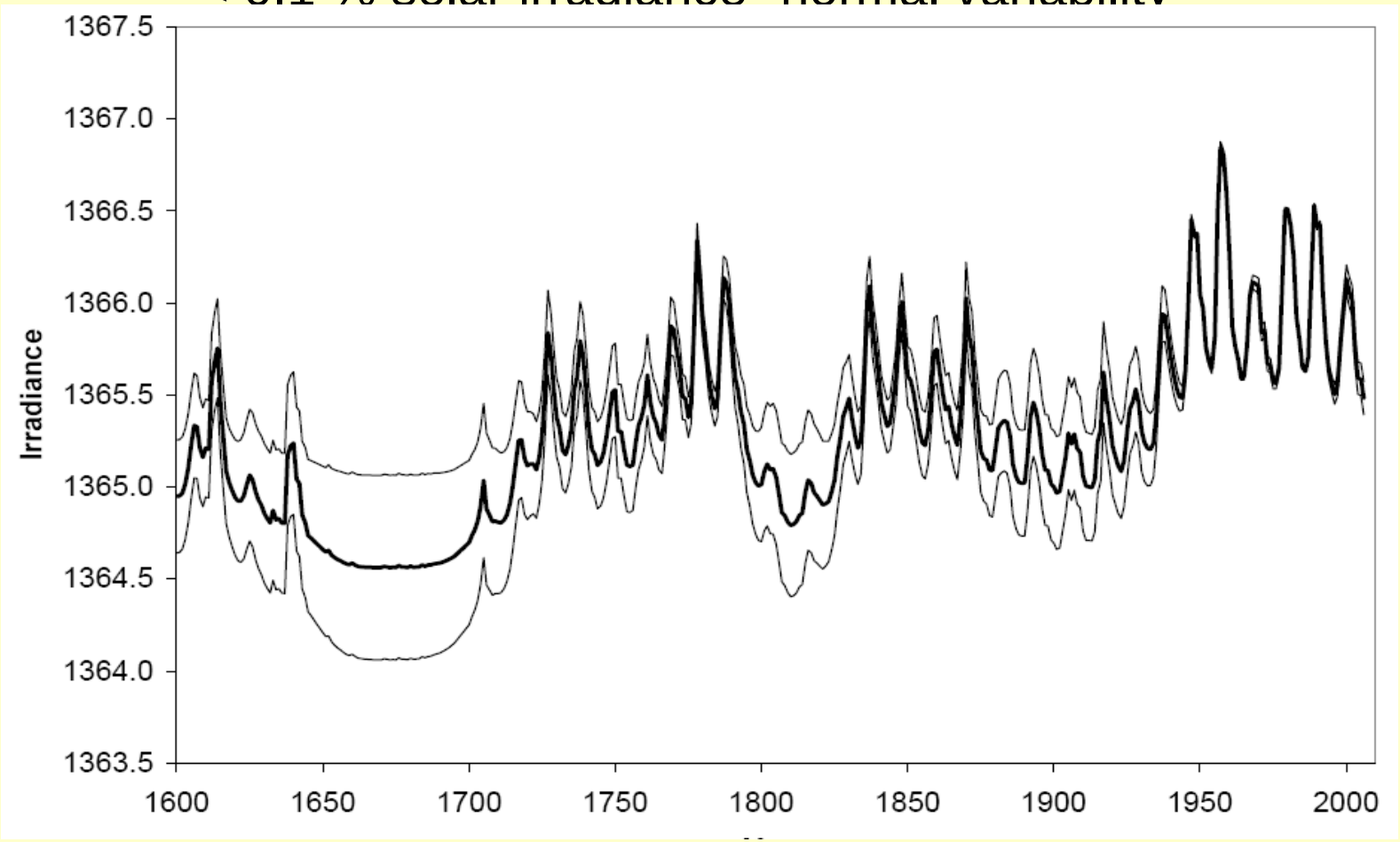
?Reference - Hoyte & Schatten?

Hathaway - http://science.nasa.gov/ssl/pad/solar/sunspots.htm

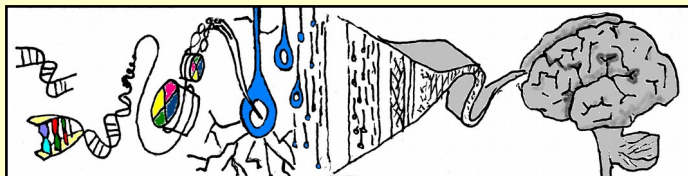


Solar variability on all timescales

< 0.1 % solar irradiance "normal variability"



K.F. Tapping, D. Boteler, A. Crouch, P. Charbonneau, A. Manson, H. Paquette "Solar magnetic activity and total irradiance since the Maunder minimum" ?Journal vol/n/pp? Springer Science & Business Media. Printed in the USA 2006 27pp



II. Climate Basics - Astronomy, Geology, Evolutionary Biology

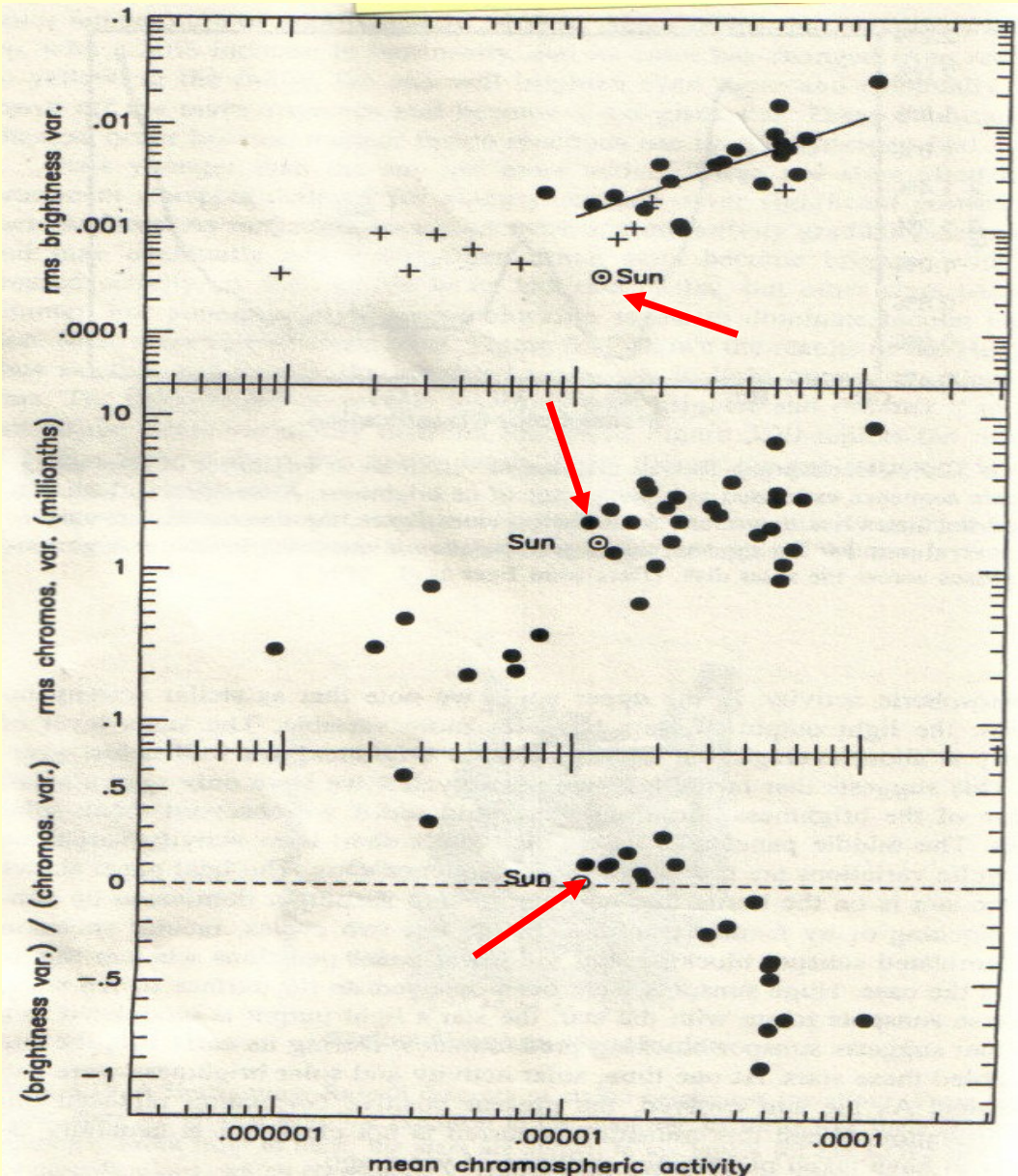
Our Sun - well behaved compared to its brethren!!

Whose to say that the solar activity doesn't wander over these maps?

1. rms brightness variation

2. rms chromospheric variation (millionths)

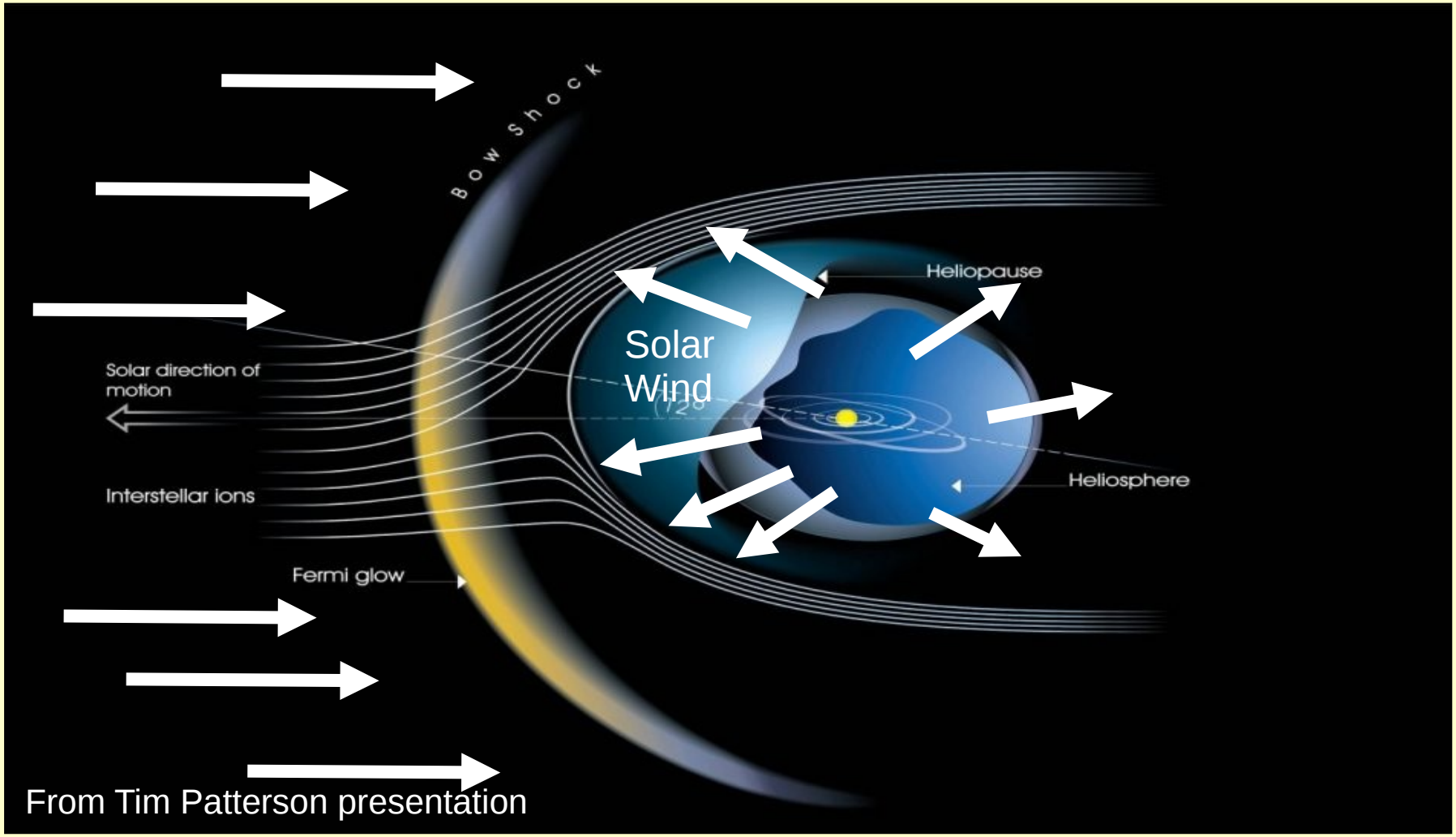
3. brightness variation divided by chromospheric variation



Douglas V. Hoyt, Kenneth H. Schatten "The role of the sun in climate change" Oxford University Press, Oxford UK, 1997, 279pp – superb background book

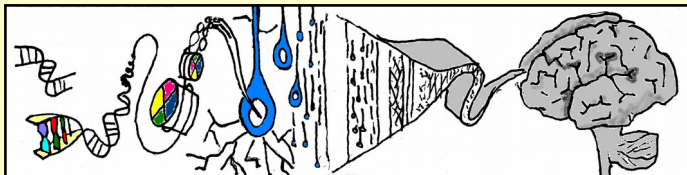
From Lockwood etal 1992

The "Star Trek" theory of climate - Galactic rays



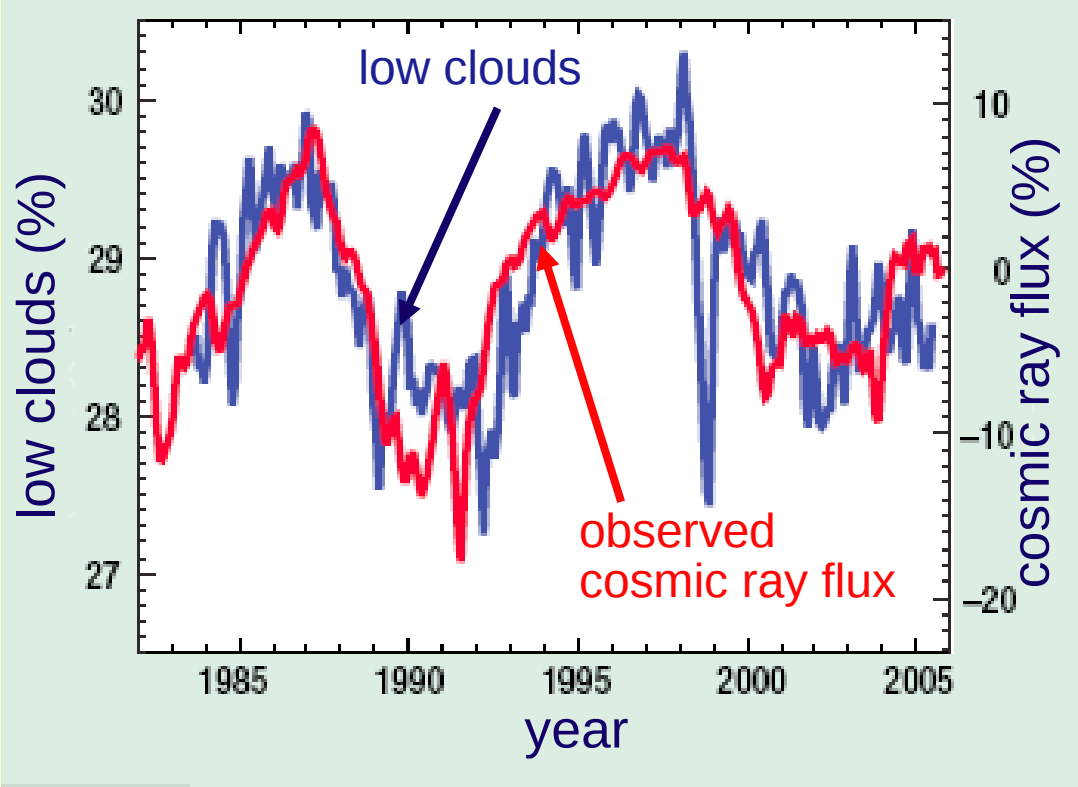
From Tim Patterson presentation

Carslaw et al., 2002 *Science* **298**: 1732-1737
Veizer, J., 2005 Geoscience Canada 32: 13-30
Svensmark et al. 2006 Proc. Royal Soc. Ser. A.



Galactic rays and Clouds

1.7 % variation in low cloud formation between solar maximum and minimum (vs <0.1 % solar irradiance variation)



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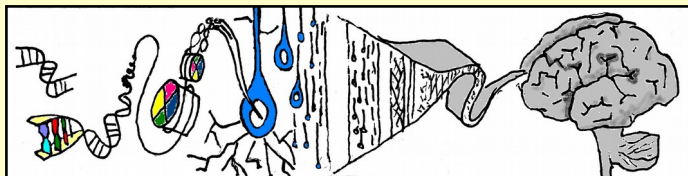
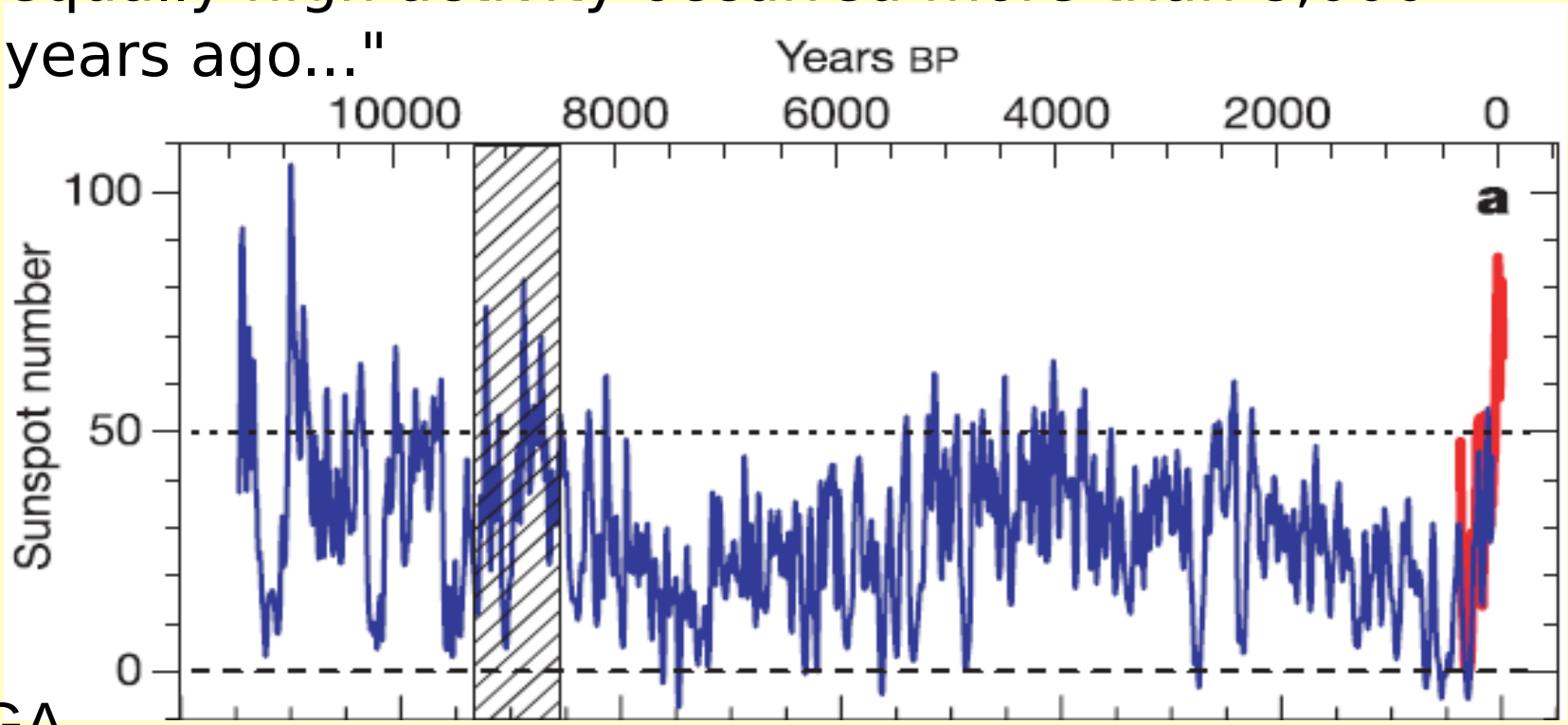


Solar variability on all timescales

"...the level of solar activity during the past 70 years is exceptional, and the previous period of equally high activity occurred more than 8,000 years ago..."



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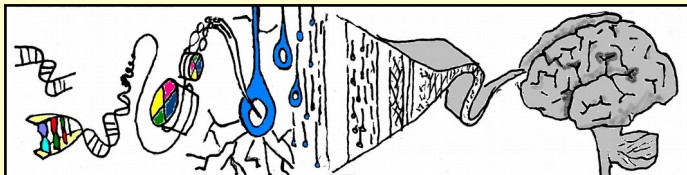
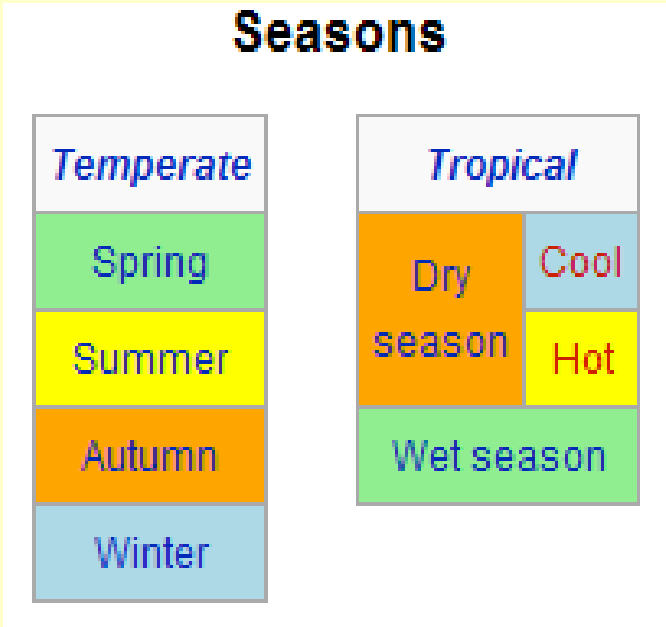
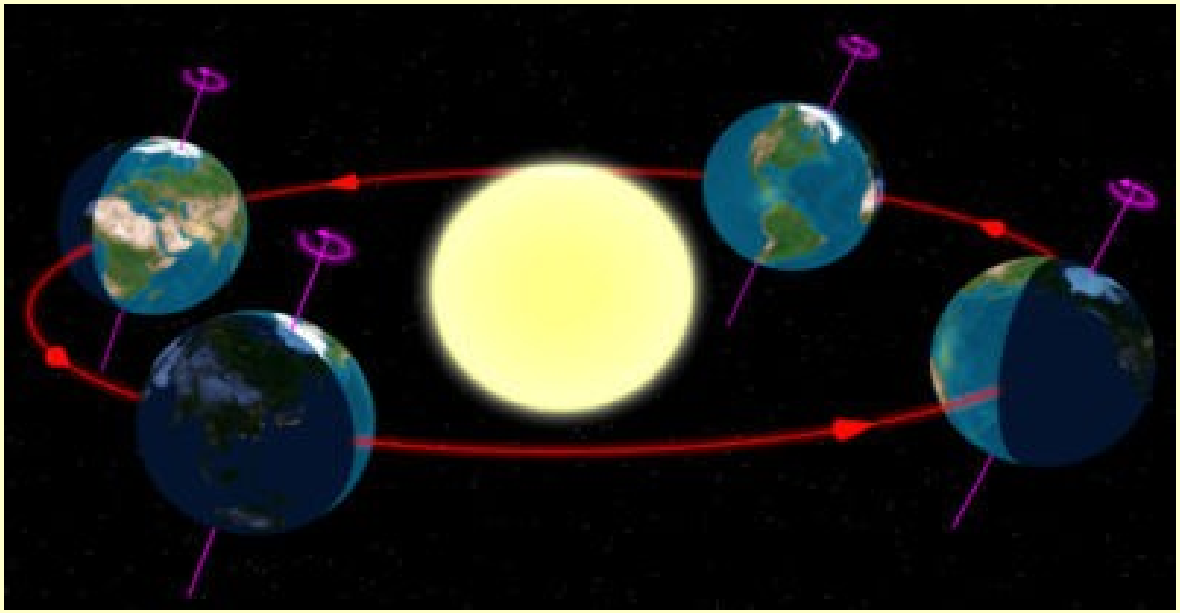
Sami K. Solanki, Ilya G. Usoskin, Bernd Kromer, Manfred Schüssler, Jürg Beer "Unusual activity of the Sun during recent decades compared to the previous 11,000 years" Nature, 28 October 2004



Days and Seasons



As we'll see on the next slides, the seasons change with time...



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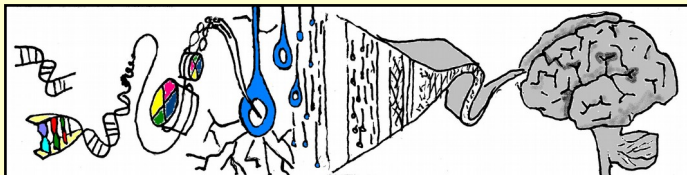
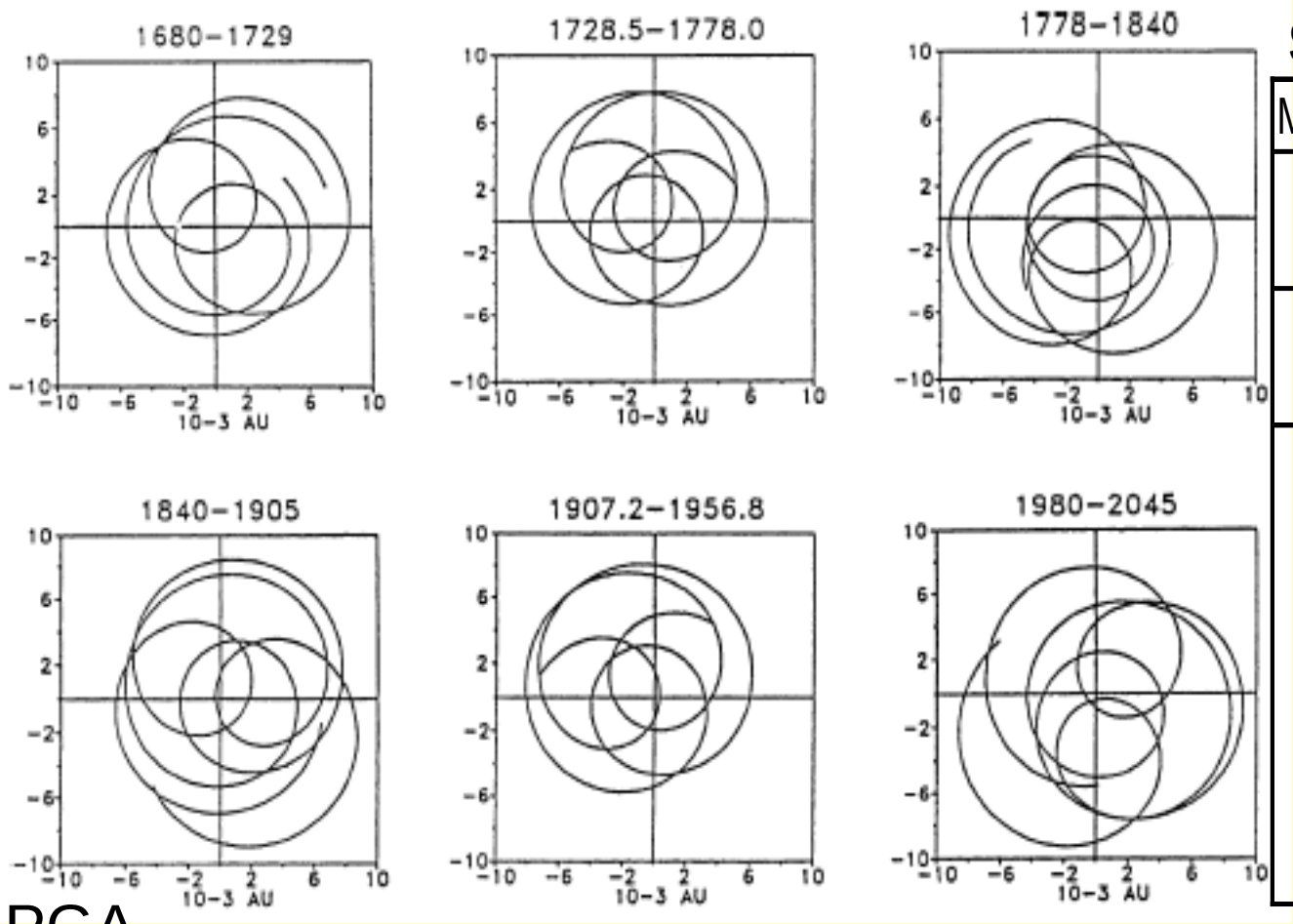
http://en.wikipedia.org/wiki/Seasons



The wobbling of the sun (decades to millenia)



Short-term periodicities

Motion	Temperature
178.7	n/a
50-60	n/a
7.8	7.8
12.8	12.8
6.5	6.5
7.4	7.3-7.4
8.4	8.4-8.5
10.4	10.3-10.5
12.0	n/a
13.8	n/a
n/a	14.3

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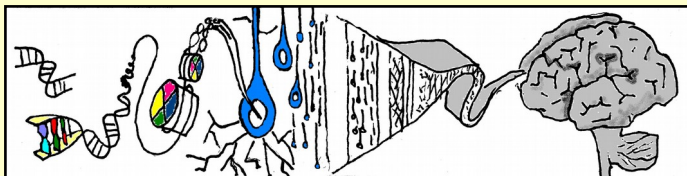
Ivanka Charvatova, Jaroslav Strestik 2004 "Periodicities between 6 and 16 years in surface air temperature in possible relation to solar inertial motion" Journal of Atmospheric and Solar-Terrestrial Physics 66 (2004) pp219-227



II. Climate Basics - Astronomy, Geology, Evolutionary Biology

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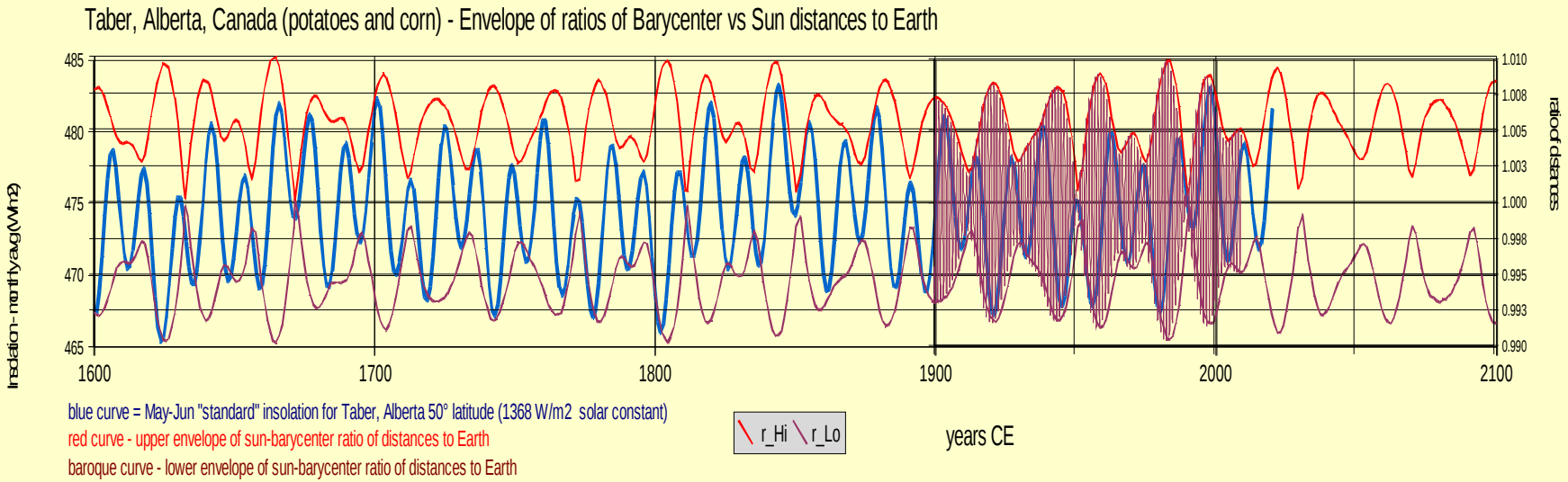

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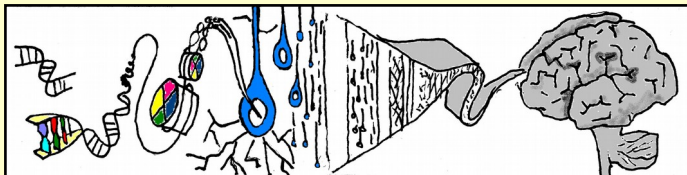
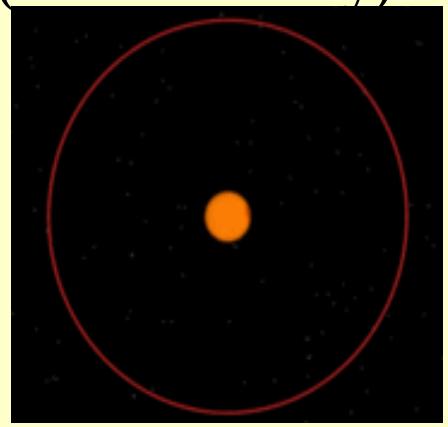
Bill Howell 2007 "A Preliminary note on Holocene climate"
www.billhowell.ca/Climate and sun/Howell 2007 - A Preliminary note on Holocene climate.pdf



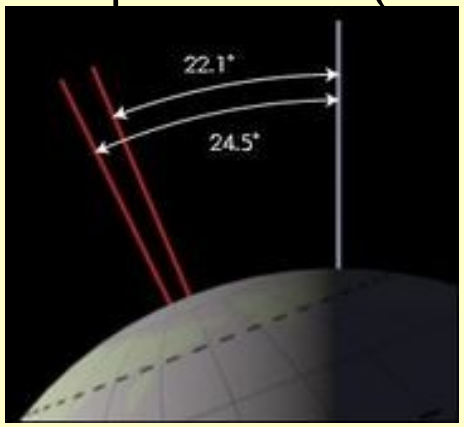
Milankovic cycles

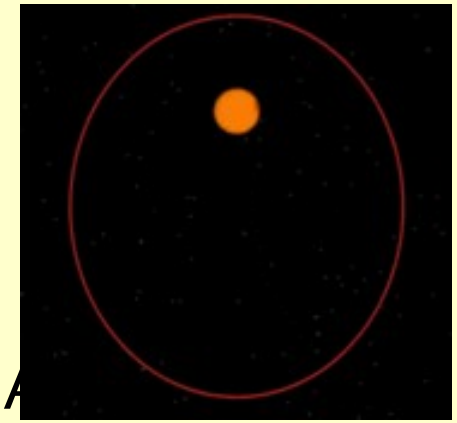
Orbit Eccentricity (~413 & 100 ky)

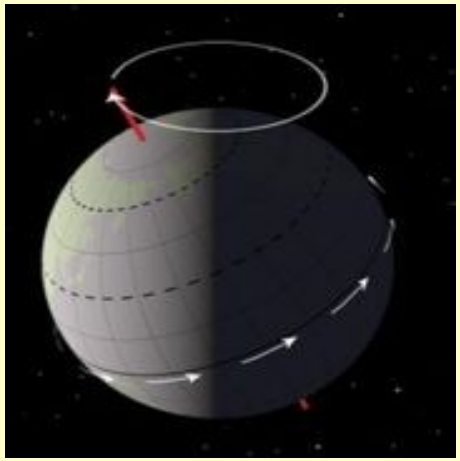


Earth Axis tilt (~41 ky)

precession (~23 ky)

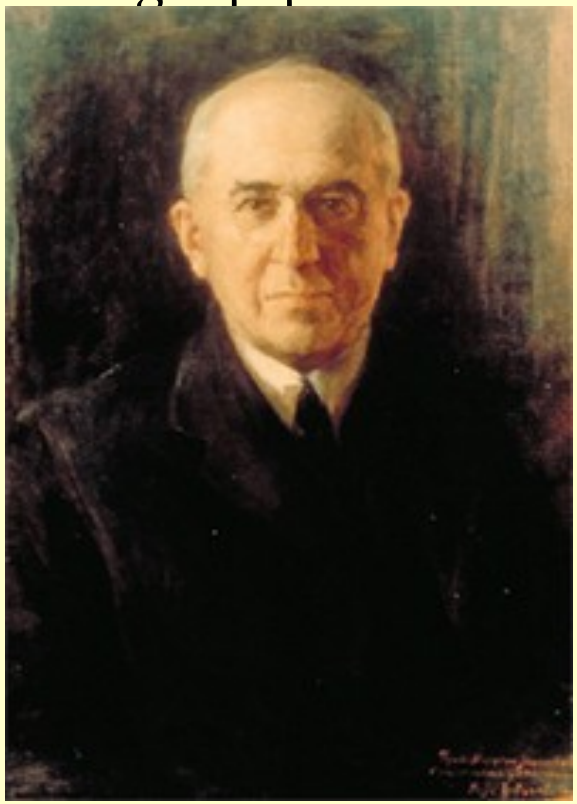






Milutin Milanković

ice ages paper 1941



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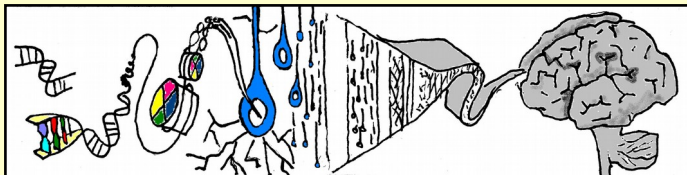
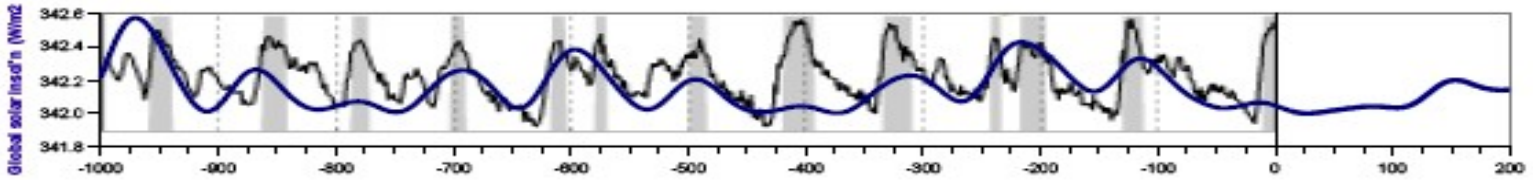
www.wikipedia.org



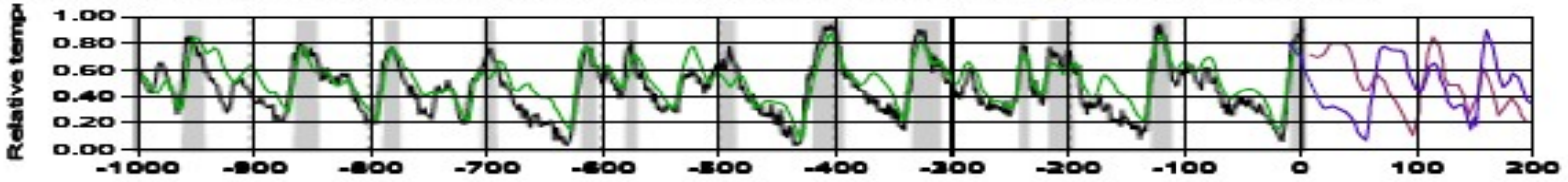
Milankovic - NOT deglaciation?!

Figure ?? - Graphs of recent glaciation models over the last 1 MyBP

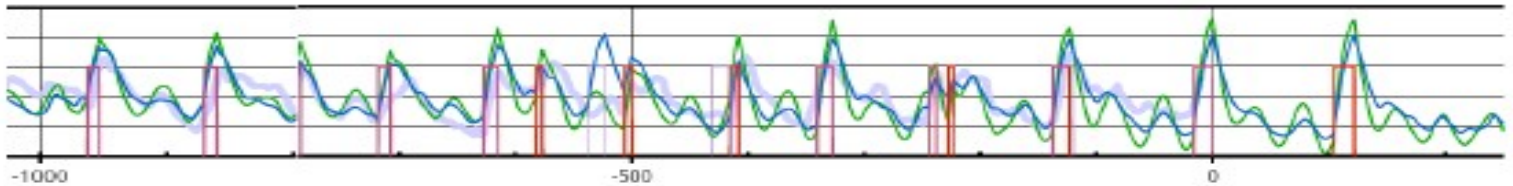
a) Milankovic insolation cycles and 1 My of glaciations (global insolation values), Reference: Laskar etal, Wikipedia



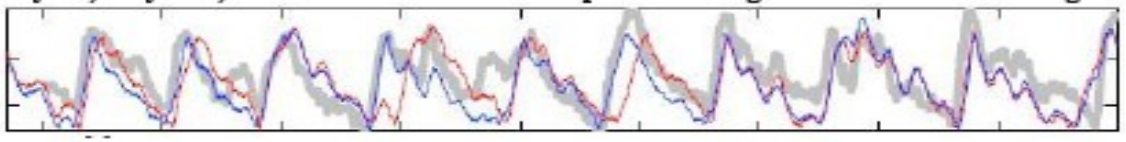
b) Paillard's Milankovic threshold model for 1 My of glaciations, Reference: Frédéric Parrenin, Didier Paillard 2003



c) Howell's variant of Paillard's model for 1 My of glaciation (this paper - non-optimized results from first generation modelling)



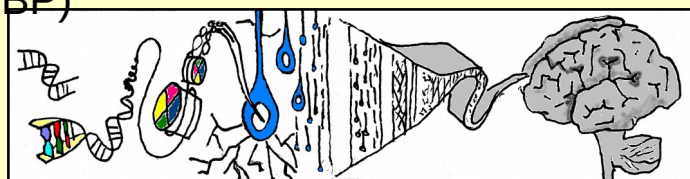
d) Tziperman, Raymo, Huybers, Wunsch 2006 - Nonlinear phase locking to Milankovitch forcing



thousand years Before Present (ky BP)

www.billhowell.ca/Climate and sun/Howell - Glaciation models for the last 6 million years.pdf

www.wikipedia.com, ?Agterberg etc...) Parrenin & Paillard, Tziperman



Galactic rays and glaciations?

Berylium 10 as a proxy for solar activity

– seems to capture last glaciation cycle?
– alternate or complement to Milankovic theory?
– but shorter-term correlations OK but not great?

I can't find a more recent graph...

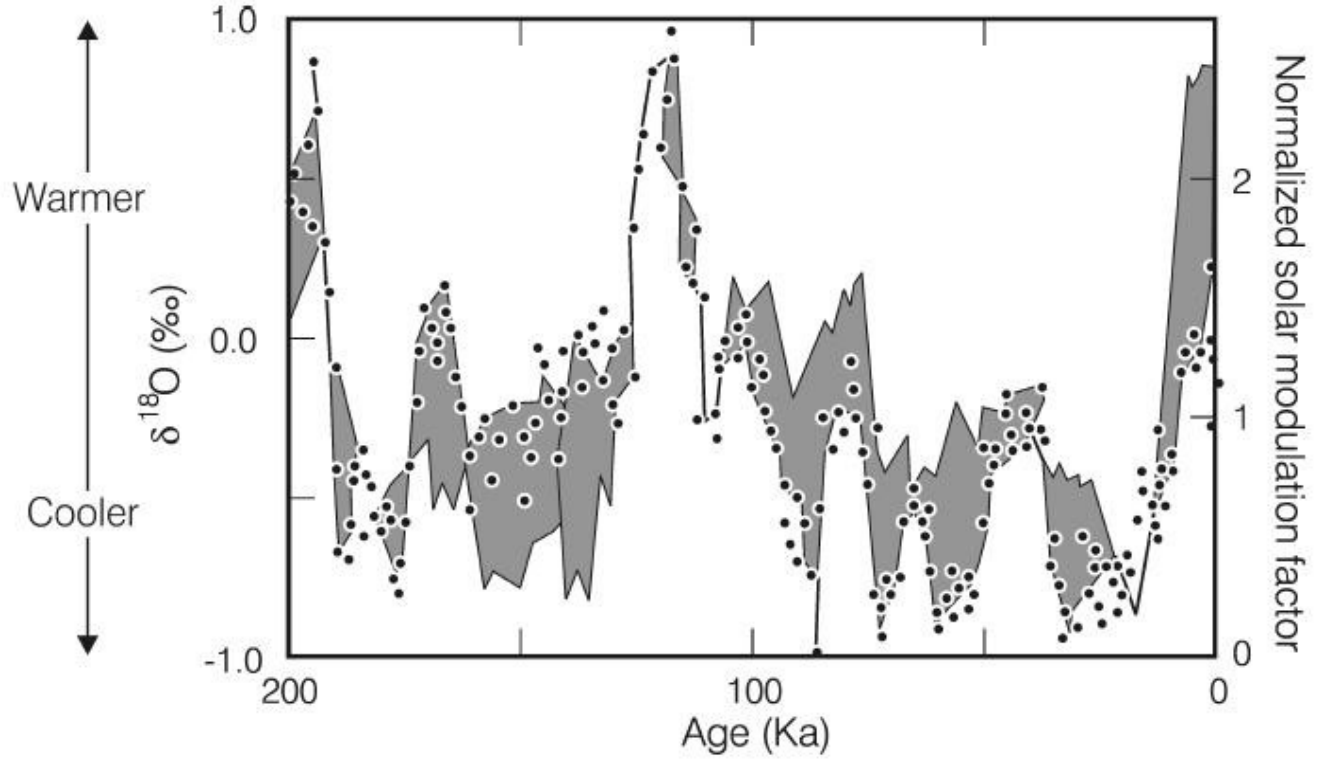
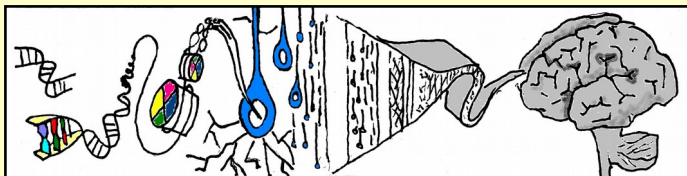


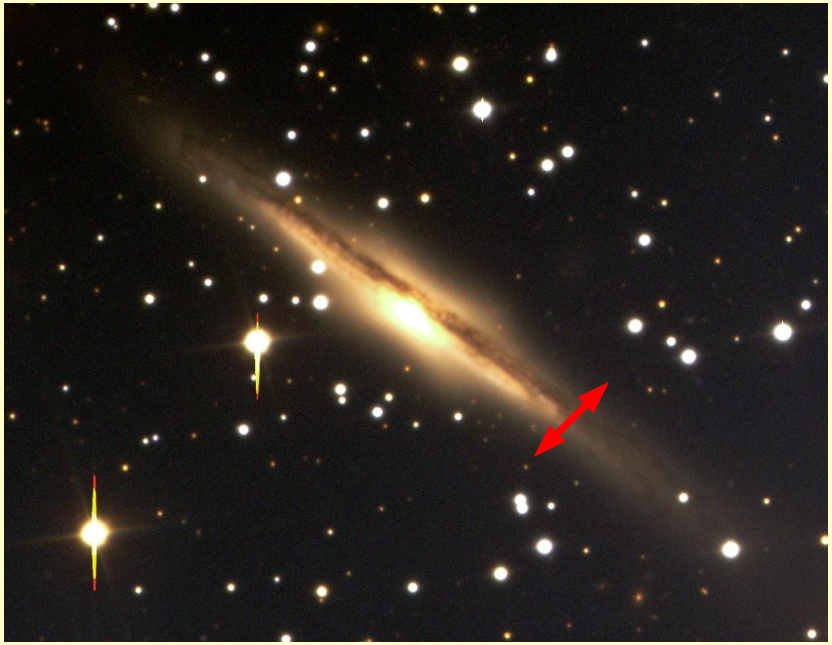
Figure 54. Calculated intensity of solar irradiance (dots) during the past 200 000 years juxtaposed with the normalized $\delta^{18}O$ record of the oceans (shading). Note that the magnitude of uncertainties in the derived curve are a matter of debate, but this would not necessarily impact the causation which could be only from Sun to Earth. Adapted from Sharma (2002).

Scherer, Veizer, Shaviv et.al. 2006 "Interstellar-Terrestrial relations: variable cosmic environemnts, the dynamic heliosphere, and their imprints on terrestrial archives and climate" Kluwer Academic Publishers, Netherlands, 2006 ~163pp. Space Science Reviews 127/1-4, 327-465.



Milky Way cycles

One theory is that movement of the solar system relative to the Milky Way exposes Earth to varying levels of galactic rays, and therefore varying cloud cover.



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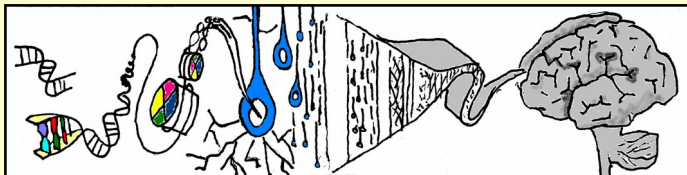
www.wikipedia.org



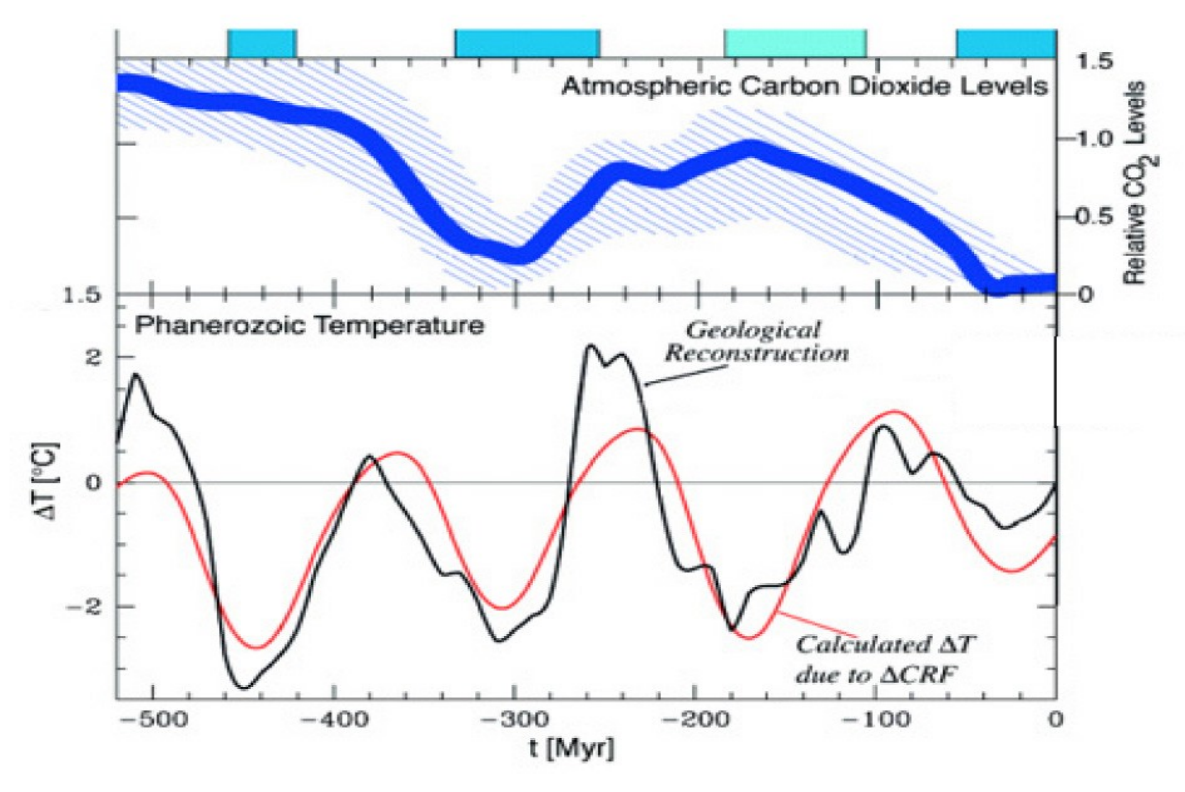
II. Climate Basics - Astronomy, Geology, Evolutionary Biology

Galactic rays & Long term climate change?

Note: Glaciation periods even when CO2 was 5 to 50 times higher!

Evolutionary biology has dominated longer term trend

(angiosperm/ gymnosperm, C34/ C4 plant vasculature etc etc)

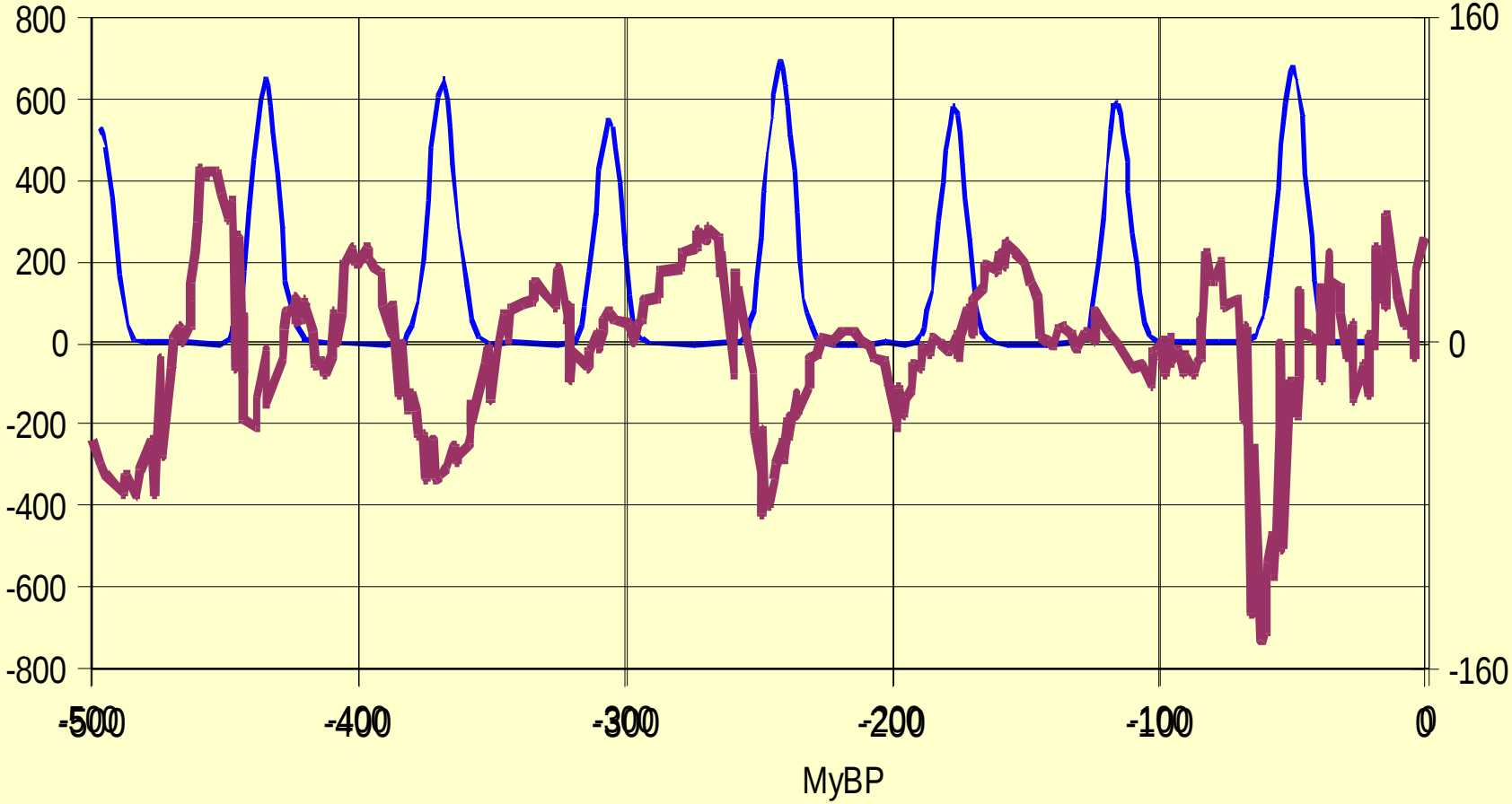


Jan Veizer "Celestial climate driver: A perspective from four billion years of the carbon cycle" Geoscience Canada, vol32 n1, pp13-28, March 2005

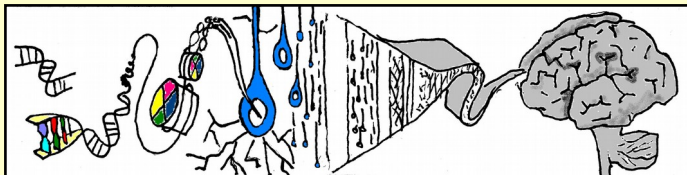
II. Climate Basics - Astronomy, Geology, Evolutionary Biology

Milky Way cycles & mass extinctions?

bourgandy - measure of species diversity
blue - rough indicator galactic ray exposure when solar system bobs above the plane of the Milky Way



Mikhail V. Medvedev, Adrian L. Melott "Do extragalactic rays induce cycles in fossil diversity?" arXiv:astro-ph/0602092v1 Dept of Physics & Astronomy, Uof Kansas, 4 Feb 2006 13pp (NOTE: digitized graph!)



II. Climate Basics - Astronomy, Geology, Evolutionary Biology

Other mediators of solar insolation & climate

- More Astronomy - Milankovic cycles, movement in galaxy, solar axis, solar irradiance spectra, helio & geo-magnetic fields, Earth orbit inclination, etc
- Climate reservoirs - Ocean circulation, Glaciers
- Tertiary effects
  - Light reflectance changes (cloud, ice/snow, vegetation,...)
  - Green House Gases (GHGs)
  - Wind-ocean oscillations (Quasi-Biannual, El Nino, etc)
  - Asteroids, volcanic, seismic, geothermal, continental drift

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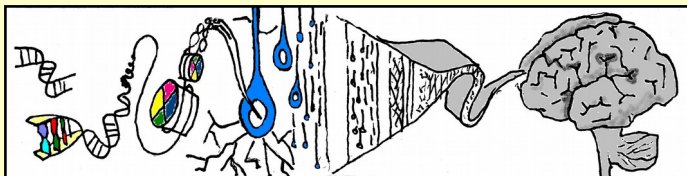
- Climate as a set of water cycles



Outline

1) Introduction
2) BIG climate drivers - astronomy, geology, biology
3) Kyoto Premise - science fashion->cult->religion
4) Canadian Prairies - climate & food production
5) Summary, conclusions, questions

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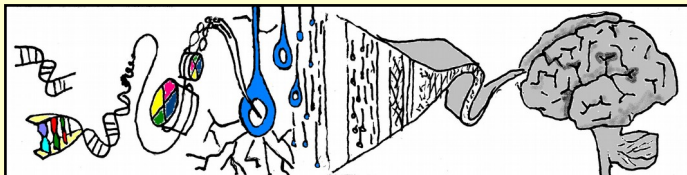
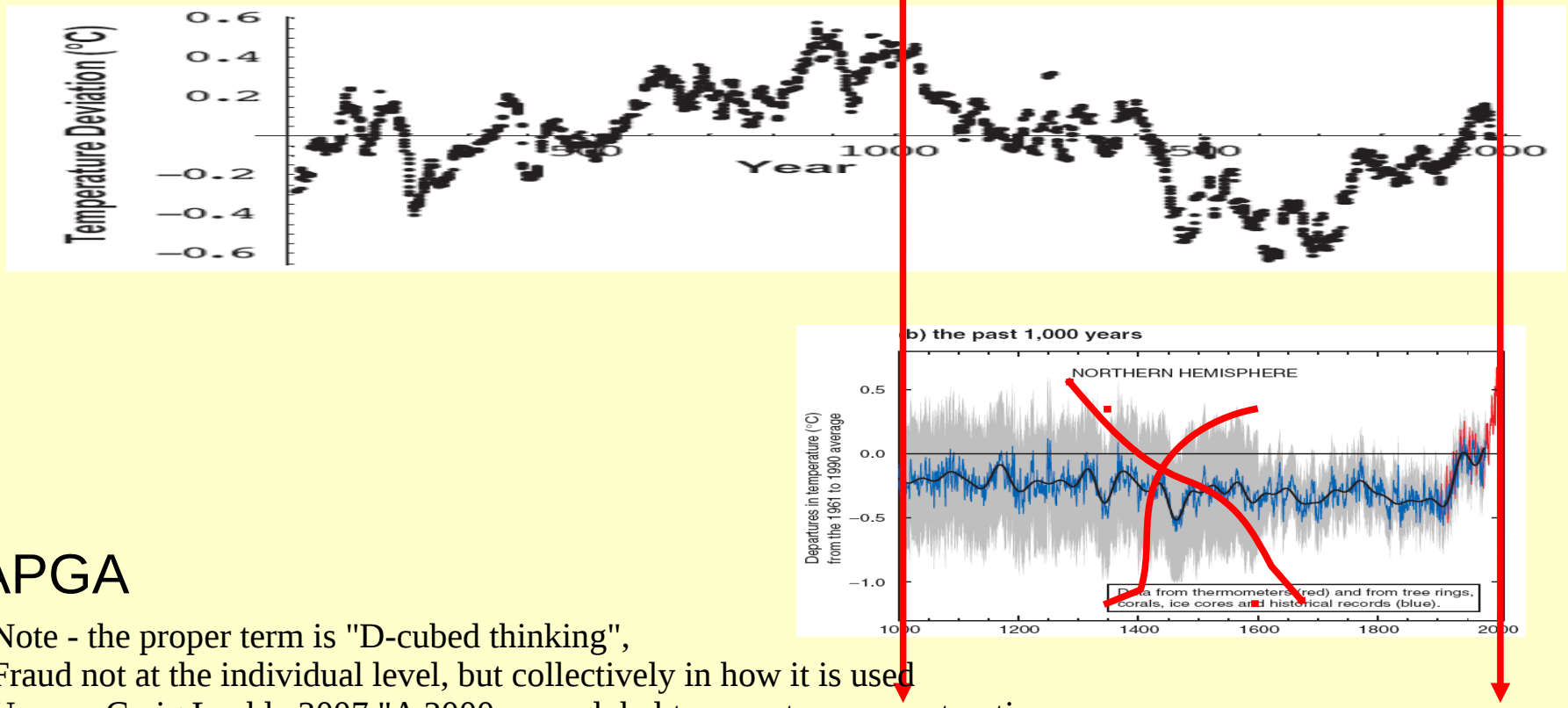


III. The Kyoto Premise - 4 crumbling pillars

1. Hockey stick temperatures

Is the "Scientific Consensus" on the hockey stick the greatest fraud in scientific history? (notice the splicing of proxies & modern data)



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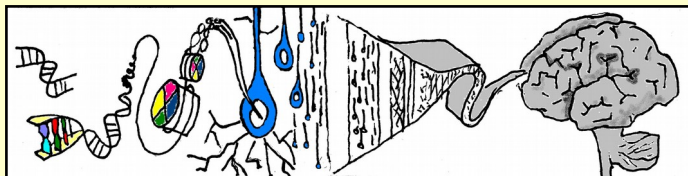
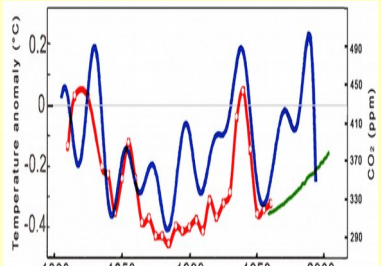
Note - the proper term is "D-cubed thinking",
Fraud not at the individual level, but collectively in how it is used
Upper: Craig Loehle 2007 "A 2000-year global temperature reconstruction based on non-treering proxies" Energy & Environment, v18 n7+8 2007
Lower: UN-IPCC 1st Assessment Report, Lower 3rd AR

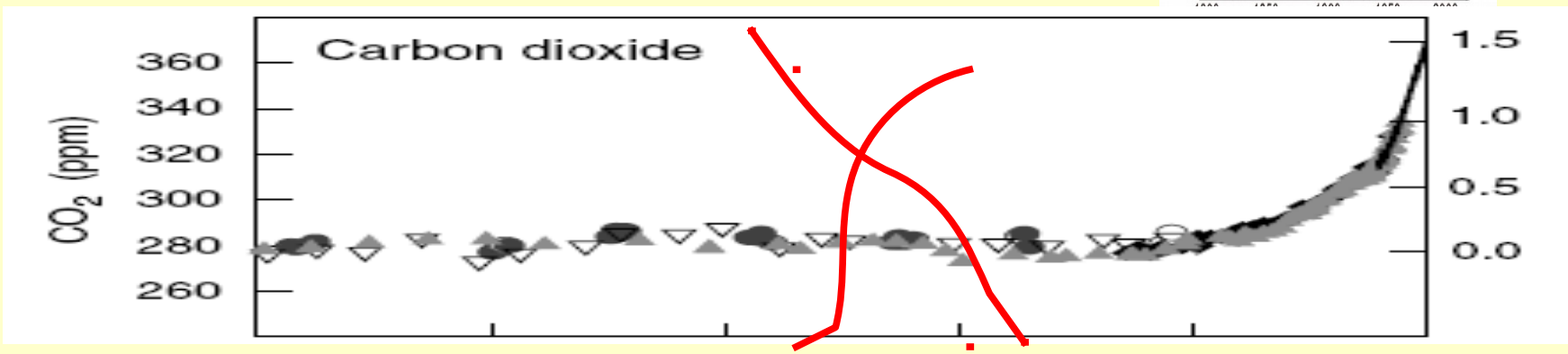


III. The Kyoto Premise - 4 crumbling pillars

2. Hockey stick CO_2 concentrations

...or is the "Scientific Consensus" on recent CO_2 even worse?





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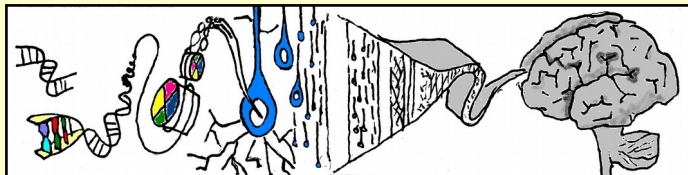
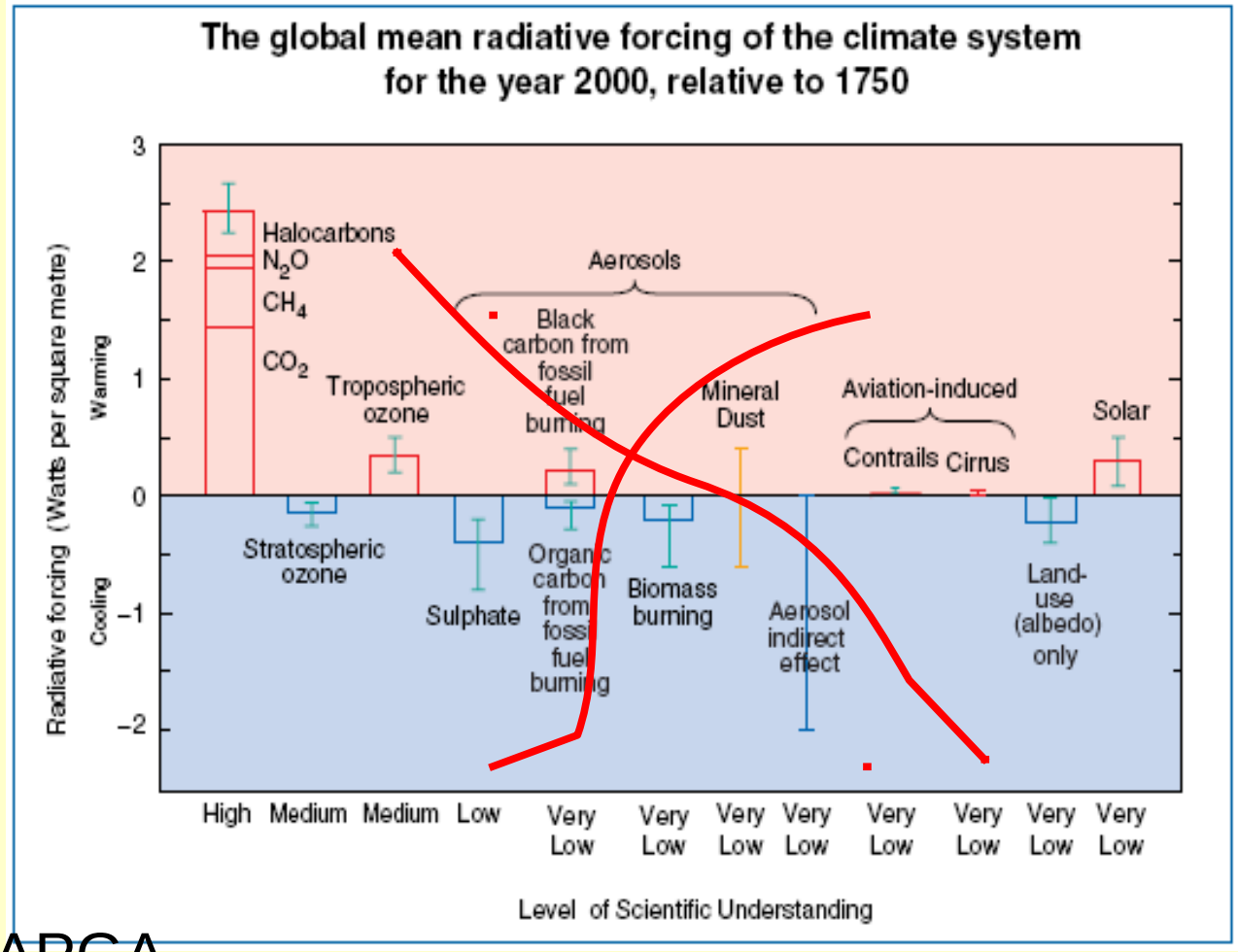
Ernst-Georg Beck "180 Years of atmospheric CO2 Gas Analysis by Chemical Methods" Energy & Environment, v18 n2, 2007
http://www.biokurs.de/treibhaus/180CO2_supp.htm
UN-IPCC 3rd Assessment Report



3. Key Climate Factors



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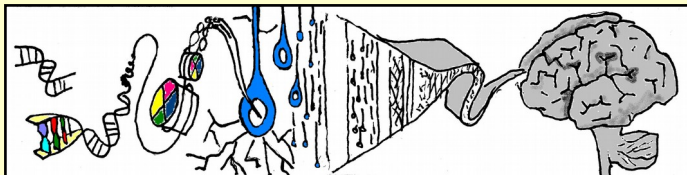
UN-IPCC Third Assessment Report, 2001

UN-IPCC man-made effects, missing:
- water vapour
- cloud
- now galactic rays
- etc, etc

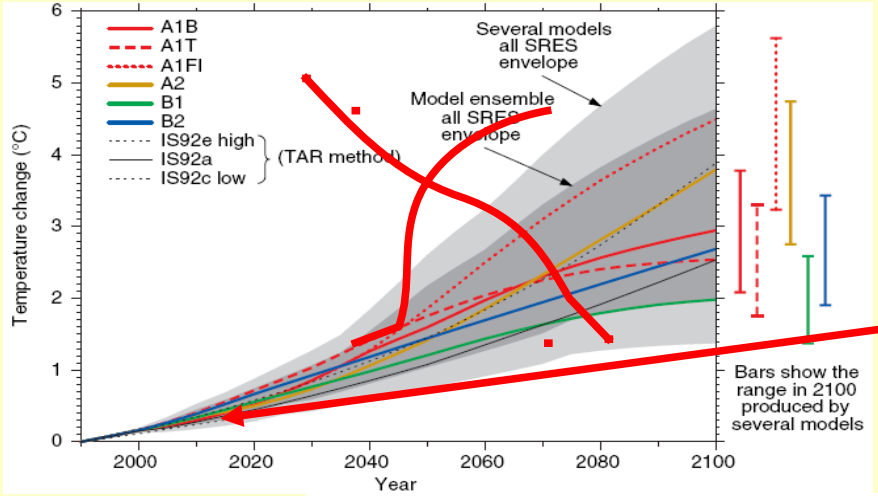
My opinion:

1. CO_2 effect exaggerated ~5 times?
2. Solar effects de-emphasized by a factor of ~10 ???



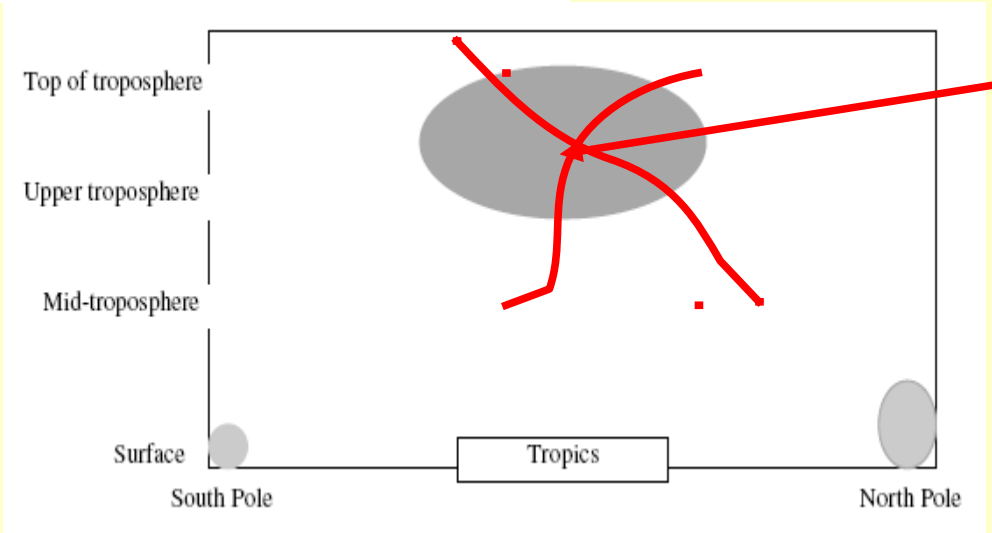
III. The Kyoto Premise - 4 crumbling pillars

4. General Circulation Models



The key climate projections aren't working:

- temperatures (max in 1998) (all of 1900's)



- NO GHG effect in troposphere!!

Small-world universal function approximators.

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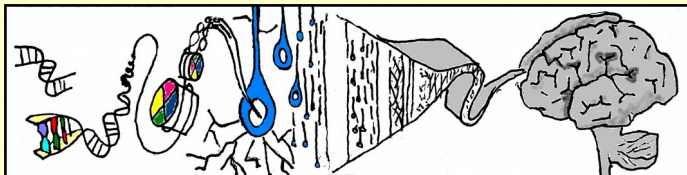
UN-IPCC 3rd Assessment Report

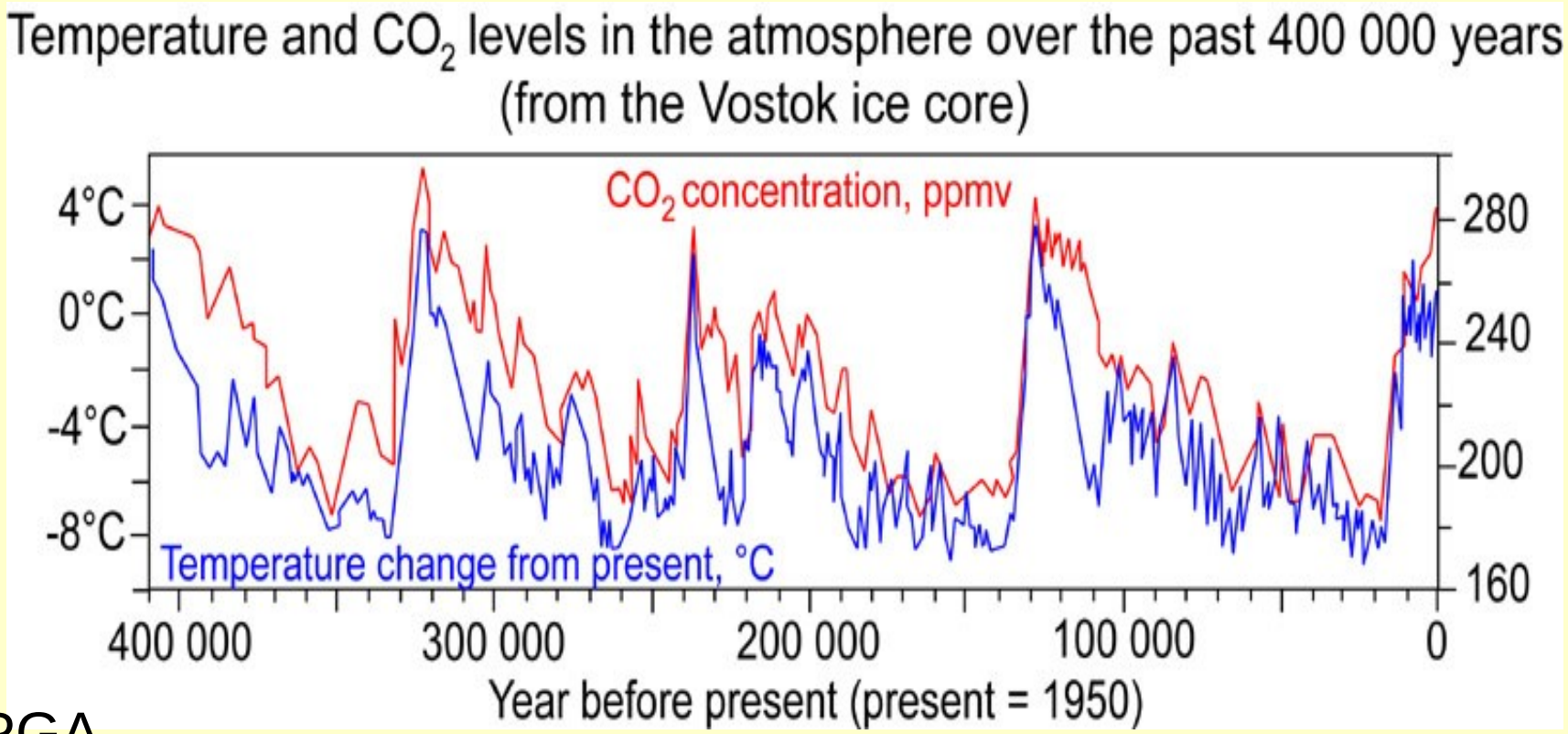
Ross McKitrick 2007 "The T3 Tax as a Policy Strategy for Global Warming" Department of Economics, University of Guelph, Prepared for the Vancouver Volumes



III. The Kyoto Premise - a NEW, 5th of 4 crumbling pillars?

5. CO_2 is a time-lagged, fuzzy thermometer

Al Gore's favourite graph? Why do so many scientists have difficulties recognizing causation arguments?



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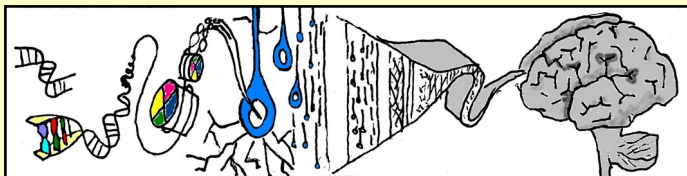
?Reference?



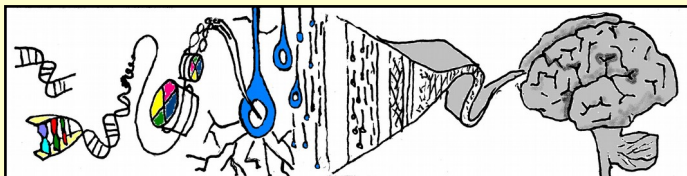
III. The Kyoto Premise

Personal observations

1. Many of the best climate scientists aren't climate scientists. Many aren't even scientists.
   - eg. truck drivers, ***economists***, ***historians***, engineers, teachers, politicians

2. Power of the web - this is a great example of where professional institutes and scientists, benefitting from huge funding and other resources, are bested by "amateurs" on the web (incl. non-climate scientists).

3. Open access to information - as with politics, we now see how vital this is in science.



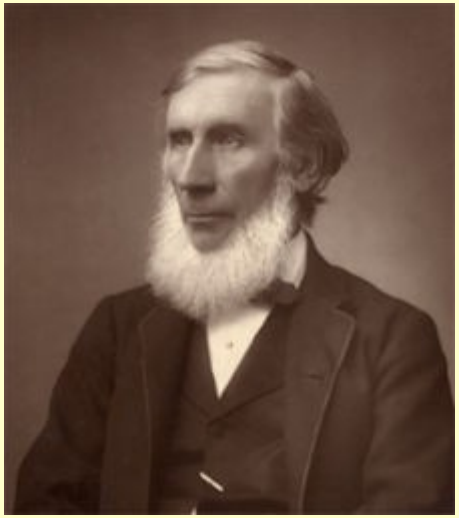
III. The Kyoto Premise - Ignoring the 800 pound gorilla

THE most important Green House Gas!!

We've known since the mid 1800's what, BY FAR, the most important GHG is.

What is it?

Joseph Fourier
1824 paper



John Tyndall
1859 paper

Svante Arrhenius
1896 paper

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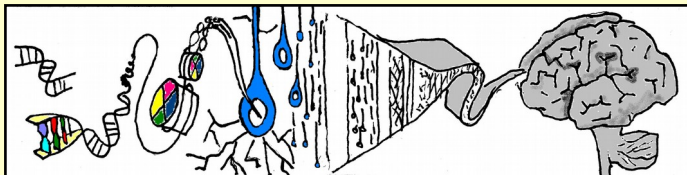
http://en.wikipedia.org/wiki/Arrhenius
http://en.wikipedia.org/wiki/Joseph_Fourier
http://en.wikipedia.org/wiki/John_Tyndall

(he also pushed Wallace & Darwin's work on evolution)



III. The Kyoto Premise - Ignoring the 800 pound gorilla

Water vapour - King of GHGs!!!

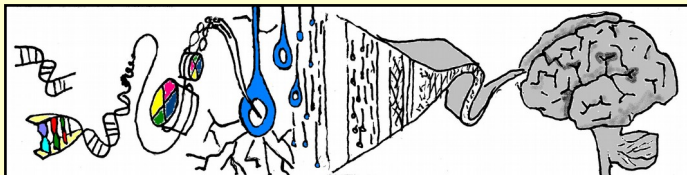
John Tyndall, 1859:

...The answer he received was that water vapour, among the constituents of the atmosphere, was the strongest absorber of radiant heat and was the most important gas controlling the Earth's surface temperature.

A leading Canadian scientist:

GHG #1 : water vapour
GHG #2 : water vapour
GHG #3 : water vapour
GHG #4 : water vapour
GHG #5 : carbon dioxide

James Rodger Fleming "John Tyndall's Research on Trace Gases and Climate" in "Historical Perspectives on Climate Change (New York and Oxford: Oxford University Press, 1998)

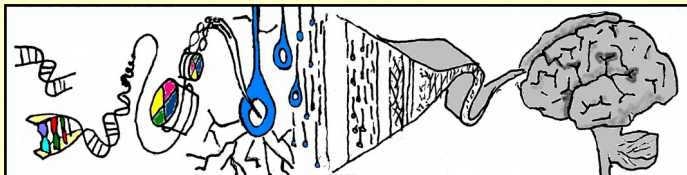


III. The Kyoto Premise - Ignoring the 800 pound gorilla

The climate as a system of water cycles

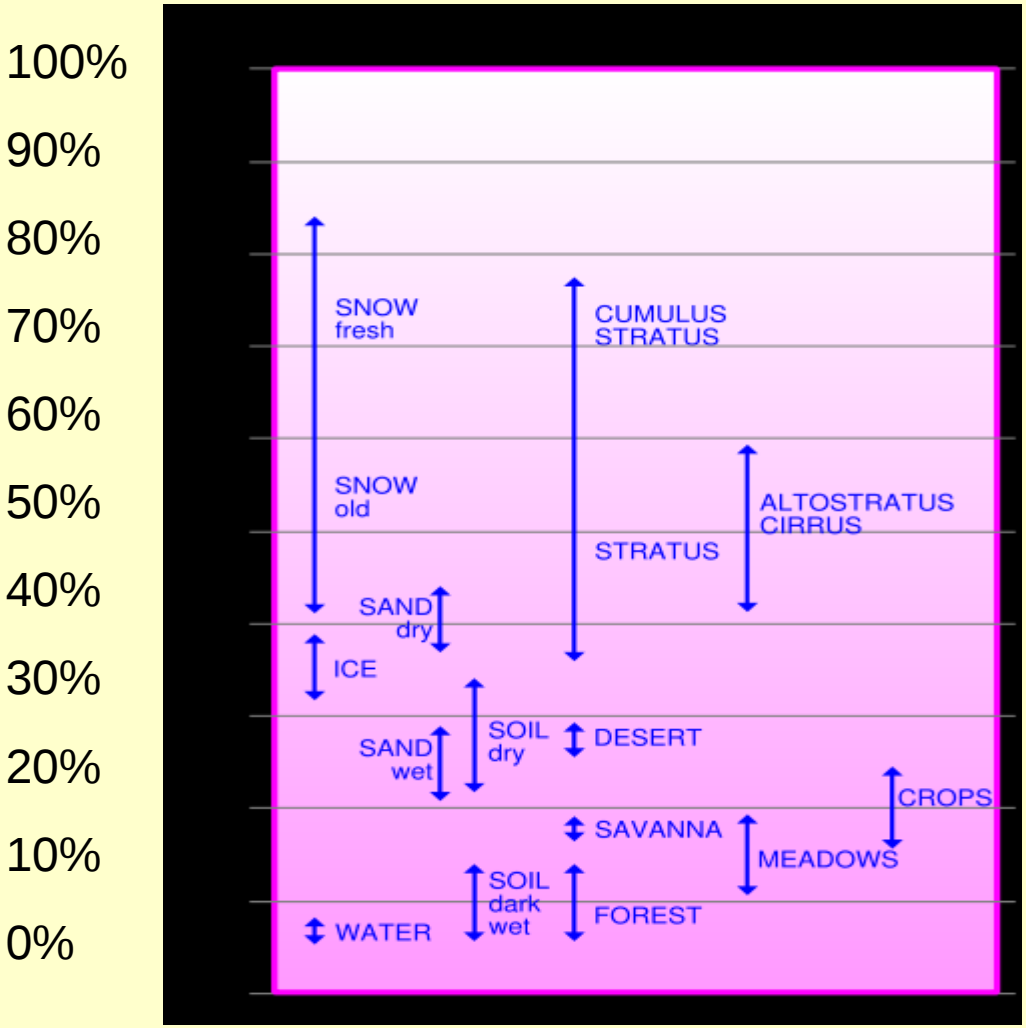
The magic of water

- Green-House Gas (GHG) **#1** !!!
- Atmospheric heat transport across the globe (evaporation/ precipitation)
- Ocean currents around the globe
- Temperature changes seem muted compared to precipitation effects
- Albedo - water / ice / cloud

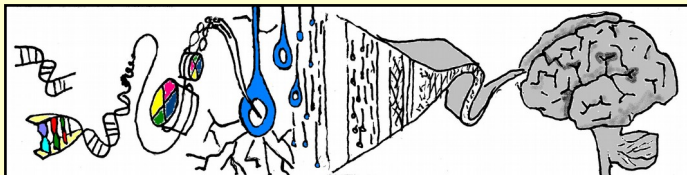


III. The Kyoto Premise - Ignoring the 800 pound gorilla

Albedo - reflection of sunlight



? Reference - ?Wikipedia?



III. The Kyoto Premise - CO_2 is a good guy

CO2 is HUGELY beneficial!!

Average Growth Enhancement due to a 300 ppm increase in atmospheric carbon dioxide

C3 Cereals (eg wheat)	49%
C4 Cereals (eg corn)	20%
Fruits and Melons	24%
Legumes	44%
Roots and Tubers	48%
Vegetables	37%

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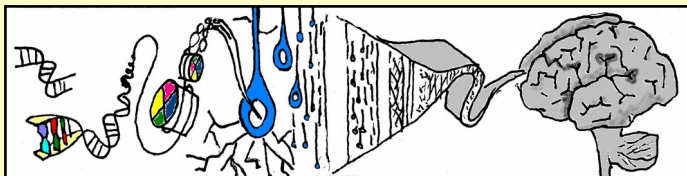
Source: Idso May 2007

David Archibald "The Past and Future of Climate" May, 2007 A presentation to The Lavoisier Group's 2007 Workshop Rehabilitating Carbon Dioxide' held in Melbourne on 29-30 June 2007
CO2 Science website on plant productivities



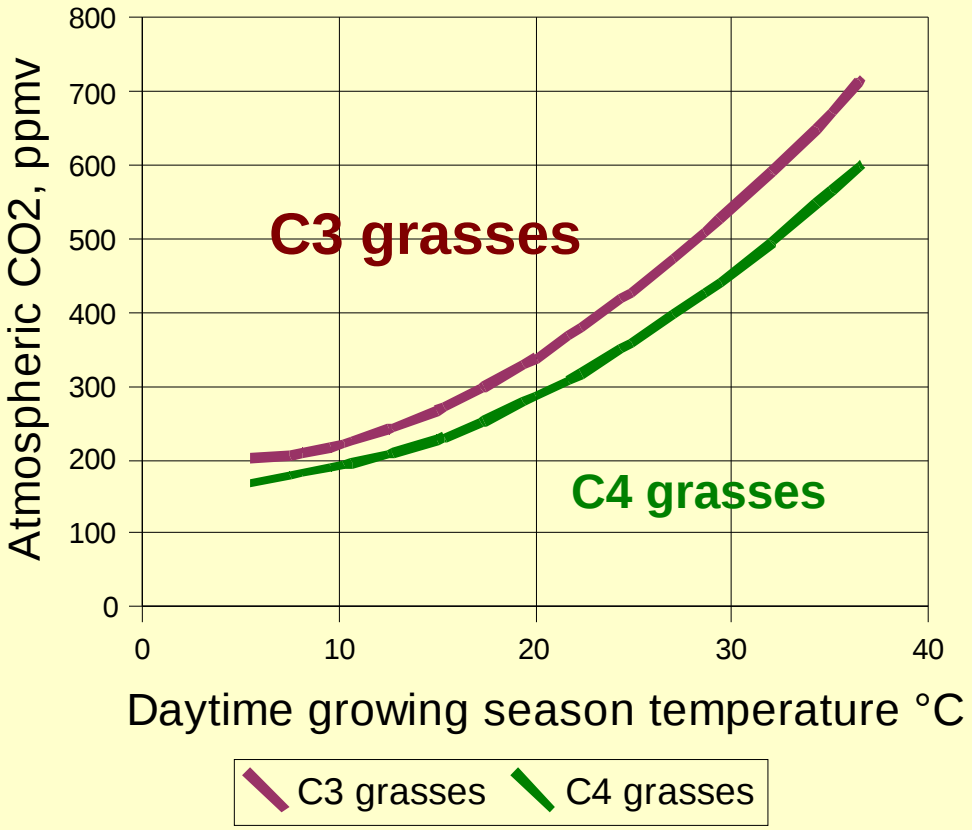
III. The Kyoto Premise - CO_2 is a good guy

Plant mediation of atmospheric CO_2?

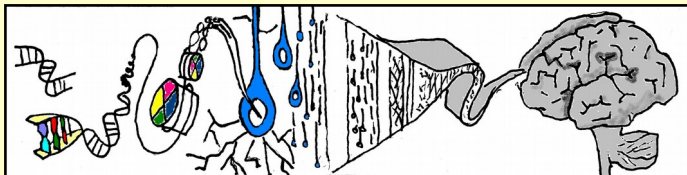
Crossover model of C3/C4 photosynthesis based on quantum yield of C3 and C4 plants.

Note: Humidity levels are not considered!!!

It appears to me that marine/ land photosynthesis may help set the atmospheric CO2 concentration, even in modern times. Ocean solubility is considered to be the dominant factor.

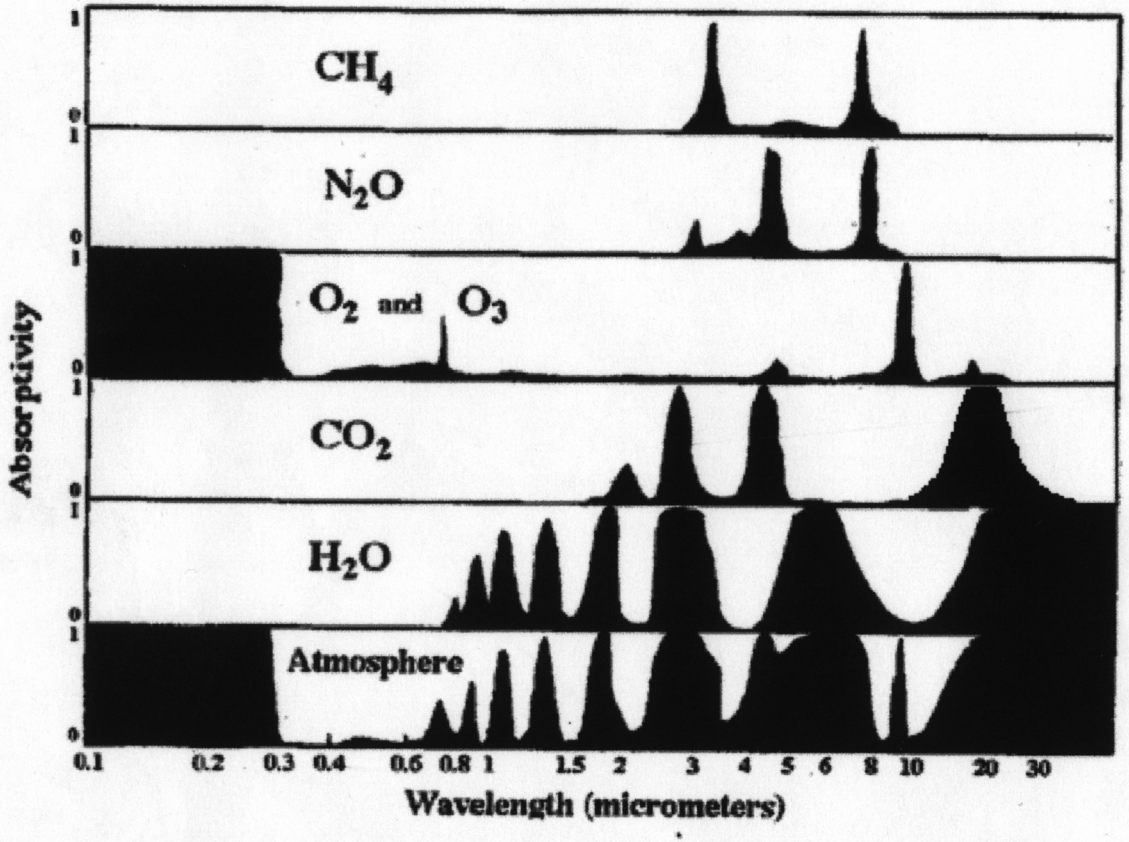


T.E. Cerling, J.R. Ehleringer, J.M. Harris "Carbon dioxide starvation, the development of C4 ecosystems, and mammalian evolution" Phil TransRSocLondB vol 353, pp159-171, 1998



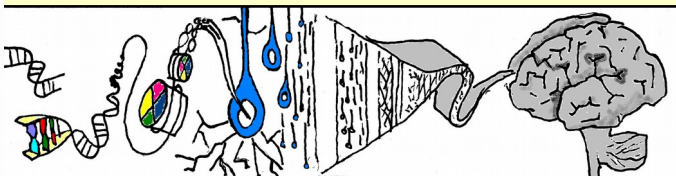
III. The Kyoto Premise - Ignoring the 800 pound gorilla

CO_2 as THE major GHG? Nyet



Absorptivity of various gases of the atmosphere and the atmosphere as a whole as a function of the wavelength of radiation. An absorptivity of zero means no absorption while a value of one means complete absorption. The dominant absorbers of infrared radiation are water vapor (H_2O) and carbon dioxide (CO_2). Oxygen (O_2) and ozone (O_3) absorb much of the sun's ultraviolet radiation.

?Reference



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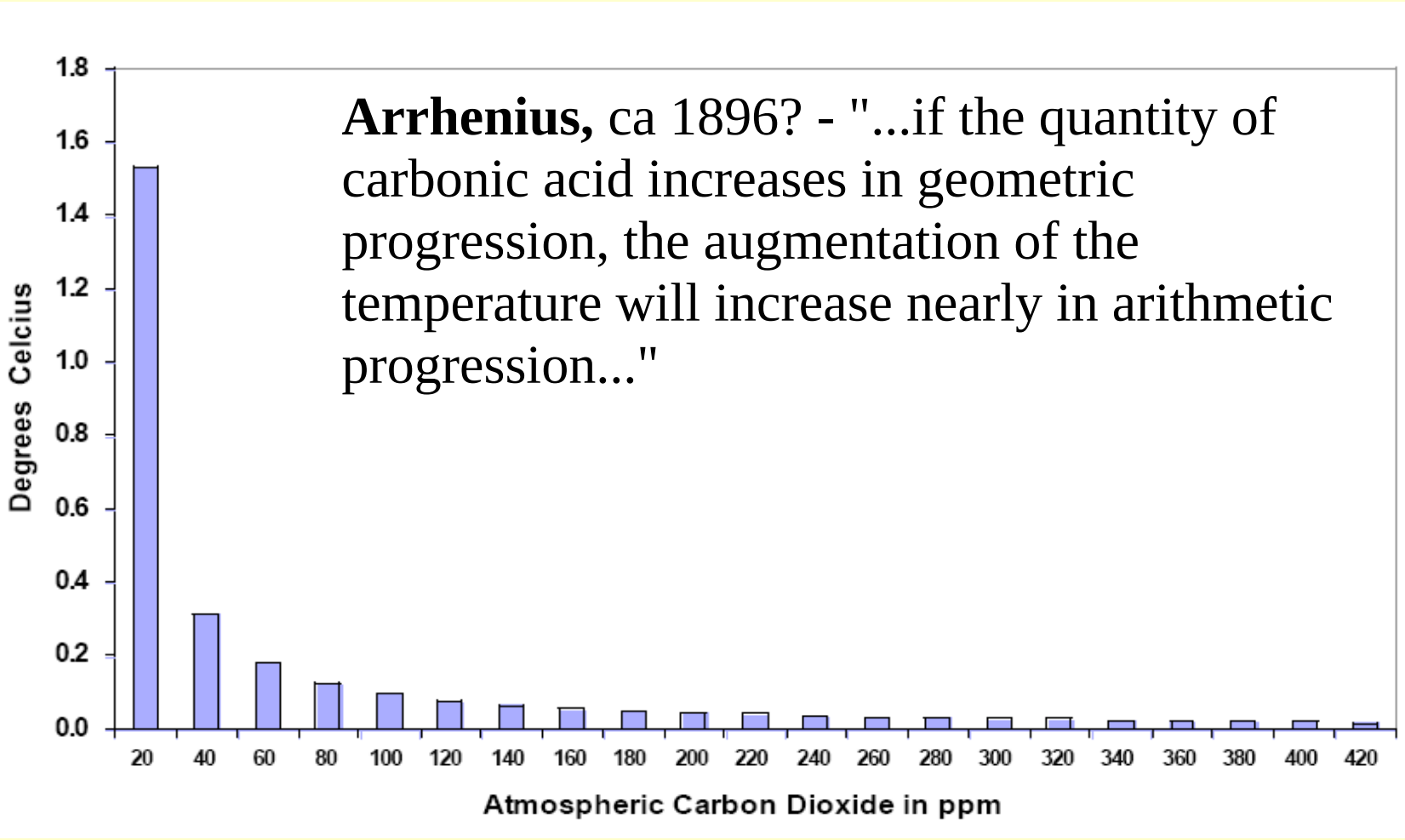
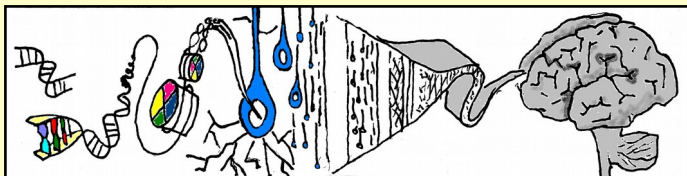


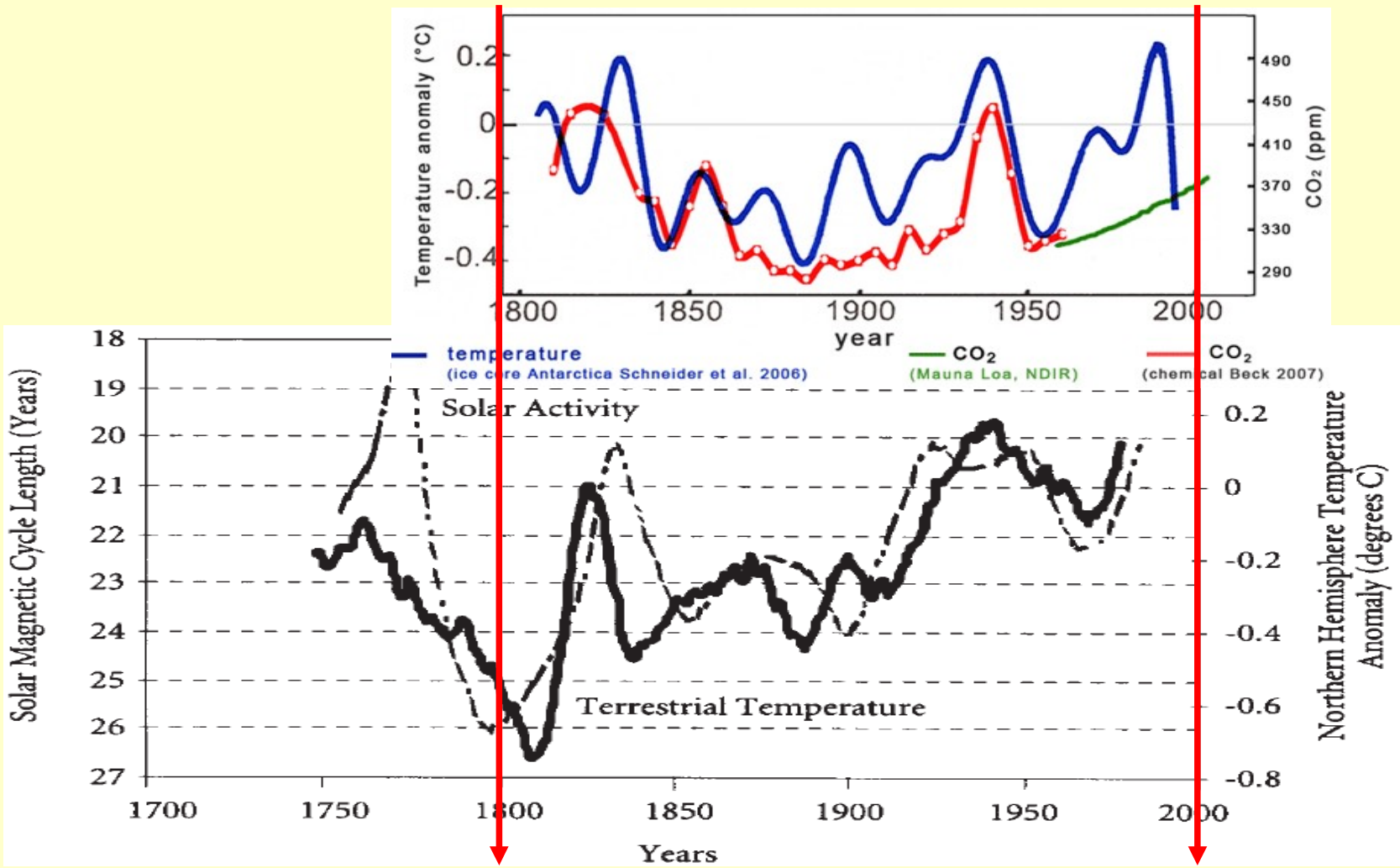
Arrhenius, ca 1896? - "...if the quantity of carbonic acid increases in geometric progression, the augmentation of the temperature will increase nearly in arithmetic progression..."

?Reference Lindzmann of MIT?

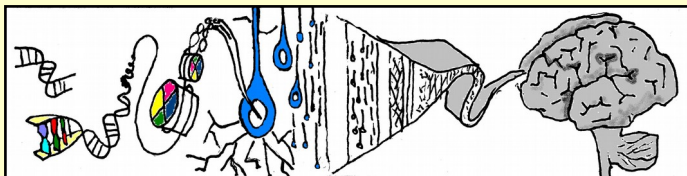


III. The Kyoto Premise

CO2 is a time-lagged, fuzzy thermometer



Ernst-Georg Beck http://www.biokurs.de/treibhaus/180CO2_supp.htm
Willie Soon, Sallie Baliunas "The Varying Sun and Climate Change" Fraser Forum, Januaryn 2003 pp11-13



III. The Kyoto Premise - CO_2 is a good guy

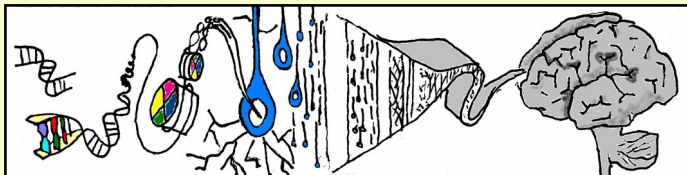
CO2 is HUGELY beneficial!!

- food for plants
- helps plants better utilise water!
- higher agricultural productivity

Calling CO2 a toxic gas is **INSANE**!

(we're all guilty of breathing it out)

CO_2 is a time-lagged, fuzzy thermometer



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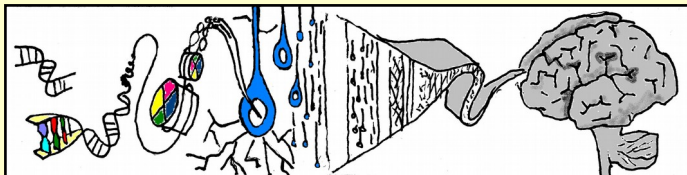
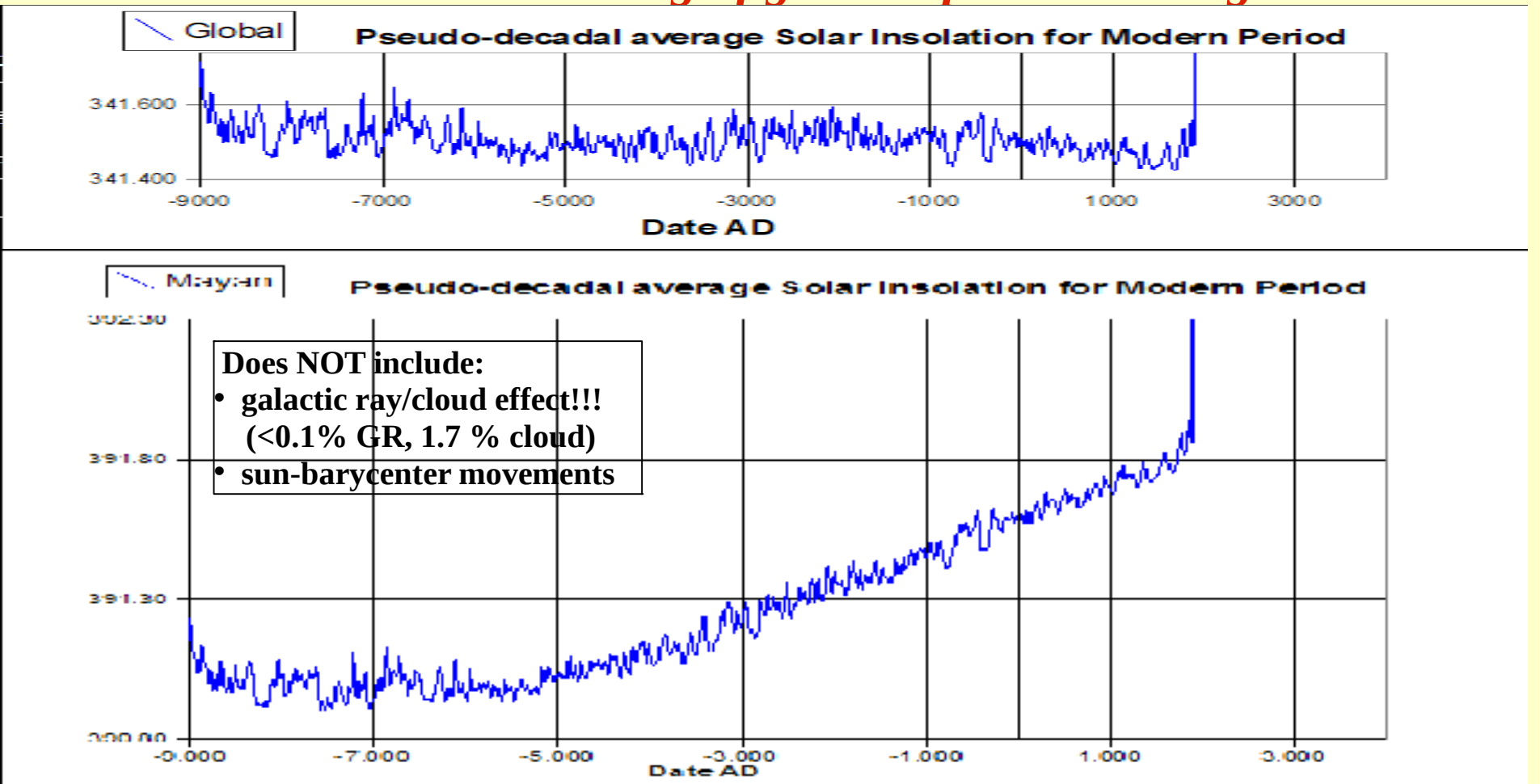


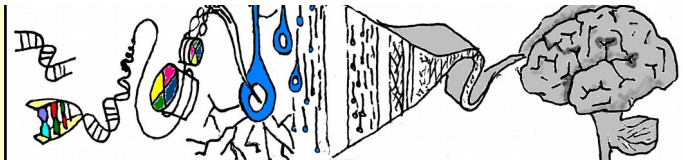
IV. Climate and Food Production

Productivity - Historical long view

"...The Milankovic wandering of greener pastures and glaciers..."



www.billhowell.ca/Civilisations and sun/Howell - Mega-Life, Mega-Death and the Sun II, towards a quasi-predictive model of the rise and fall of civilisations.pdf



Productivity - Historical

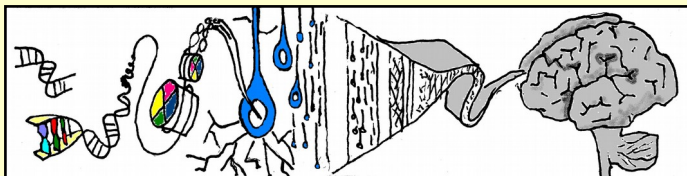
- Ancients planted crops according to solar calendar, develop grain storage, water reservoirs and irrigation systems, water-lift technologies etc

- Astronomy - tracking the sun, moon & planets

- William Herschel, 1801 - relates English wheat prices to sunspot activity, using data from Adam Smith's "Wealth of Nations"

- ?USA scientist & Maunder, 1920? - tree rings and sunspots, related to the "Maunder Minimum" of solar activity

Douglas V. Hoyt, Kenneth H. Schatten "The role of the sun in climate change" Oxford University Press, Oxford UK, 1997, 279pp
Willie W-H Soon, S.H. Yaskell "The Maunder Minimum and the variable sun-earth connection" World Scientific Publ, Signapore, 2003 278pp



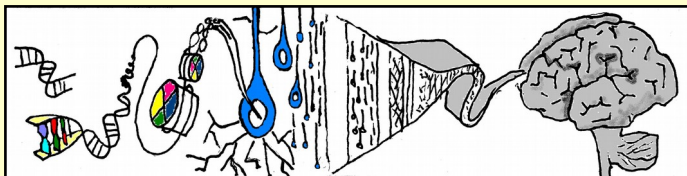
Climate and Food Production

Productivity

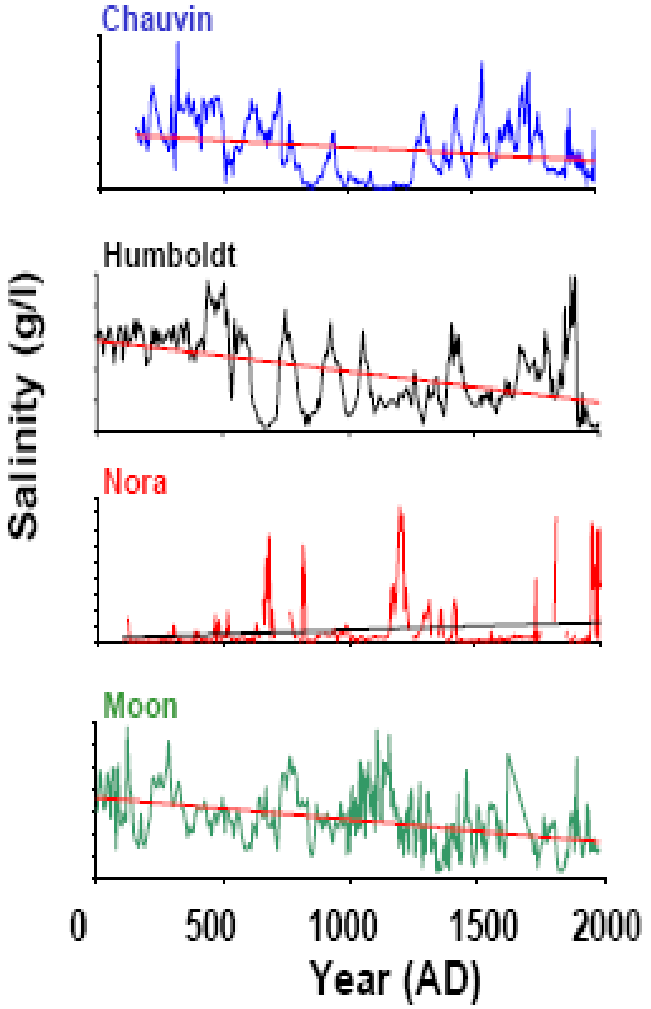
Temperature
Precipitation
CO_2

Problems

Droughts
Floods
Disease
Pests
Crop selection
Taxes, insurance & financing
War



Droughts - Leavitt et.al. Uof Regina



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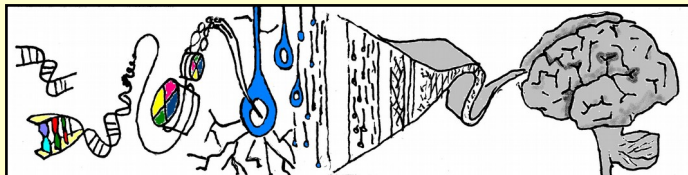
Peter Leavitt, Gemai Chen, Jim Rusak, Sybille Wunsam, Brian Cumming 2000 "The Past, Present and Future of Prairie Droughts: How Bad is Bad?" http://www.uregina.ca/drought



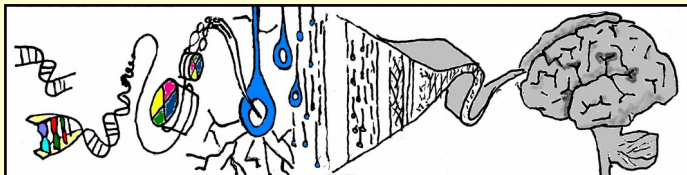
Droughts - Leavitt etal URegina

- "...Extreme droughts seem to occur every 60-100 years, with 23-45% probability of occurring again by 2030 AD. ... the 'dust bowl' of the 1930s was one of the mildest droughts of the past 2000 yr; most droughts were both more severe and longer-lasting, with an average duration of over 10 years...

- Extreme events have some periodicity, resembling solar, lunar and atmospheric-ocean causal mechanisms. *<10% of the total historical variance is due to these cycles*:
  Droughts - 14, 22, 30 & 100 year cycles
  Floods - 25, 50 & 300 year cycles

- ??...*It is likely future global warming may lead to an intensification of drought cycles*??... "

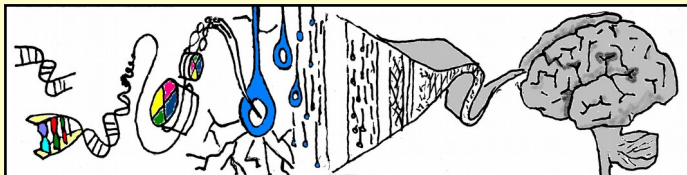
Peter Leavitt, Gemai Chen, Jim Rusak, Sybille Wunsam, Brian Cumming 2000 "The Past, Present and Future of Prairie Droughts: How Bad is Bad?" http://www.uregina.ca/drought



IV. Climate and Food Production

Dirty 30's - just a mild, short drought?

Family albums



IV. Climate and Food Production

The Prairies region

Red Crow - Peigan Blackfoot

Walking Buffalo - Morely

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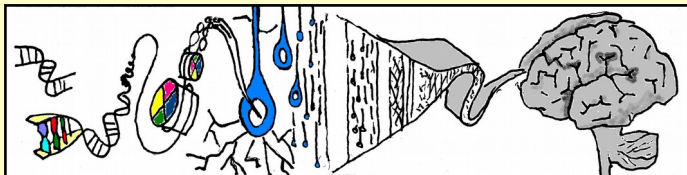
Neil Howell paintings

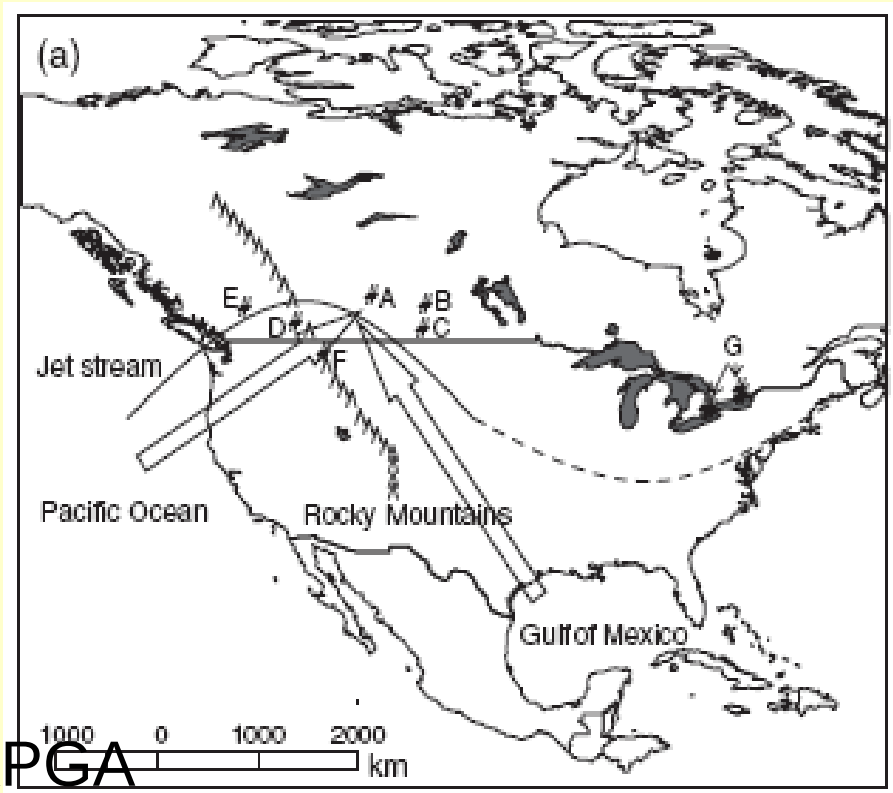


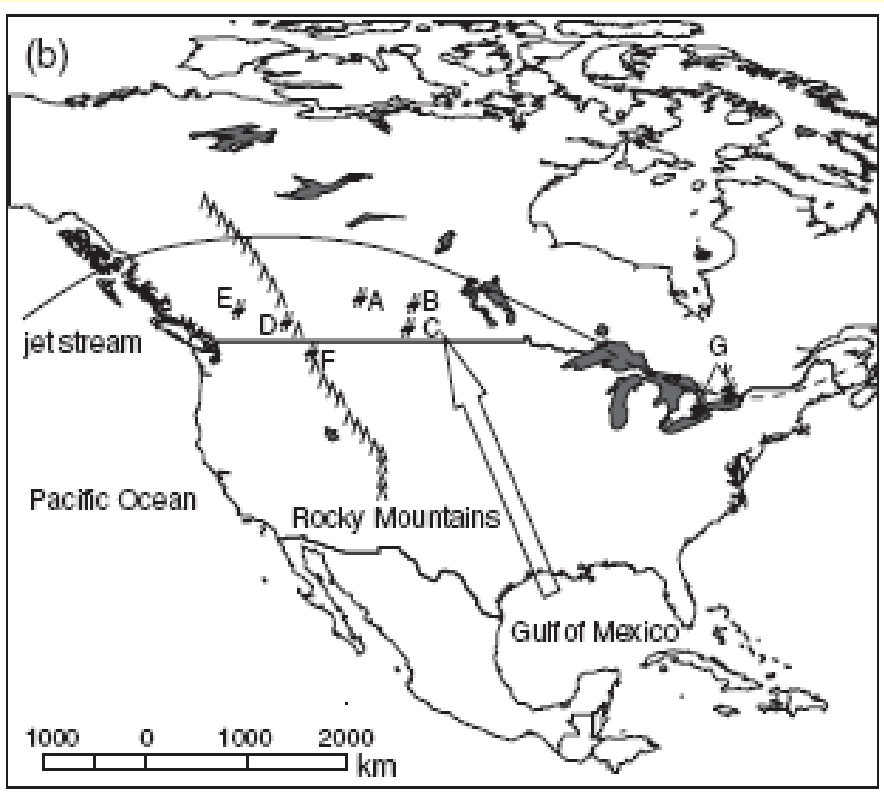
IV. Climate and Food Production

6,000 years of Prairie drought

a) jet stream in southern BC. Cyclonic storms from the Pacific Ocean tap into moisture from the Gulf of Mexico

b) the jet stream is located further north in BC. Chauvin is located too far north and west to receive moisture from the Gulf of Mexico,





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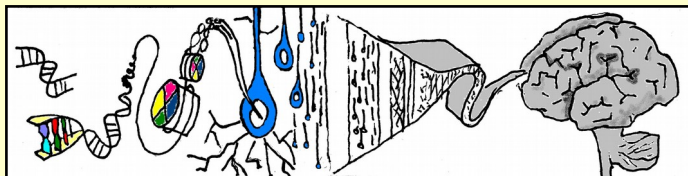
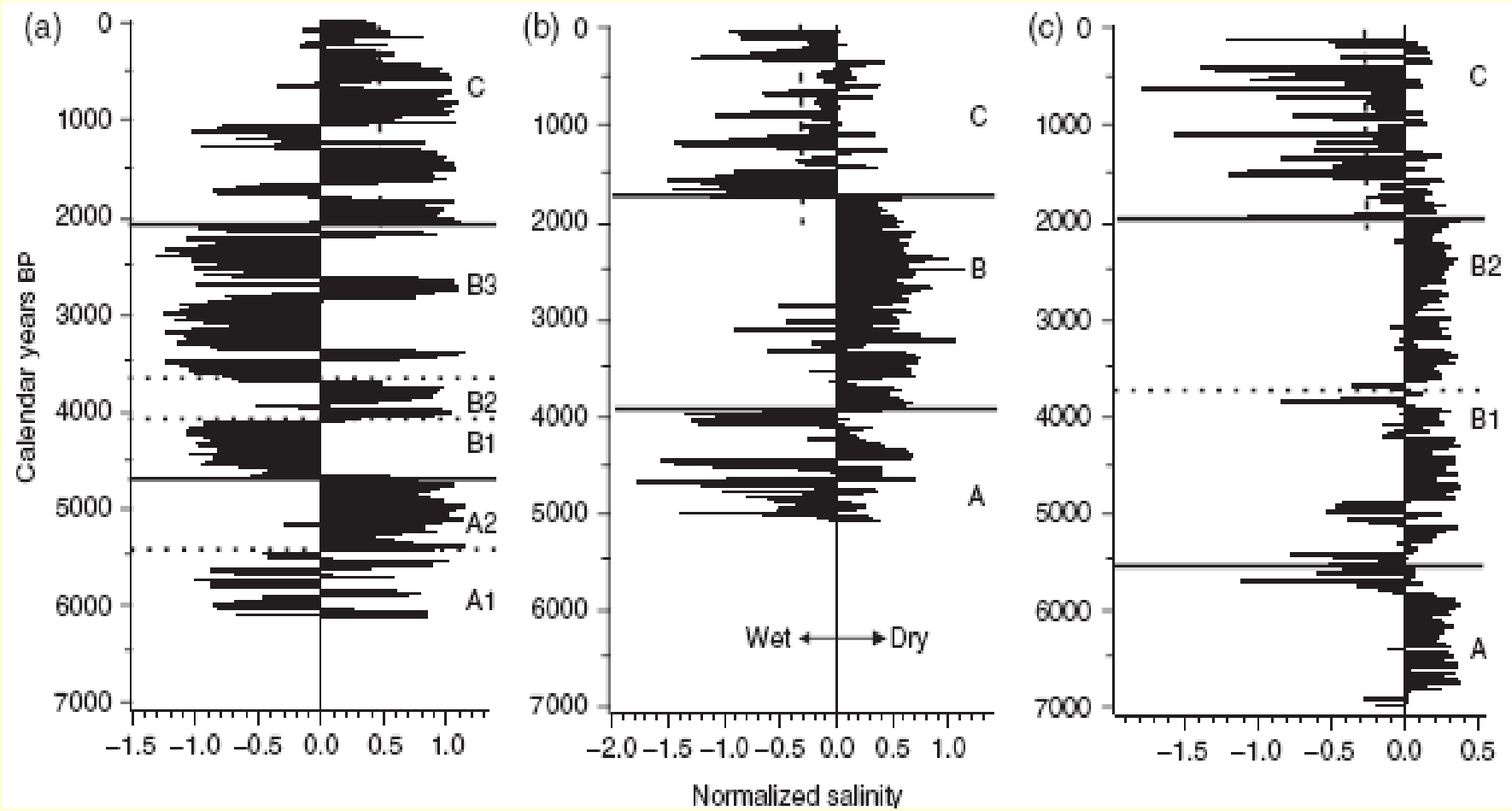
Astrid Michels, etal "Multidecadal to millennial-scale shifts in drought conditions on the Canadian prairies over the past six millennia: implications for future drought assessment" Global Change Biology (2007) 13, 1295-1307, doi: 10.1111/j.1365-2486.2007.01367.x



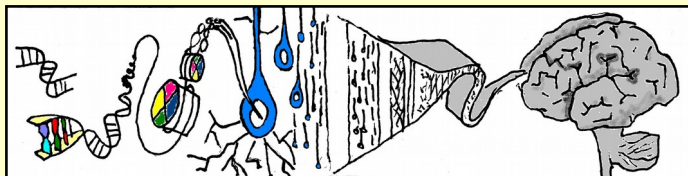
IV. Climate and Food Production

Leavitt etal - Salinity over 6,000 years

a) Chauvin Lake b) Humbolt Lake c) Oro Lake



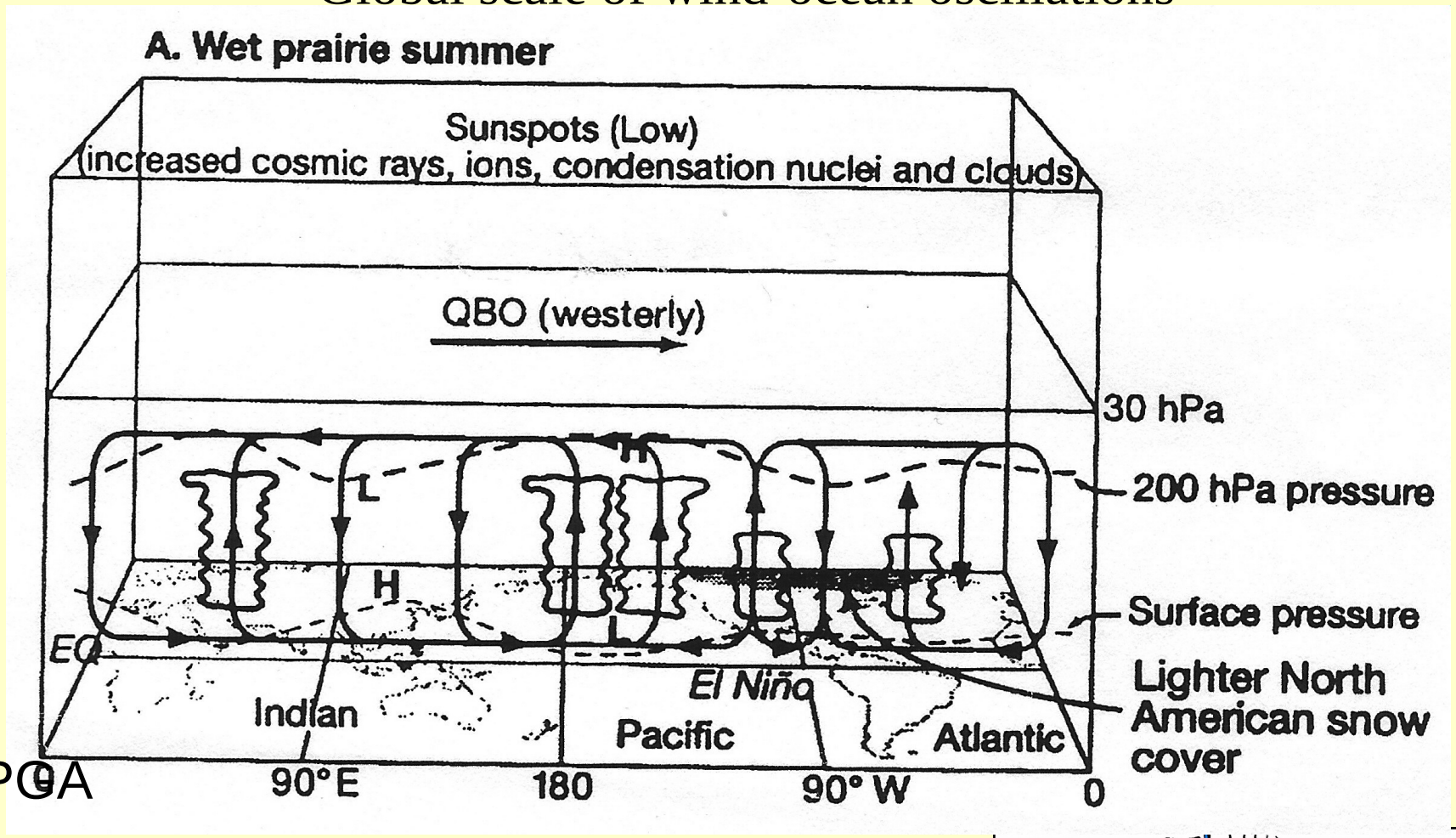
Astrid Michels, etal "Multidecadal to millennial-scale shifts in drought conditions on the Canadian prairies over the past six millennia: implications for future drought assessment" Global Change Biology (2007) 13, 1295-1307, doi: 10.1111/j.1365-2486.2007.01367.x



IV. Climate and Food Production

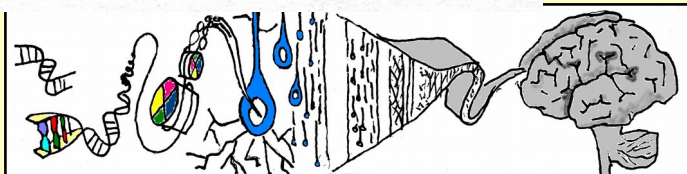
Garnett etal - **summer rainfall & crop yields**

Global scale of wind-ocean oscillations



APCA

Ray Garnett, Niru Nirupama, C Emdad Haque, T.S. Murty 2006
"Correlates of Canadian prairie summer rainfall: implications for crop yields" Climate Research 2006 v32, pp25-33

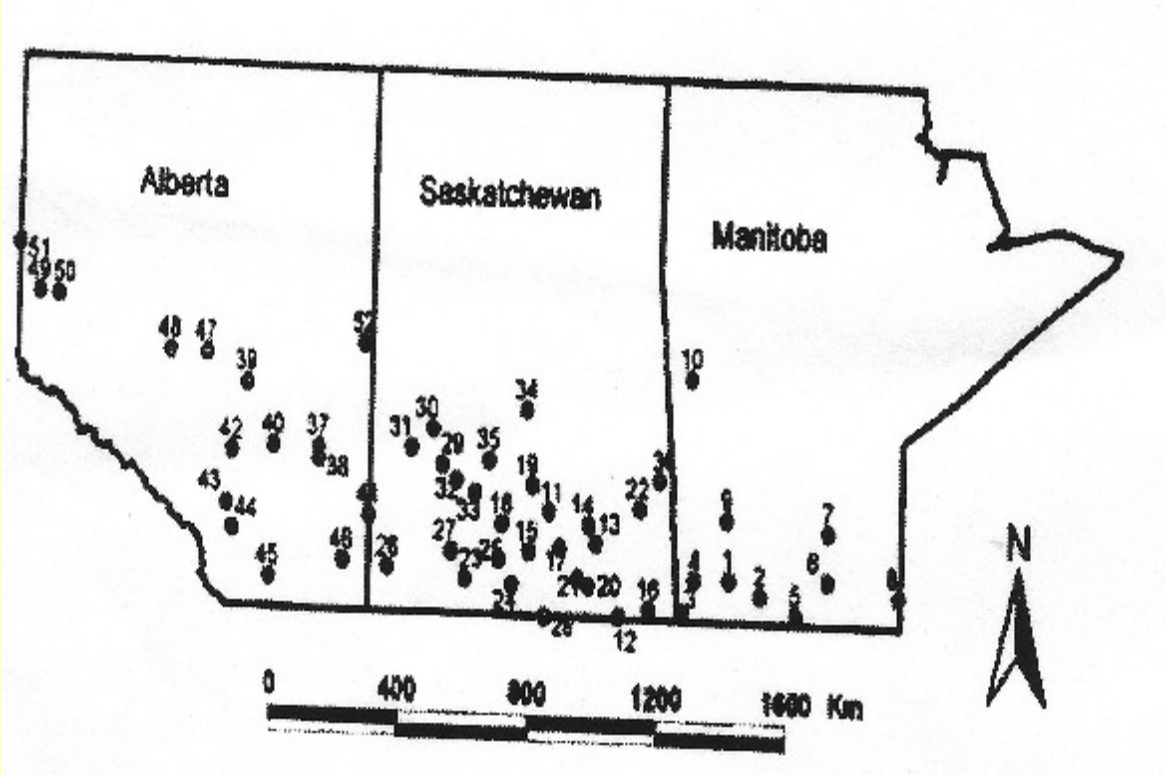


IV. Climate and Food Production

Garnett etal - **summer rainfall & crop yields**

1950 to 2004 - Sunspots, QBO, ENSO, NAS

Conceptual model of factors producing wet and dry prairie summers



APGA

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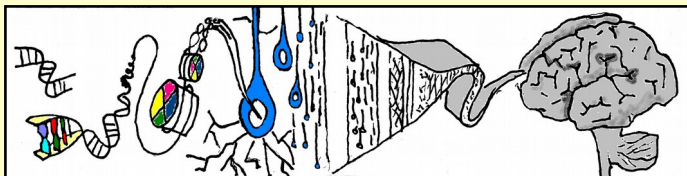
"Correlates of Canadian prairie summer rainfall: implications for crop yields" Climate Research 2006 v32, pp25-33



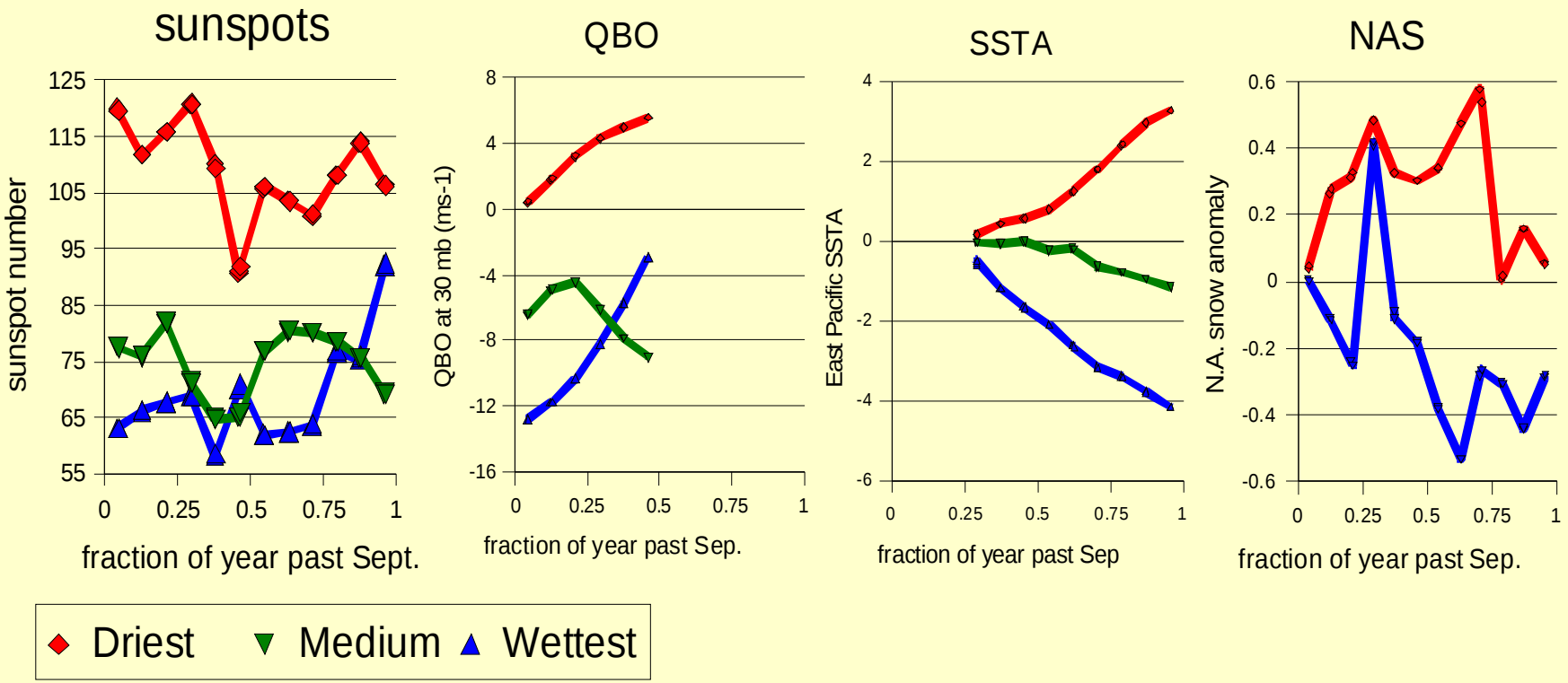
IV. Climate and Food Production - 1950 to 2004

Wettest, Median, Driest June-July

Quasi-Biannual Oscillation

Sea Surface T (El Nino)

North America Snow Cover



APGA

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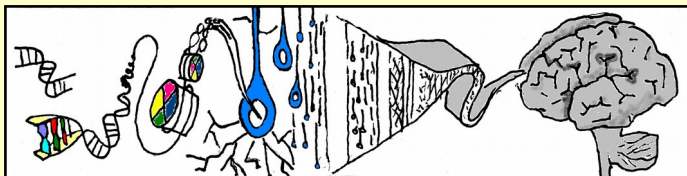


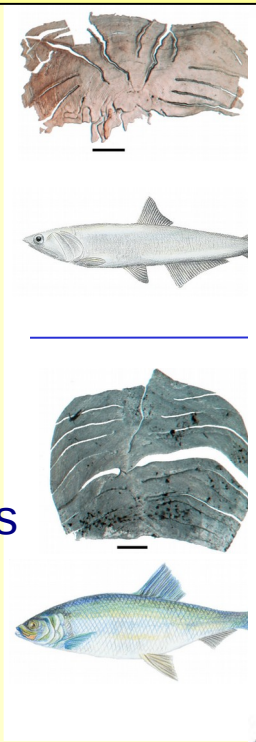
IV. Climate and Food Production

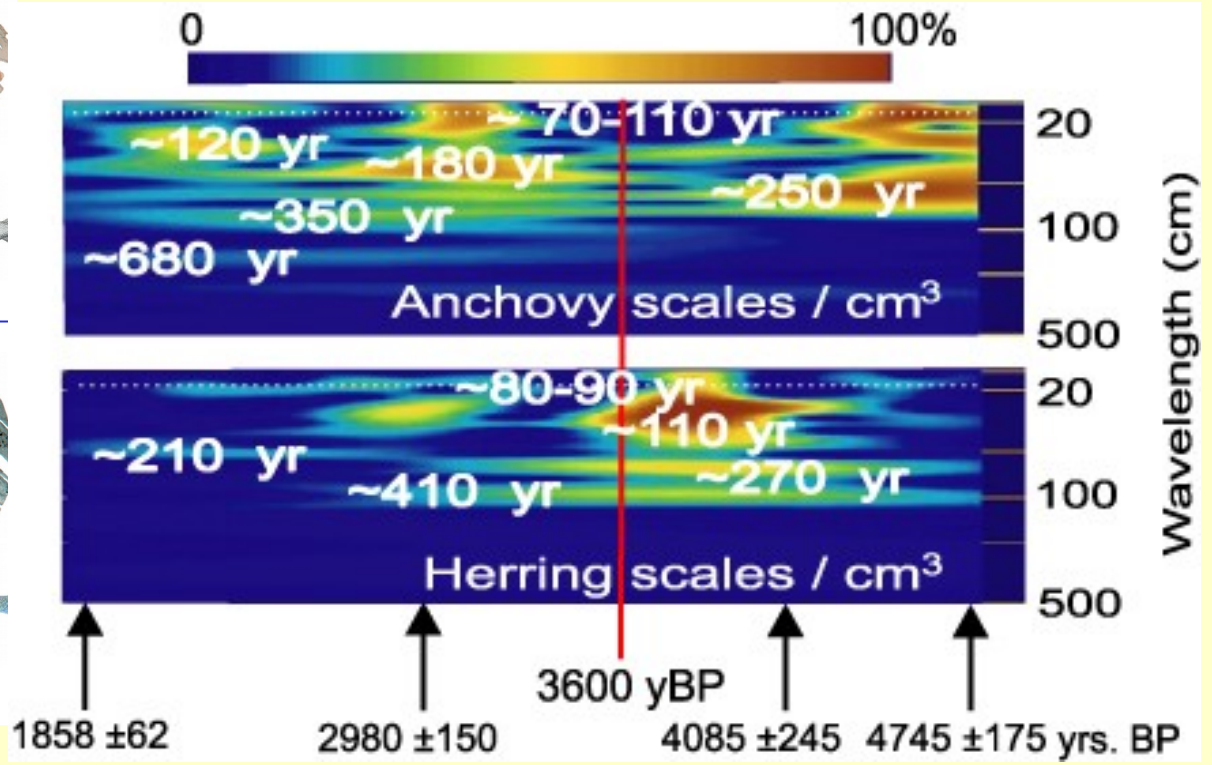
Patterson etal - Effingham Inlet

Northern Anchovy - Pacific Herring Population Trends & Cycles

~3,500 yBP phase/ frequency shift evident in both herring and anchovy data

Well-documented Gleissberg Cycle (~ 75-90 yrs) occurs frequently for long periods of time.





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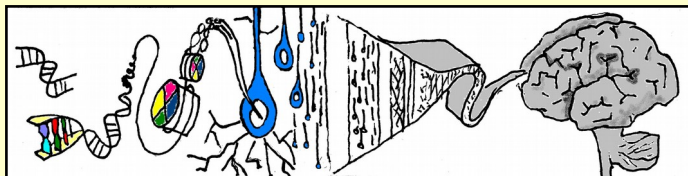
Tim Patterson presentation 17May07
Patterson et al. 2004 Palaeontologia Electronica 7, 22 p.
Patterson et al. 2005 Marine Micropaleontology 55: 183-204



South African results, Jun07

Sunspot activity and Lake Victoria, 1900-2000 (fits the data TOO well!)

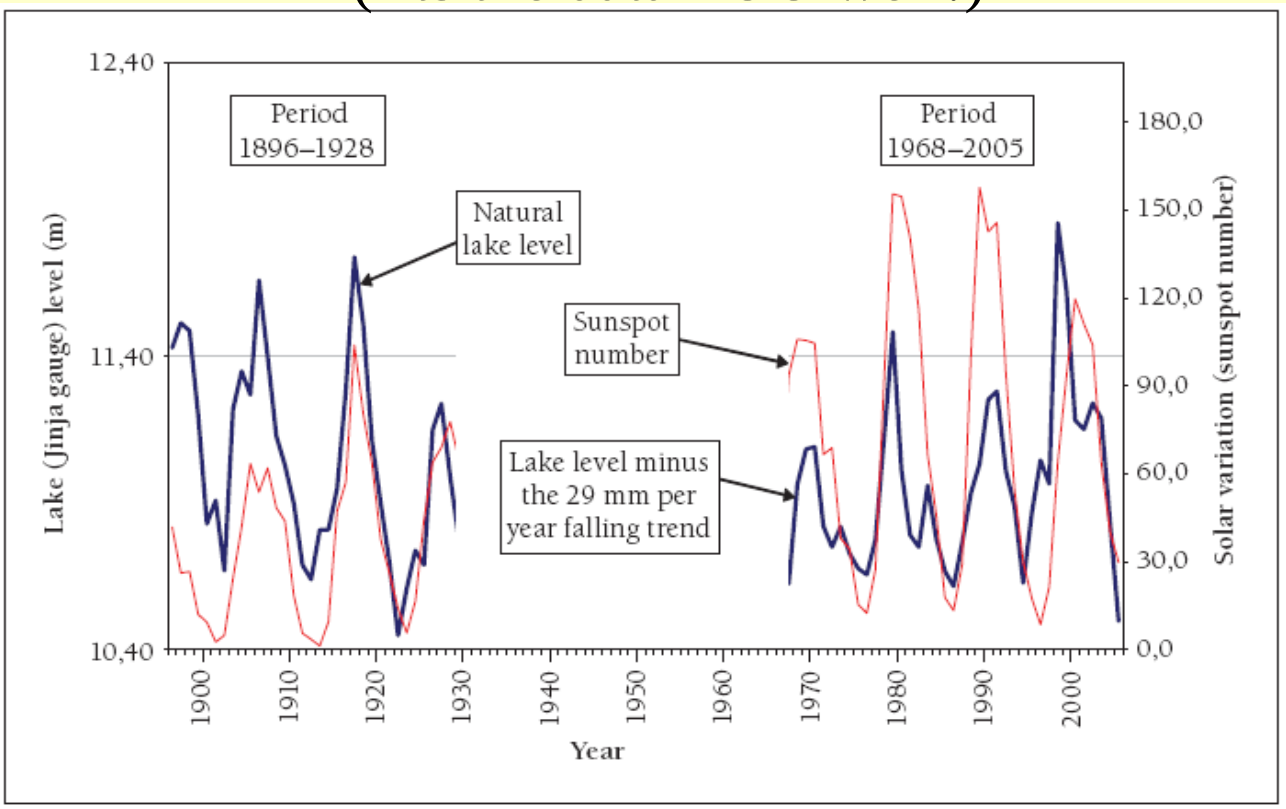
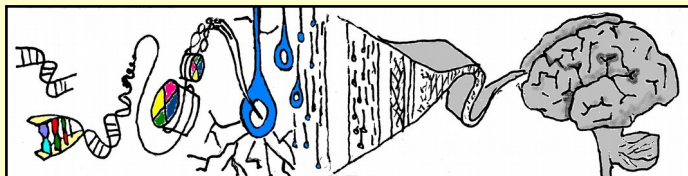


Figure 5b Levels of Lake Victoria from 1896 to 1928 and from 1968 to 2005 compared to solar variation in the form of sunspot number indices, but with the 29 mm per year falling trend in lake level eliminated from the 1968 to 2005 data

W J R Alexander, F Bailey, D B Bredenkamp, A van der Merwe and N Willemse 2007 "Linkages between solar activity, climate predictability and water resource development" Journal of the South African Institution of Civil Engineering, Volume 32 49 Number 2 June 2007



Perry 2007 - Mississippi basin

State-of-the-art breakthrough

34 year time lag

The effects of solar variability on regional climate time series were examined using a sequence of physical connections between total solar irradiance (TSI) modulated by galactic cosmic rays (GCRs), and ocean and atmospheric patterns that affect precipitation and streamflow.

The current drought (1999–2007) in the Mississippi River Basin appears to be caused by a period of lower solar activity that occurred between 1963 and 1977.

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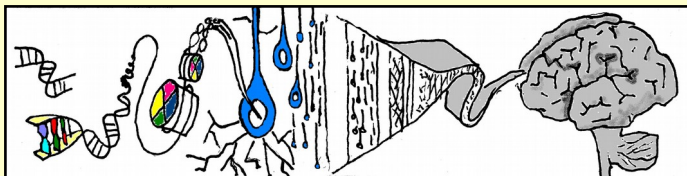
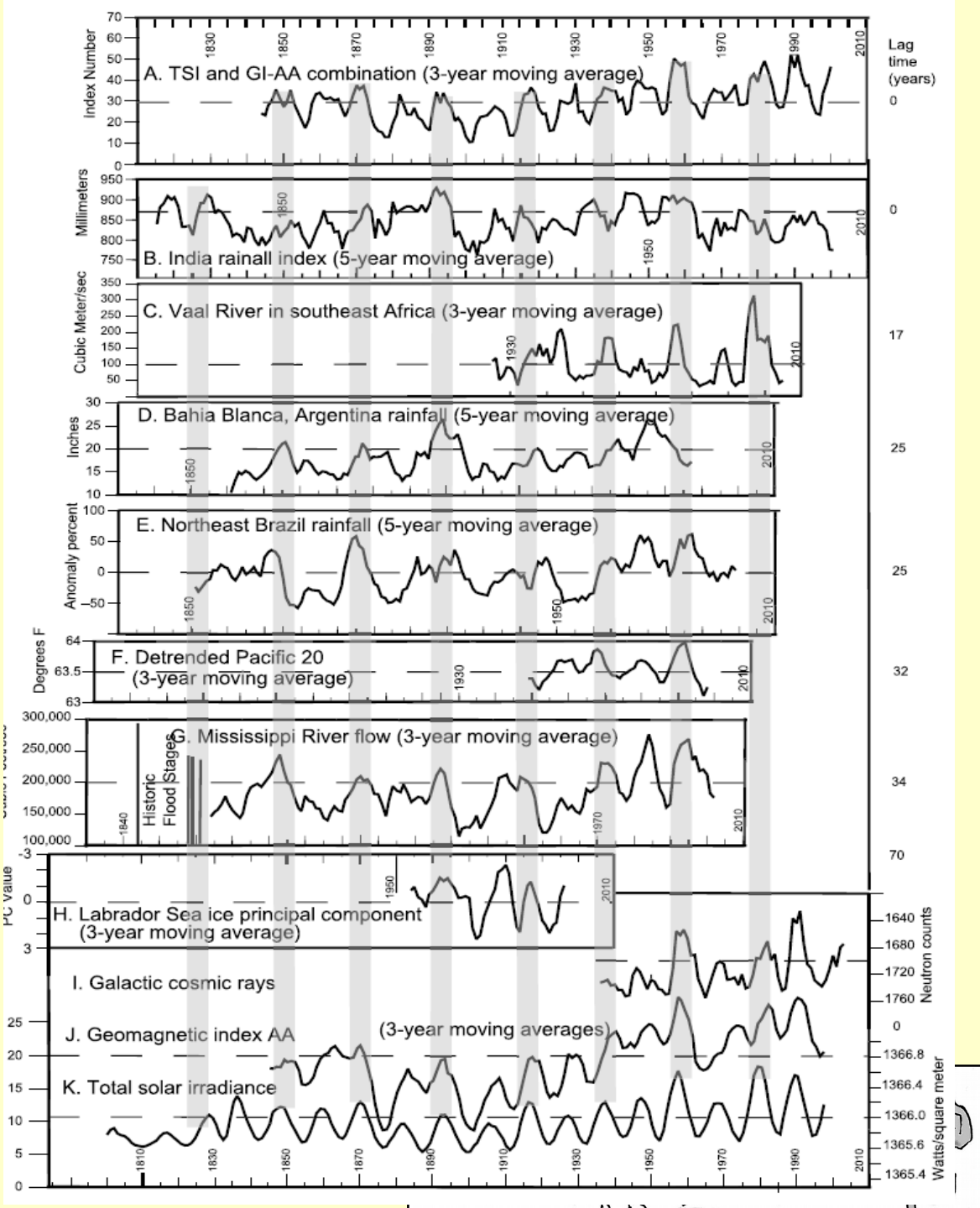
Charles A. Perry 2007 "Evidence for a physical linkage between galactic cosmic rays and regional climate time series" Advances in Space Research, Volume 40, Issue 3, 2007, Pages 353-364



IV. Climate and Food Production

Perry 2007 - Global story

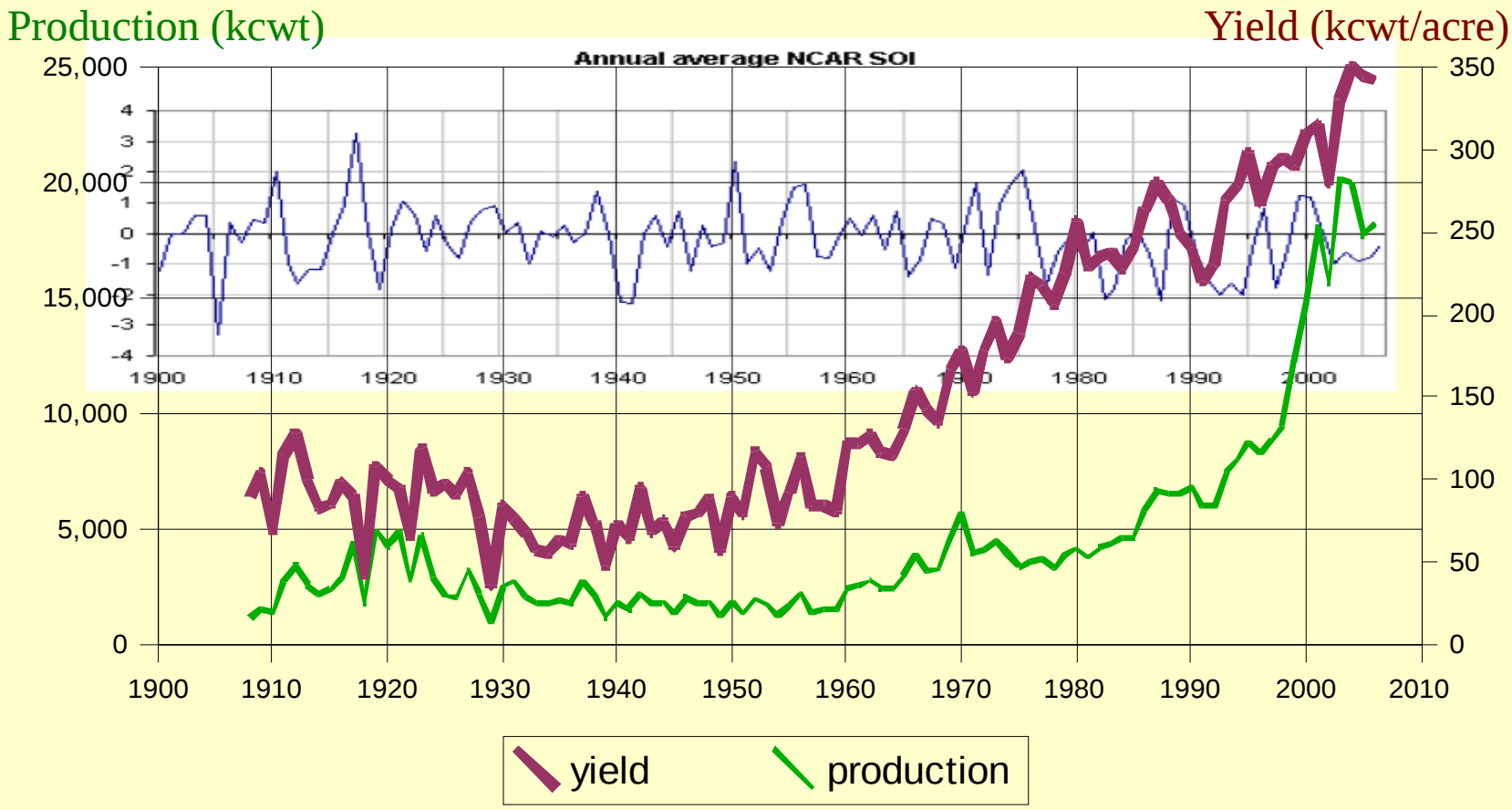
A. TSI & GI-AA combo
B. Indian rainfall index
C. Vaal river in SE Africa
D. Argentina rainfall
E. NE Brail rainfall
F. Detrended Pacific 20
G. Mississippi river flow
H. Labrador sea ice



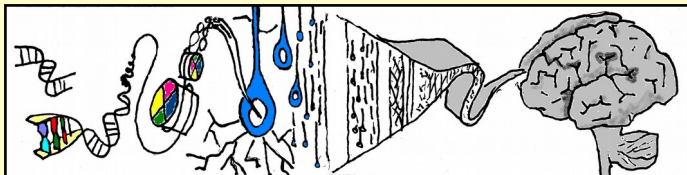
Charles A. Perry 2007 "Evidence for a physical linkage between galactic cosmic rays and regional climate time series" Advances in Space Research, Volume 40, Issue 3, 2007, Pages 353-364

IV. Climate and Food Production

Alberta Potato production and yield

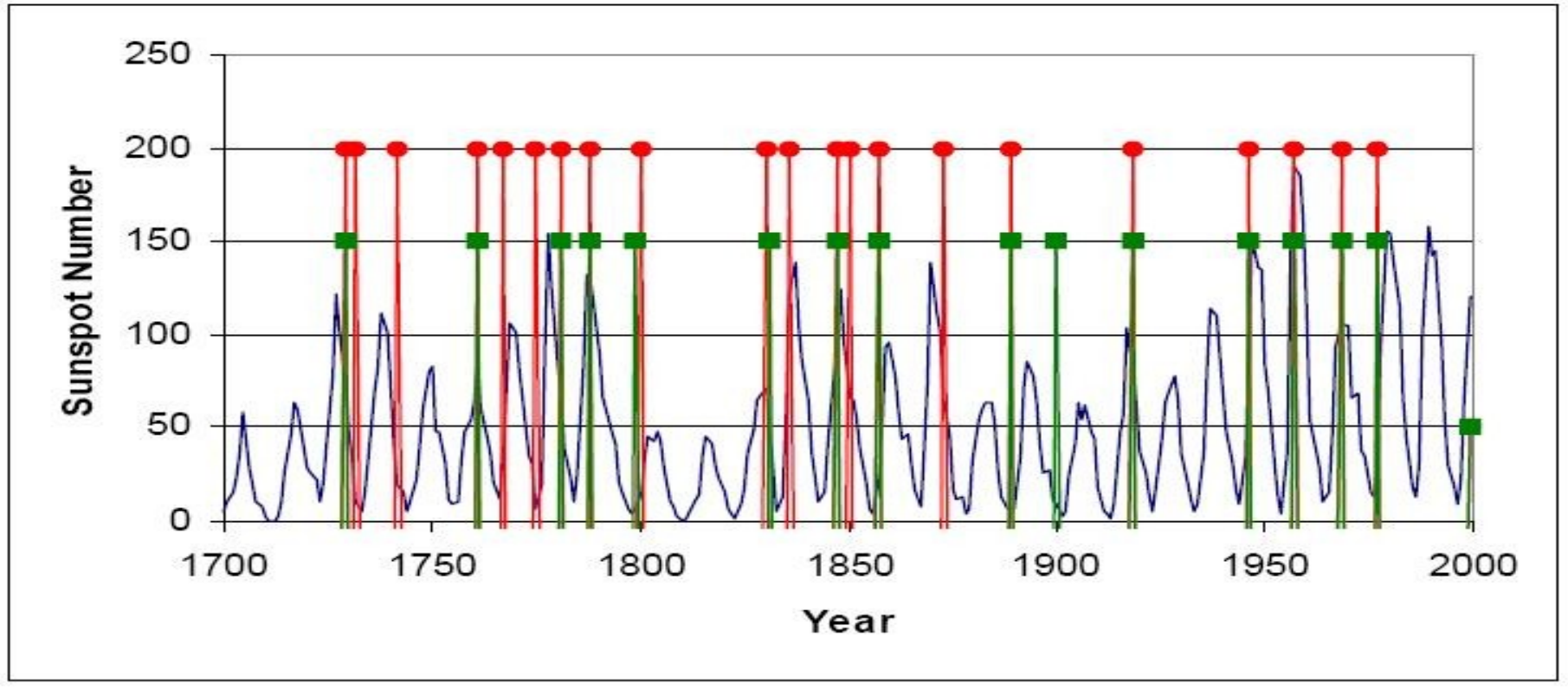


Statistics Canada - CANSIM socio-economic database
http://cansim2.statcan.ca



IV. Climate and Food Production

Influenza pandemics and solar activity



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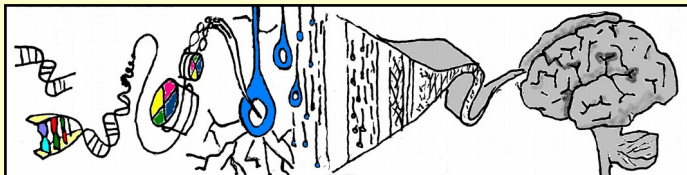
K.F. Tapping, R.G. Mathias, D.L. Surkan "Pandemics and Solar Activity – Extended paper" Unpublished as of 09Mar06



IV. Climate and Food Production

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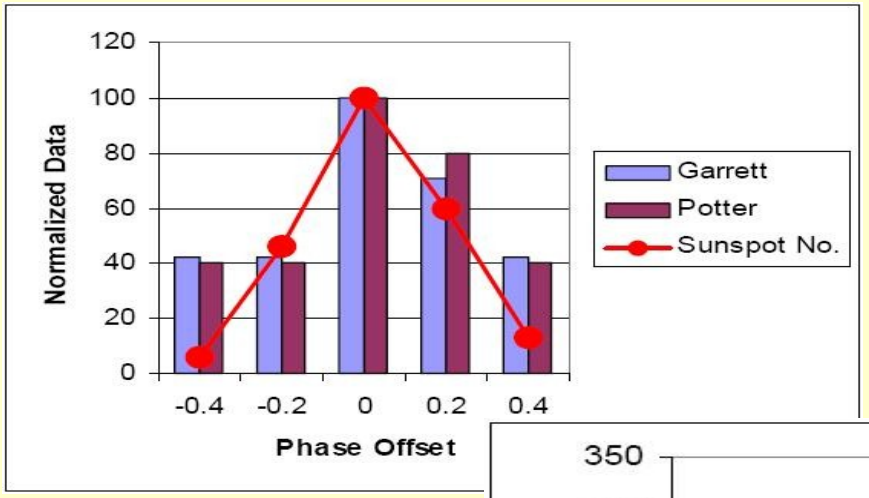

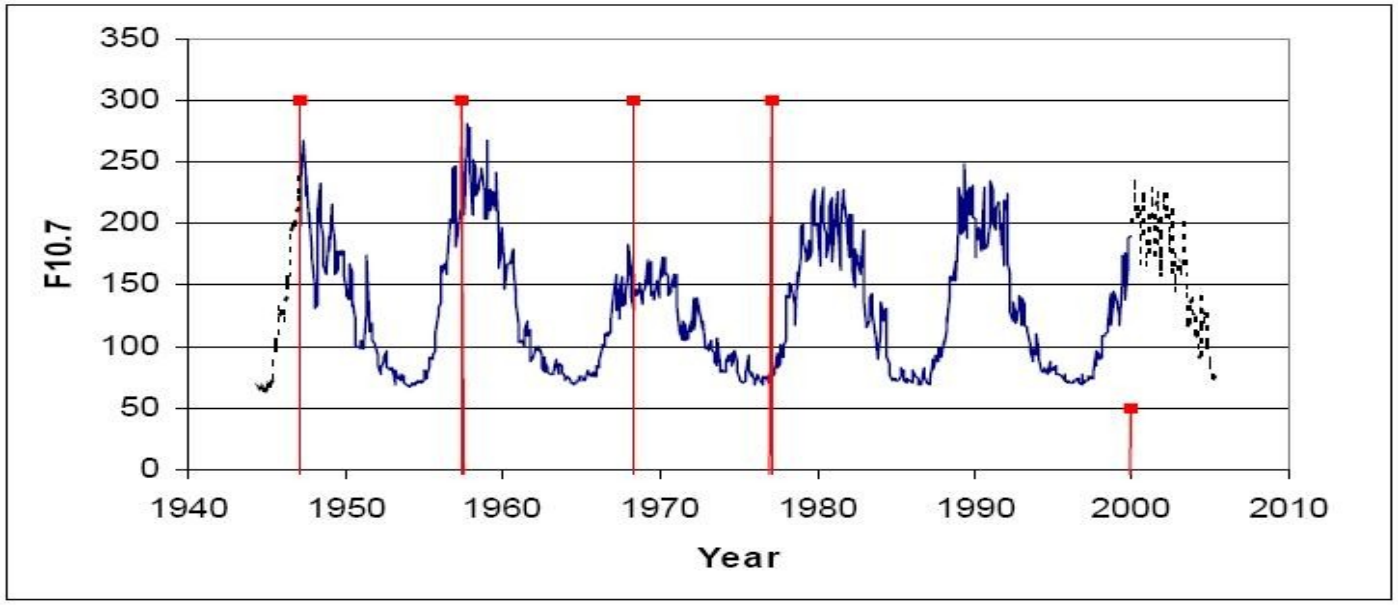

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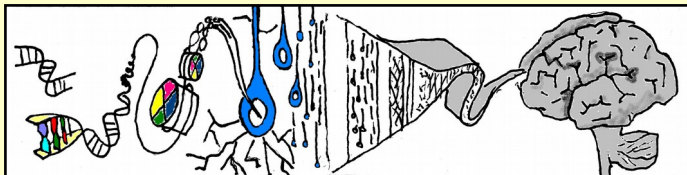


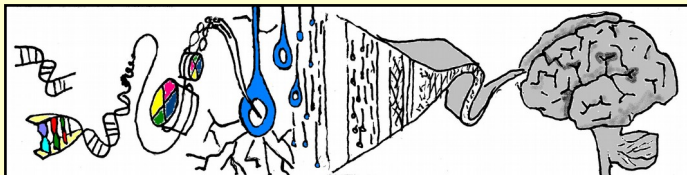
Irish Potato famine

"...It is quite important to remember that prior to the Great Famine, crop failure had been a part of the lives of the Irish for centuries..."

Famines and Crop Failures Prior to 1845

1740-1741	Massive loss of life (perhaps more than during the Great Famine)
1800-1801	Severe average mortality 50,000 - 60,000
1816-19	Severe average mortality 50,000 - 60,000
1821-2	Welfare Assistance helps lower mortality
1830-31	(Europe Wide famine causing agrarian unrest in Britain)
1839	regional distress (South and West)
1842	regional distress (South and West)
1845	**Irish Potato Famine**

Conrad Jay Bladey "The Potato Famine in History"
http://www.geocities.com/willboyne/nosurrender/chistory.html



IV. Climate and Food Production

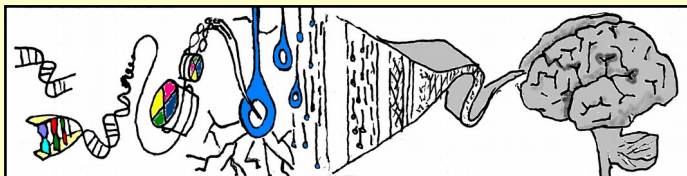
Irish Potato famine

"...The summer of 1845 was like most summers, on the whole hot and dry, but then a change occurred throughout Europe. In Ireland, the temperature dropped from 1.5-7ºF below the average temperatures of the last 19 years. In just a few weeks, the potato plants became a blighted mass of decaying vegetation..."[1]

[blame was put on thundering locomotives, wasted surplus crop, the "little people" started it, the land had become spent from over farming... reminiscent of cholera etc]

[2001] Jean Ristaino, a plant pathologist at North Carolina State University, found no sign of the US-1 strain of the fungus Phytophthora infestans when she examined DNA from more than two dozen lesion-covered potato leaves collected in Ireland and England between 1845 and 1847.

1. George J. Wong "The Origin of Plant Pathology and The Potato Famine, and Other Stories of Plant Diseases." http://www.botany.hawaii.edu/faculty/wong/BOT135/LECT06.HTM
2. Jean Ristaino "Irish Potato Famine Cause Revisited" http://www.hypography.com/article.cfm?id=31223 07Jun01



Pests - Insects are climate-sensitive!

Last Rocky Mountain locust swarms peaked from 1873-1877.

"grasshoppers ate everything but the mortgage"

Periodic swarms of migrating locusts were part of the natural rhythm of the grasslands, particularly during years of drought.

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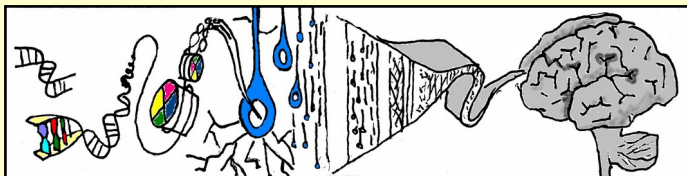
Jeffery A. Lockwood 2004 "Locust: The Devastating Rise and Mysterious Disappearance of the Insect that Shaped the American Frontier" Basic Books, New York, 2004. 304
http://www.bioone.org/perlserv/?request=get-document&doi=10.1641%2F0006-3568(2005)055%5B0080%3AEOTRML%5D2.0.CO%3B2&ct=1

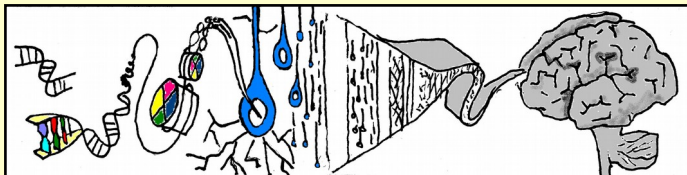


IV. Climate and Food Production - Cautions

Reliable predictions?

1. We cannot yet predict the internal activity of the Sun!!!
2. Non-Solar processes are of course very important as well:
   Climate reservoirs - oceans and glaciers
   Tertiary effects - albedo, GHGs, wind-ocean, asteroids, volcanos etc
3. Geography (including altitude, mountain ranges, proximity to bodies of water, winds etc) extremely important to timing and the nature of regional climate change.
4. Danger of "cyclo-mania" - quasi-cycles, not cycles

Better information today than for early civilisations - but still a huge amount of uncertainty



Outline

1) Introduction
2) BIG climate drivers - astronomy, geology, biology
3) Kyoto Premise - science fashion->cult->religion
4) Canadian Prairies - climate & food production
5) Summary, conclusions, questions

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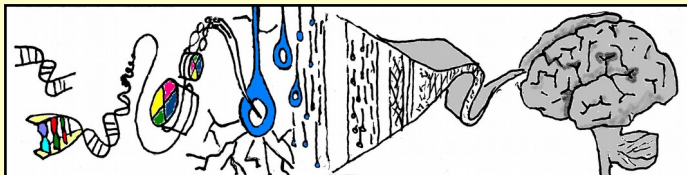
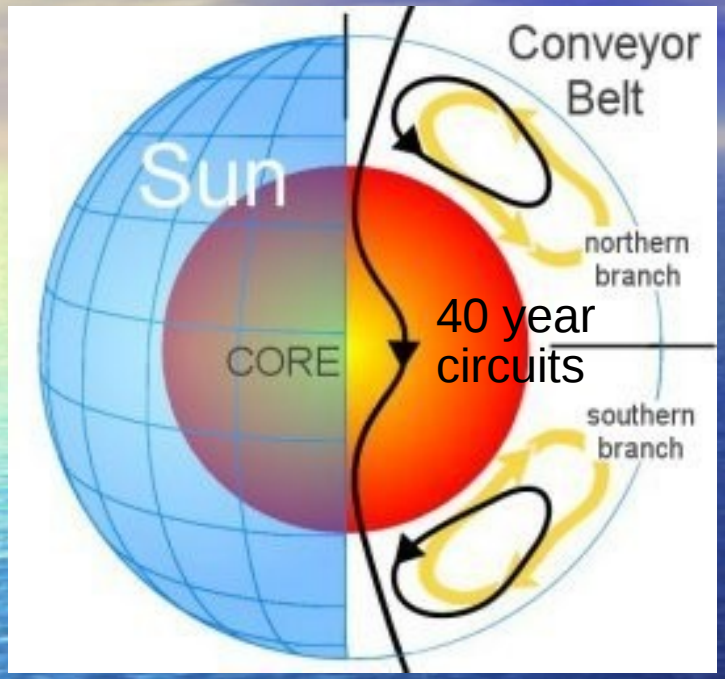
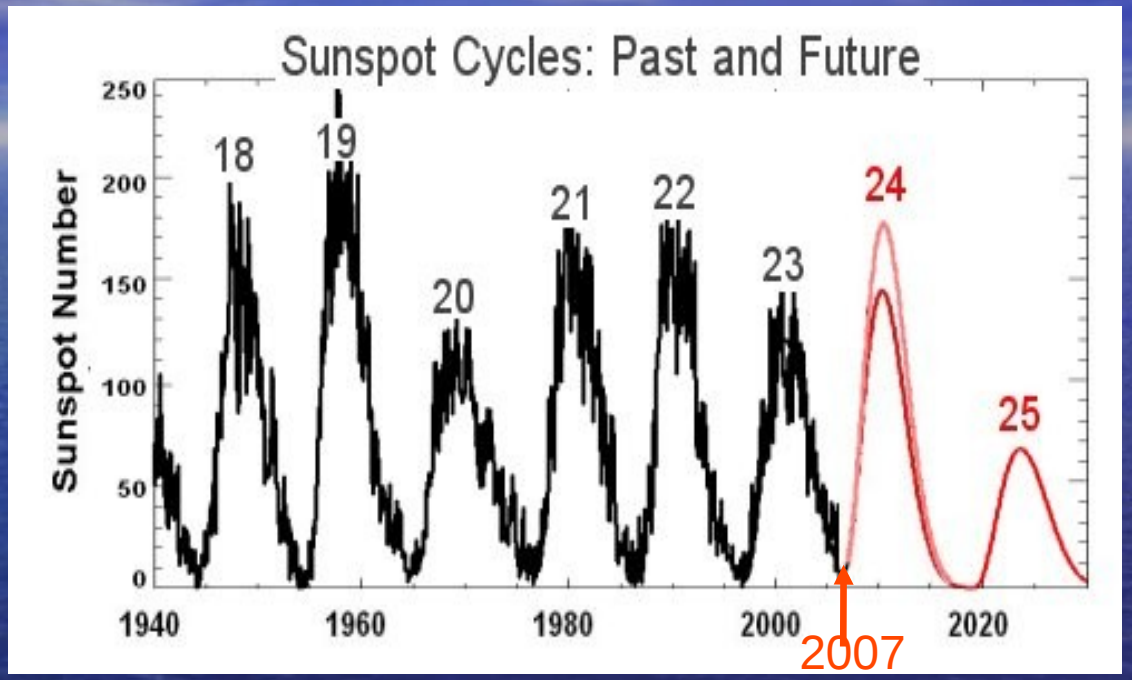


Solar Cycle 25 To Be Weakest in Centuries





The Sun's Great Conveyor Belt has slowed to a record-low crawl, which has important repercussions for future solar activity.

Normally 1 m/s since 19th century. Now 0.75m/s in N and 0.35 m/s in S.

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Tim Patterson presentation, 17May07
NASA (physorg.com/preview66581392.html)

Conclusions

The Kyoto Premise is a poor model of climate change on all time scales and geographies.

Alternative theories can actually fit the data. Many have been around for a LONG time!

Keep It Simple Stupid (KISS) – Major mistakes are being made with the initial, simple aspects of climate change. This doesn't bode well for the complex approaches if we keep jumping on science fashions-cults-religions.

Conclusions

Diversity of opinion and approach is the key retain "Multiple Conflicting Hypothesis"

"Scientific Consensus" can be an oxymoron.

especially with politically correct issues (eg health sciences, environment etc)

"Science-Policy Links" have become problematic, combined with the misapplication of management, science and policy principles.

National Post - perhaps the ONLY solid, major Canadian media source on climate change? World leader.

With apologies to Abraham Lincoln:

You can fool all of the scientists some of the time,

Almost all of the scientists all of the time,

But you can't fool all of the scientists all of the time.

Priorities for climate science - Solar physics-Astronomy, earth sciences, and new modelling approaches.

Withdraw from the UN-IPCC & Kyotol Protocol!!

World-famous Canadian "Climate Scientists "

- Steve McIntyre, financial guy, Toronto
- Ross McKitrick, economist, Uof Guelph
- Jan Veizer, geologist, Uof Ottawa
- Tim Patterson, geologist, Uof Carleton
- Ian Clarke, geologist, Uof Ottawa
- Tim Ball, climatologist, Uof Winnipeg
- Madhav Khadekar, retd climate, Environment Canada

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Still in Doubt?

Call your local Spud Trooper!

www.friendsof science.org

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http://www.thinkgeek.com/brain/whereisit.cgi?t=tater&cpg=33H

Climate Change:

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It's the Sun, Stupid!