

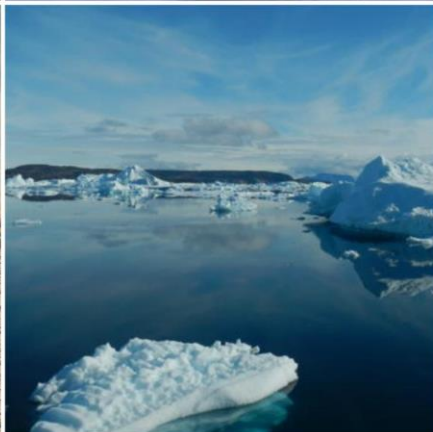
Understanding Climate Change

Nicola Scafetta
13 July, 2023

Podcast with Tom Nelson

CLIMATE ALLARMISM

Climate or weather?



**Our House
Is on Fire
Scenes of
a Family
and a Planet
in Crisis**

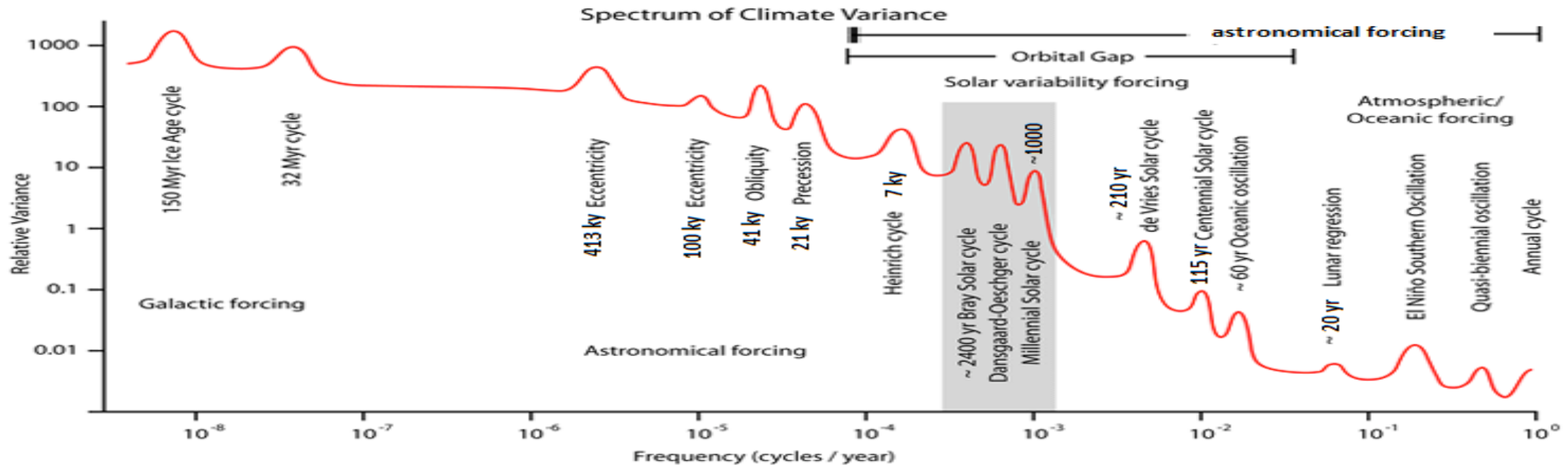
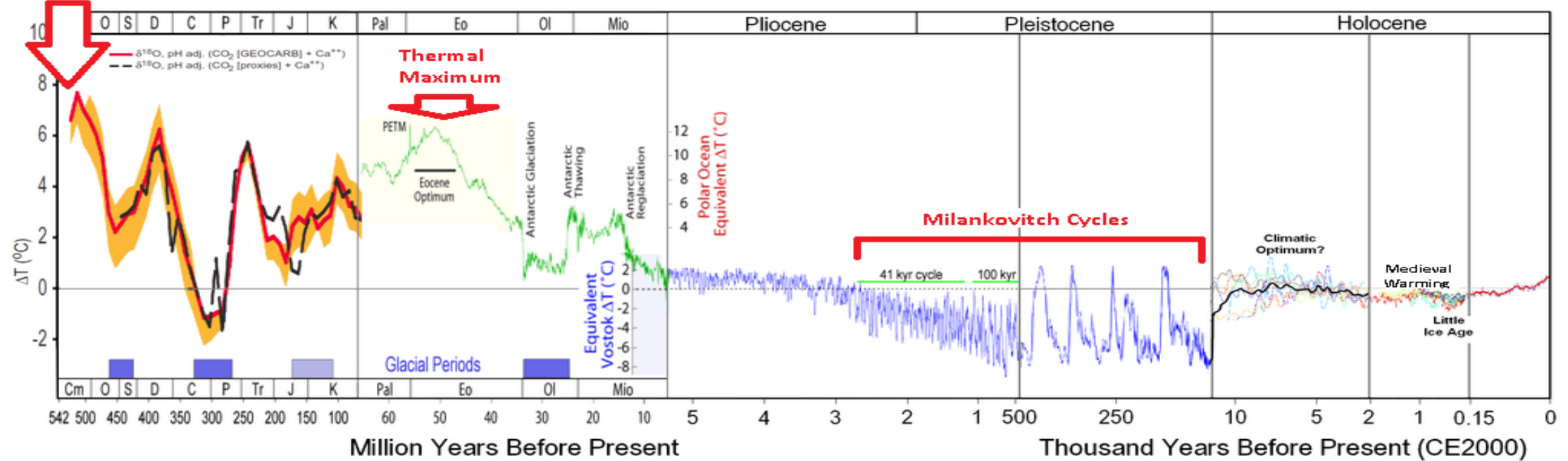
Greta Thunberg,
Svante Thunberg,
Malena Ernman,
and Beata Ernman



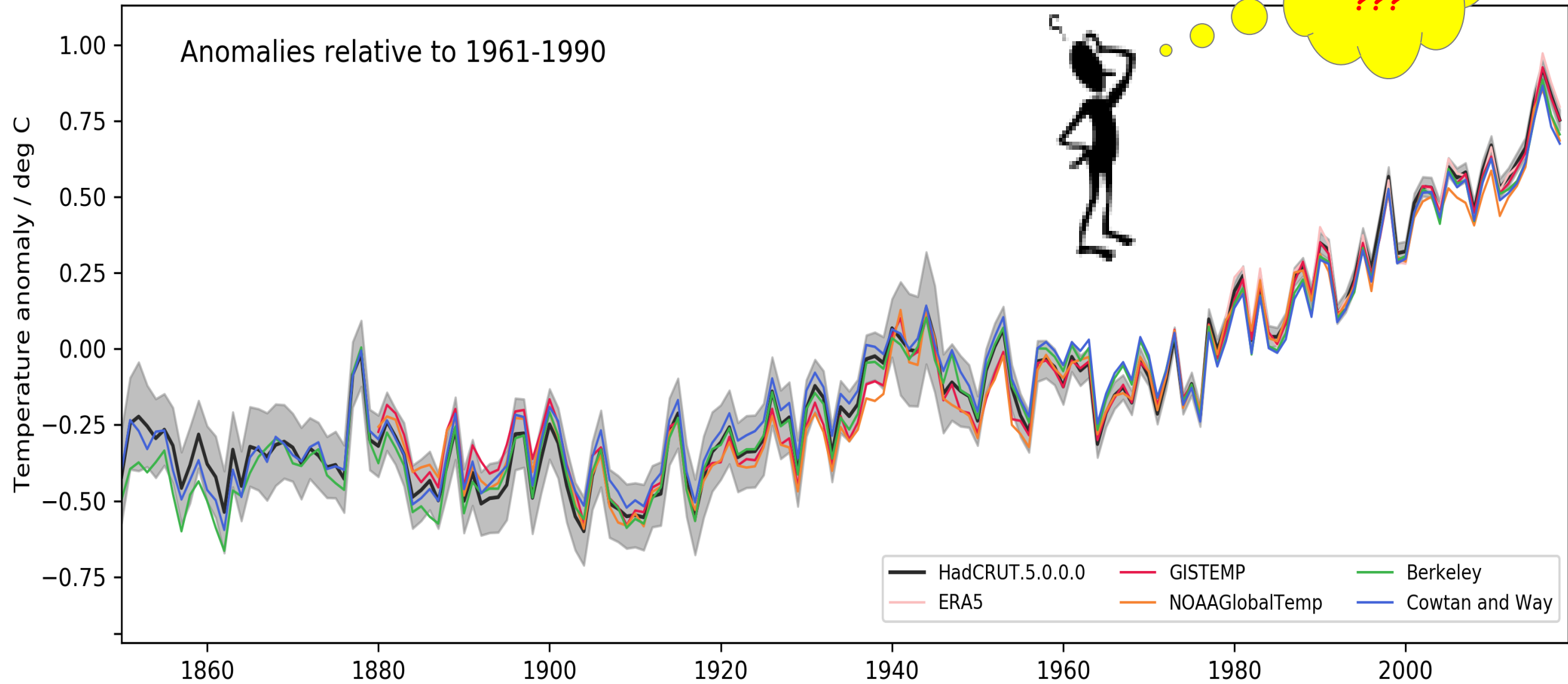
In his 2007 Nobel prize acceptance speech, Al Gore predicted: "The entire North polar ice cap may well be completely gone in five years."

Temperature of Planet Earth

End of Oxygen Explosion

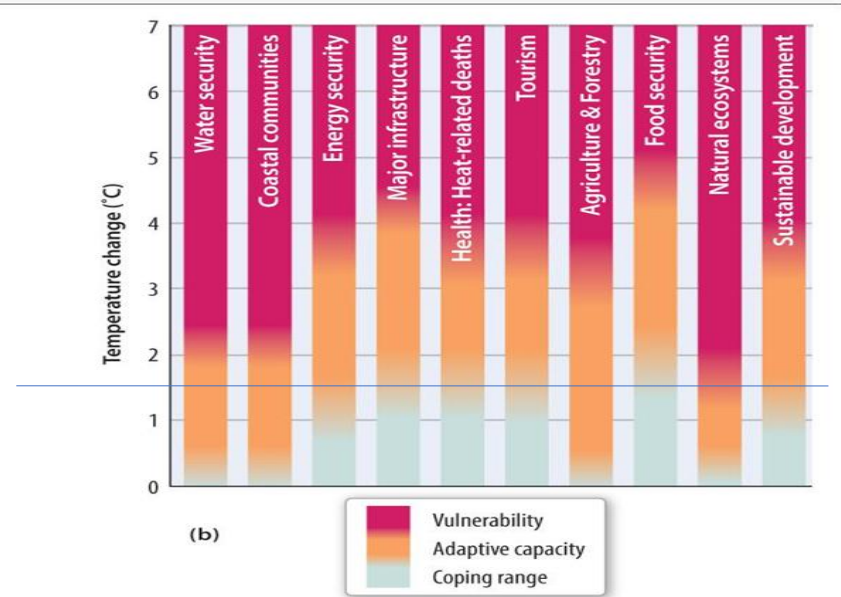
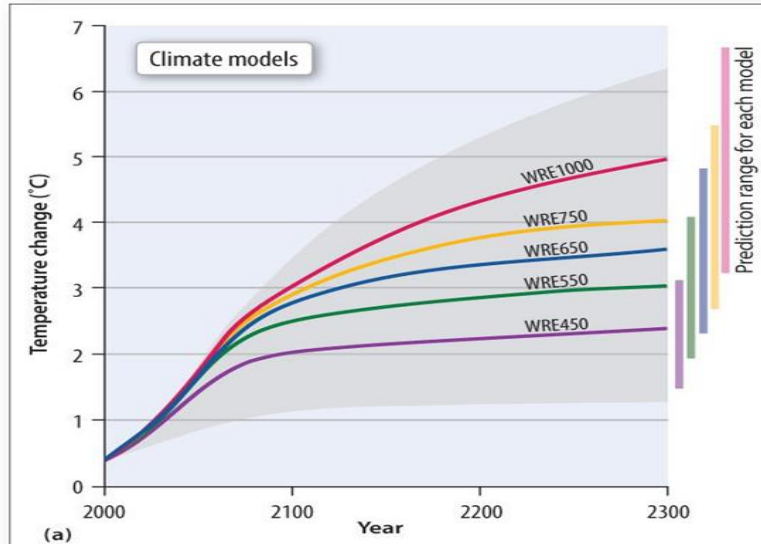
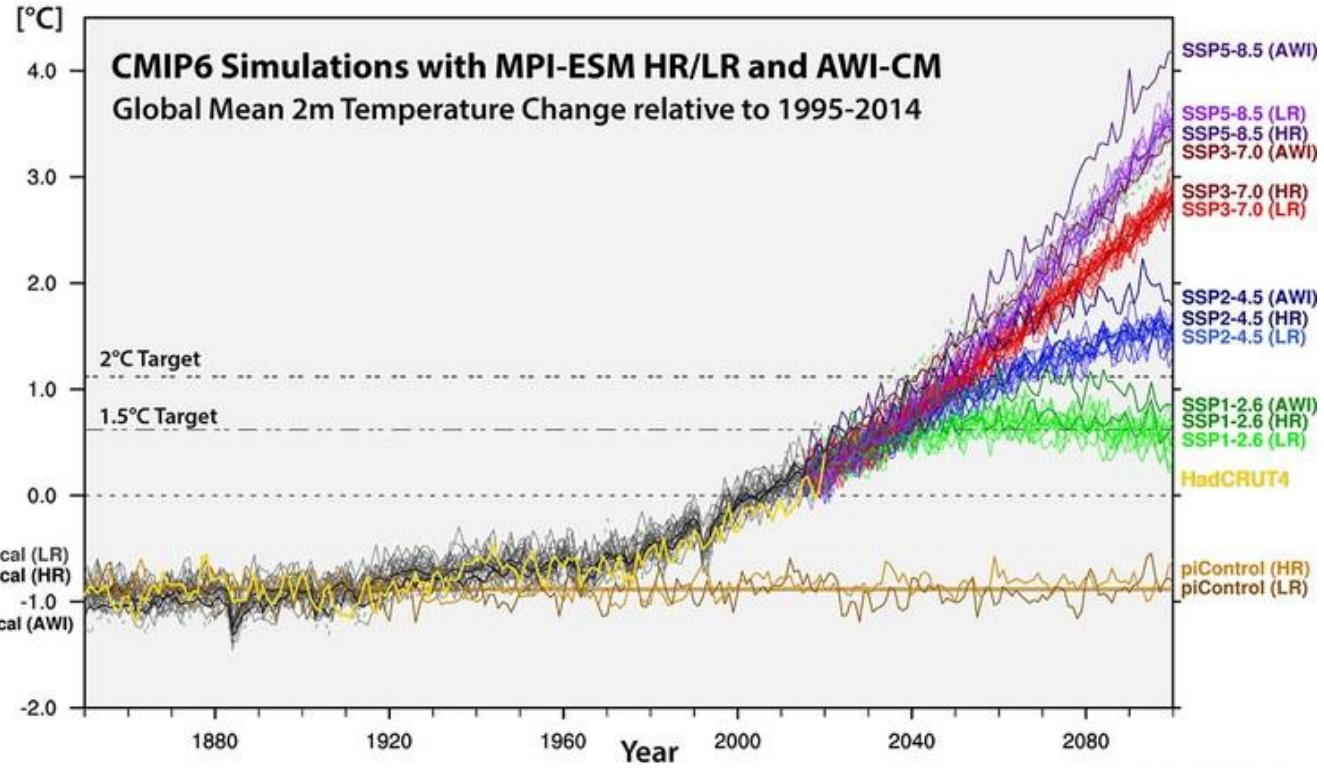


Global Warming



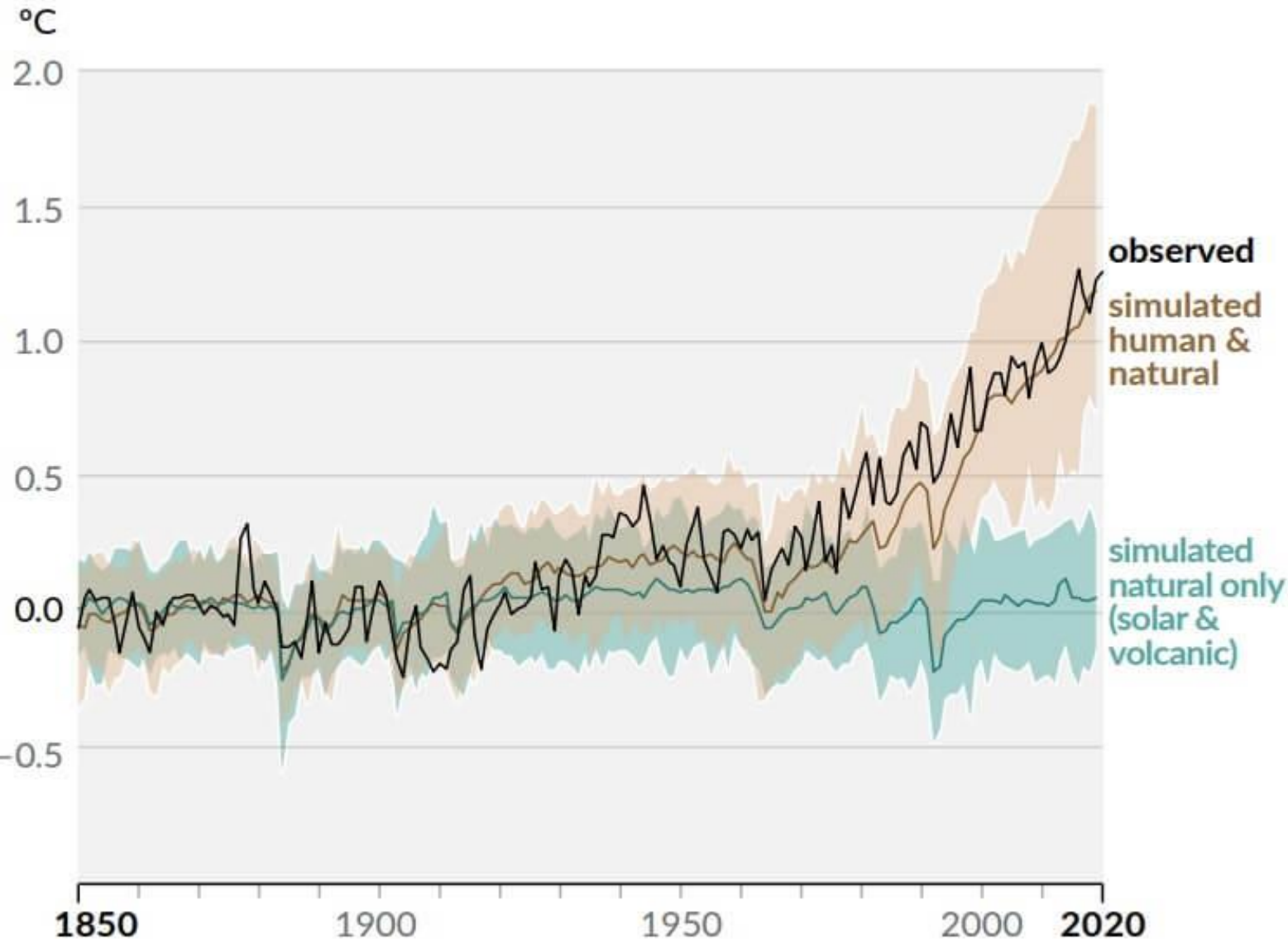
IPCC SR1.5 (2018)

The 1.5/2.0 °C warming limit



The Anthropogenic Global Warming Theory of the IPCC:

“100% of the warming since 1850-1900 is Anthropogenic”

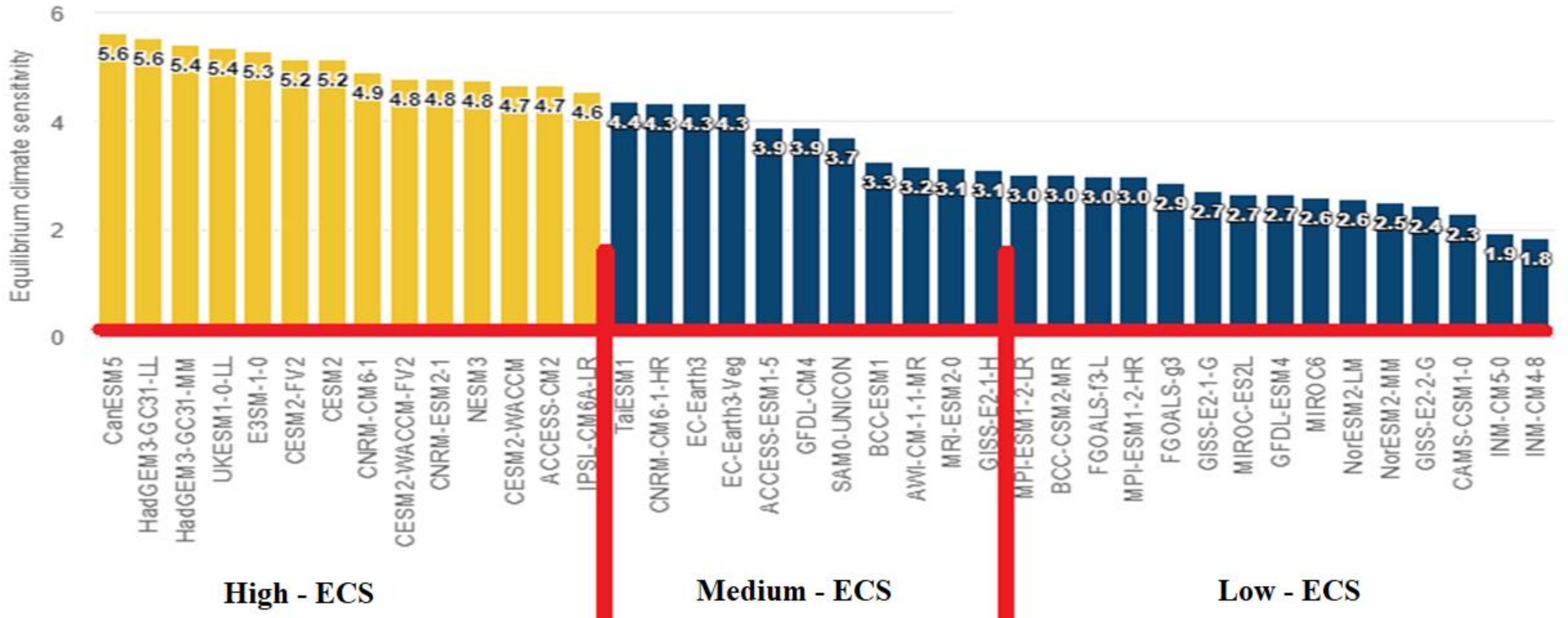


Without human input, climate models do not reproduce any warming since 1850-1900

With the human contribution, the climate models reproduce the warming since 1850-1900

Global climate models (CMIP6) and Equilibrium Climate Sensitivity (ECS).
The ECS is an estimate of eventual steady-state global warming with double CO2.

Climate sensitivity in CMIP6 models

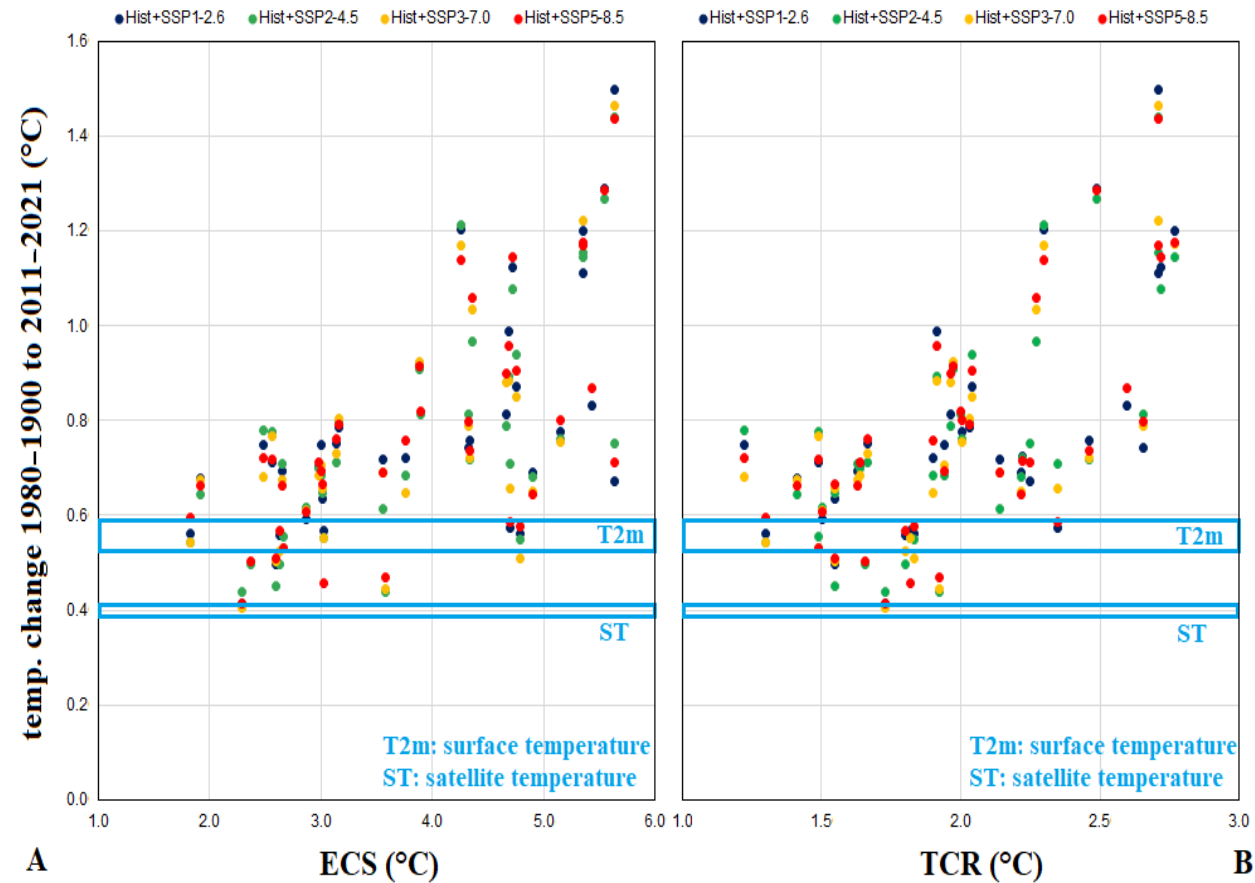
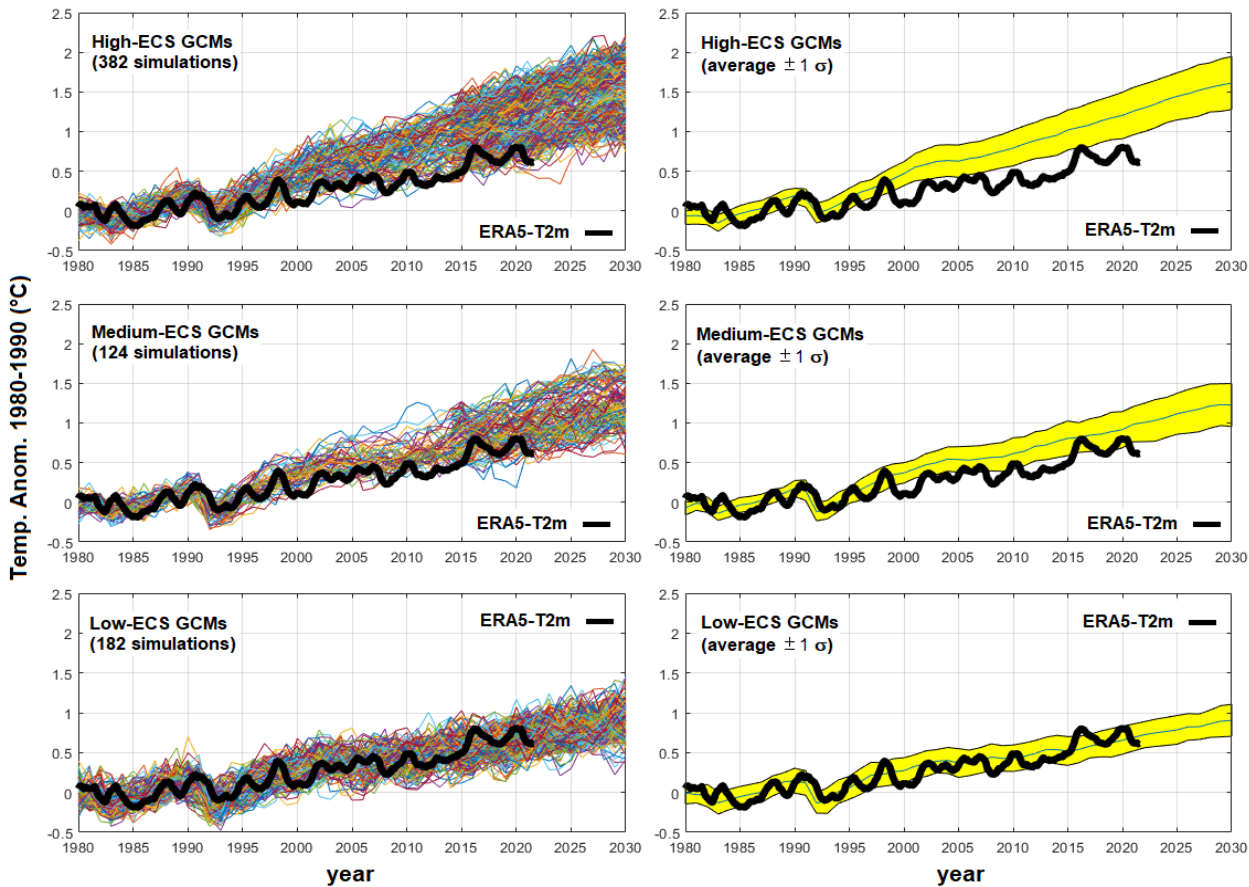


From 1980 al 2021 : GCM vs. Data

Scafetta, N. Advanced testing of low, medium, and high ECS CMIP6 GCM simulations versus ERA5-T2m. *Geophys. Res. Lett.* **2022**, *49*, e2022GL097716.

Scafetta, N. CMIP6 GCM ensemble members versus global surface temperatures. *Clim Dyn* (2022). <https://doi.org/10.1007/s00382-022-06493-w>

Scafetta, N. CMIP6 GCM Validation Based on ECS and TCR Ranking for 21st Century Temperature Projections and Risk Assessment. *Atmosphere* 2023, *14*, 345. <https://doi.org/10.3390/atmos14020345>



IPCC AR6
Figure 3.10
p. 443

The tropospheric
warming is not
produced by the
models

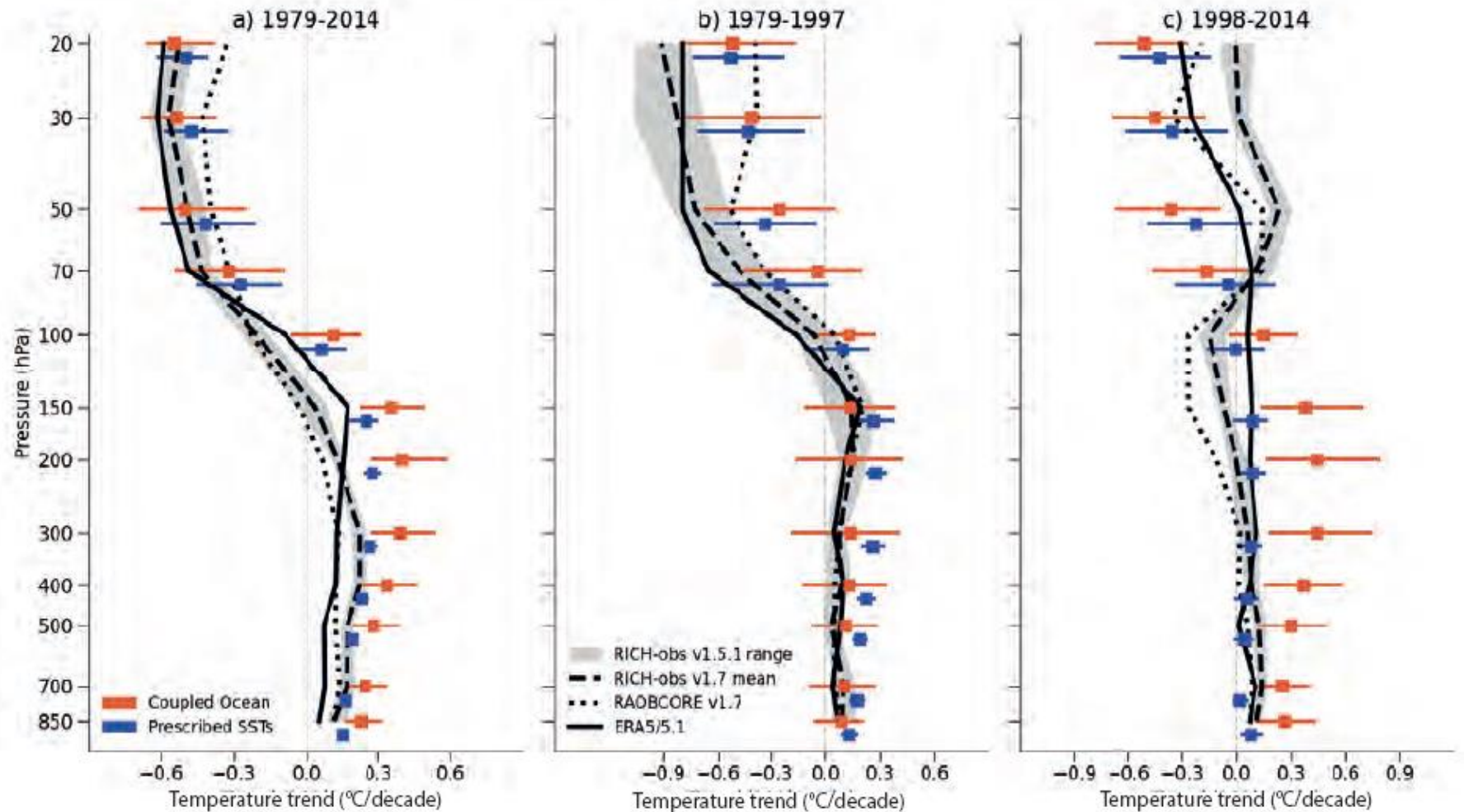
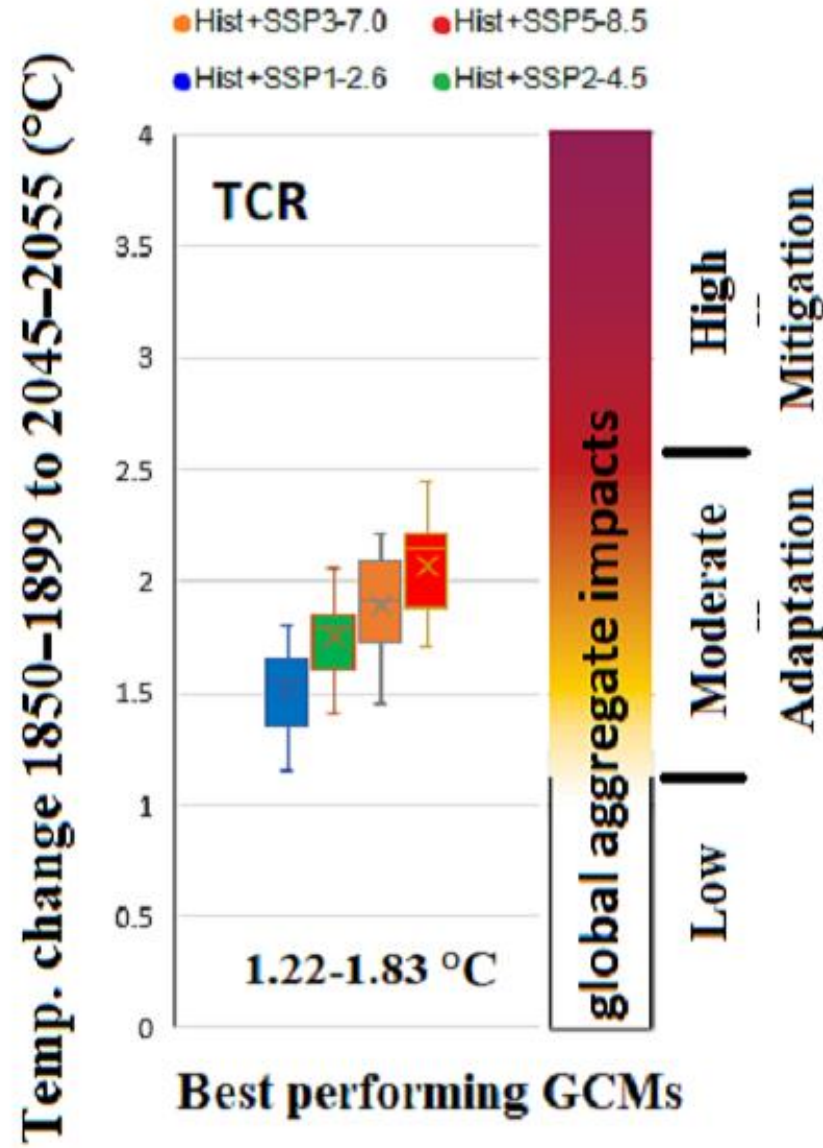
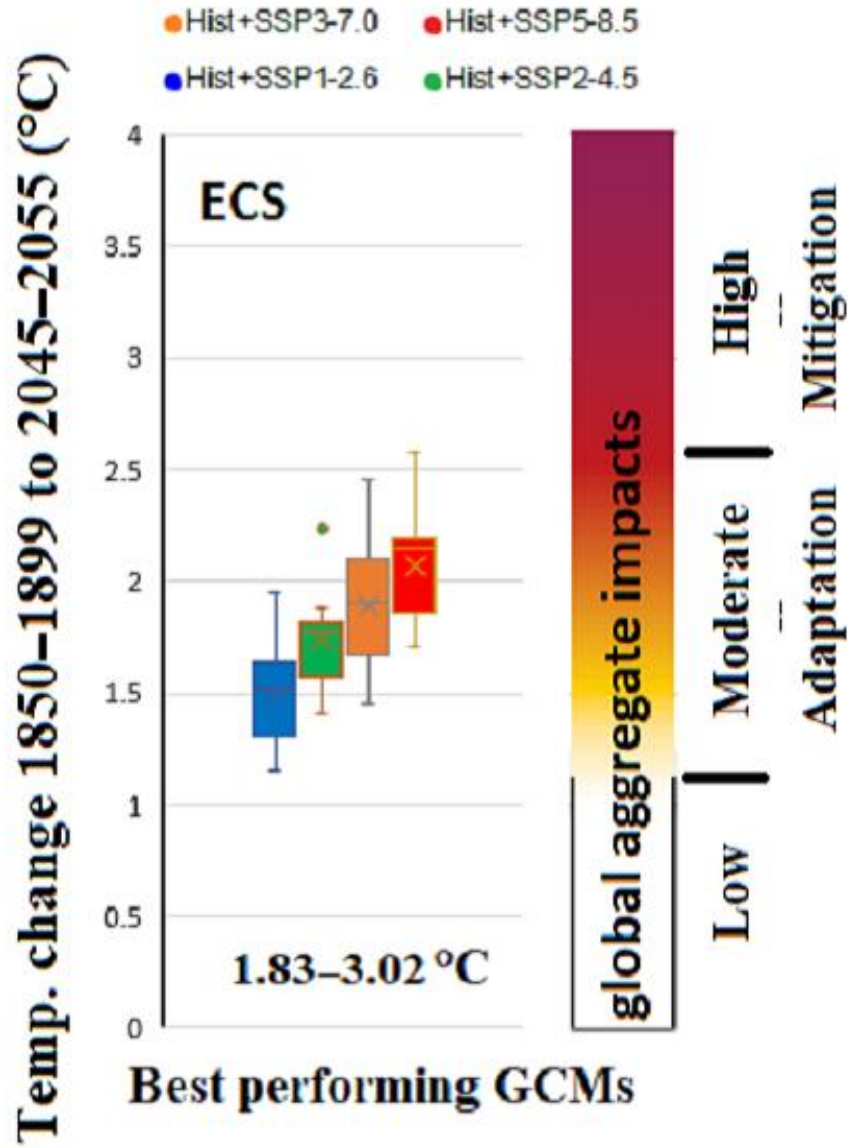


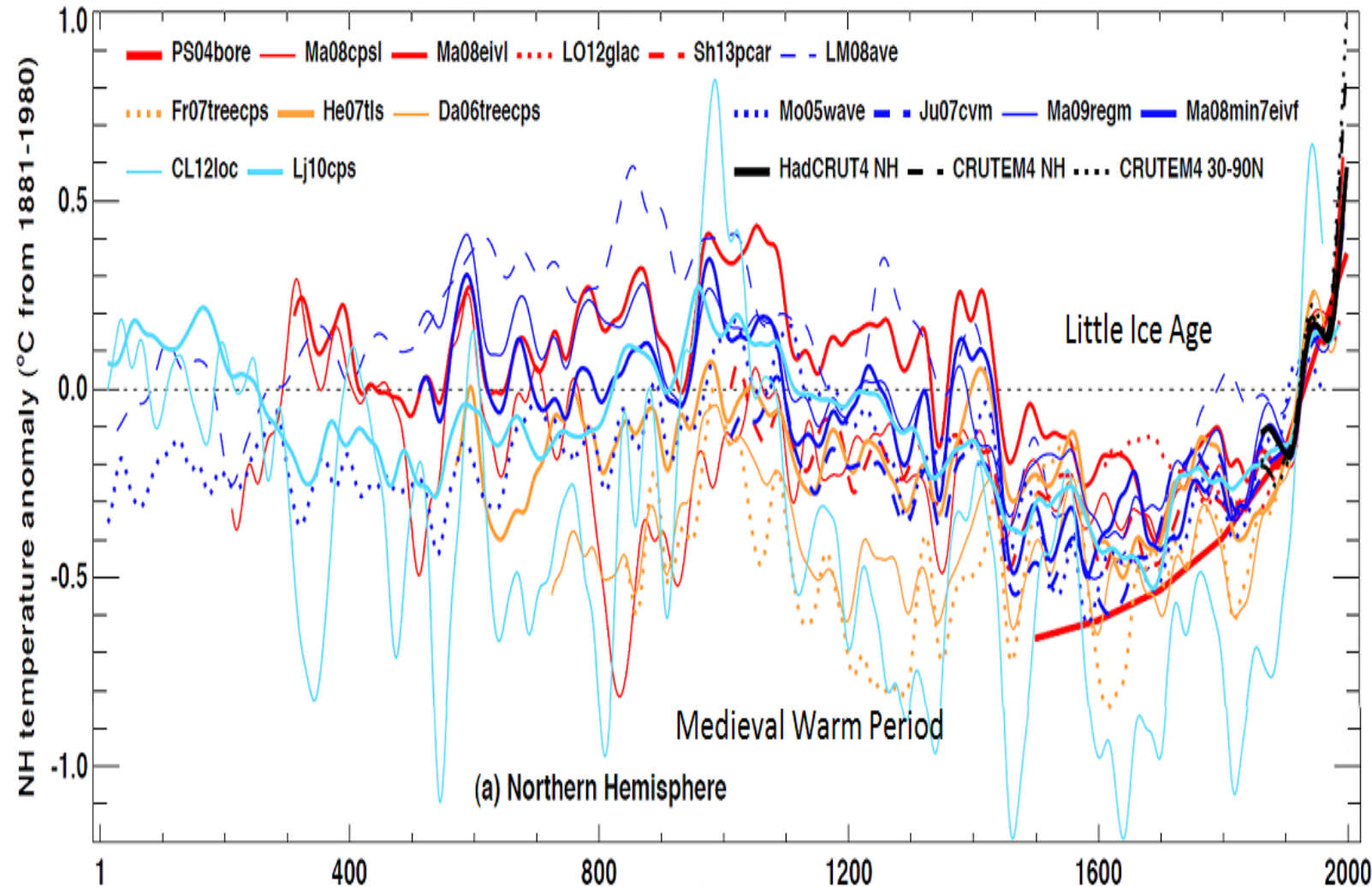
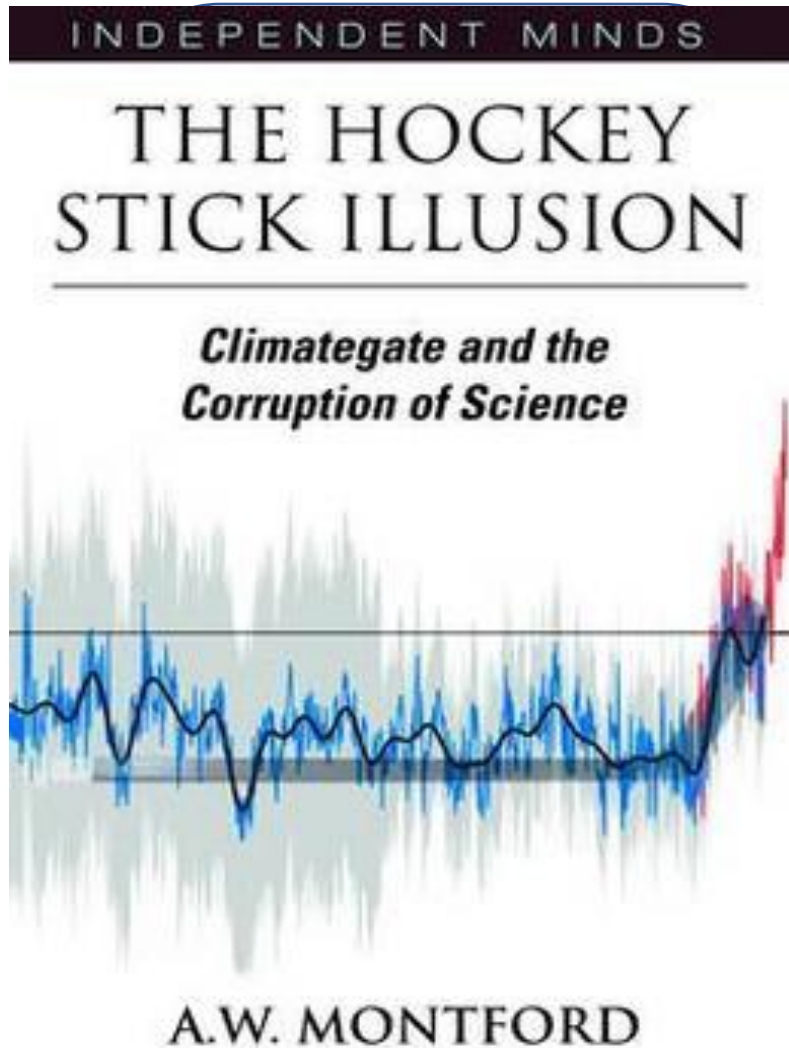
Figure 3.10 | Observed and simulated tropical mean temperature trends through the atmosphere. Vertical profiles of temperature trends in the tropics (20°S–20°N) for three periods: (a) 1979–2014, (b) 1979–1997 (ozone depletion era) and (c) 1998–2014 (ozone stabilization era). The black lines show trends in the Radiosonde Innovation Composite Homogenization (RICH) 1.7 (long dashed) and Radiosonde Observation Correction using Reanalysis (RAOBCORE) 1.7 (dashed) radiosonde datasets (Haimberger et al., 2012), and in the ERA5/5.1 reanalysis (solid). Grey envelopes are centred on the RICH 1.7 trends, but show the uncertainty based on 32 RICH-observations members of version 1.5.1 of the dataset, which used version 1.7.3 of the RICH software but with the parameters of version 1.5.1. ERA5 was used as reference for calculating the adjustments between 2010 and 2019, and ERA-Interim was used for the years before that. Red lines show trends in CMIP6 historical simulations from one realization of each of 60 models. Blue lines show trends in 46 CMIP6 models that used prescribed, rather than simulated, sea surface temperatures (SSTs). Figure is adapted from Mitchell et al. (2020), their Figure 1. Further details on data sources and processing are available in the chapter data table (Table 3.SM.1).

Only Green projections are realistic



The anthropic thesis was believed because of one 1998-2001 Northern Hemisphere temperature reconstruction showing little climate variation during the pre-industrial period.

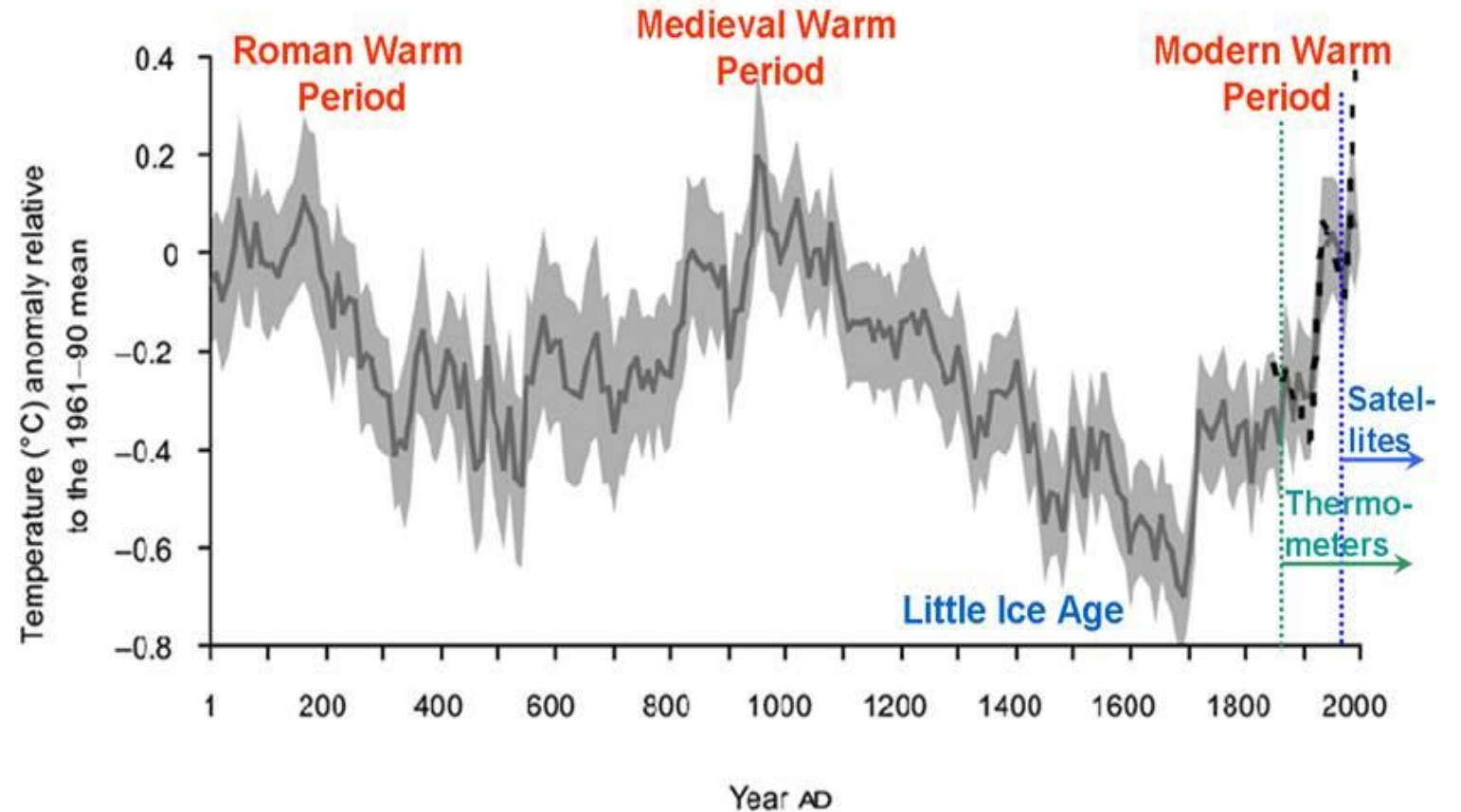
The IPCC used the Hockey Stick record by Mann in 2001 and 2007 before abandoning it in 2013.



- Let's see one of the modern reconstructions
- The “Hockey Stick” disappears
- A great Millennial Cycle appears

Nearly Every Century Experiences Global Warming or Cooling

Temperature Reconstruction* for N. Hemisphere, 1 - 2000 AD
Shows Modern Warm Period Not Exceptional



*Ljungqvist, F.C. 2010. A new reconstruction of temperature variability in the extra-tropical Northern Hemisphere during the last two millennia. *Geografiska Annaler: Physical Geography*, Vol. 92 A(3), pp. 339-351, September 2010. DOI: 10.1111/j.1468-0459.2010.00399.x

Vikings in Greenland

<https://ancientfoods.wordpress.com/2012/02/17/viking-barley-in-greenland/>



Evidence suggests Vikings grew barley in south Greenland



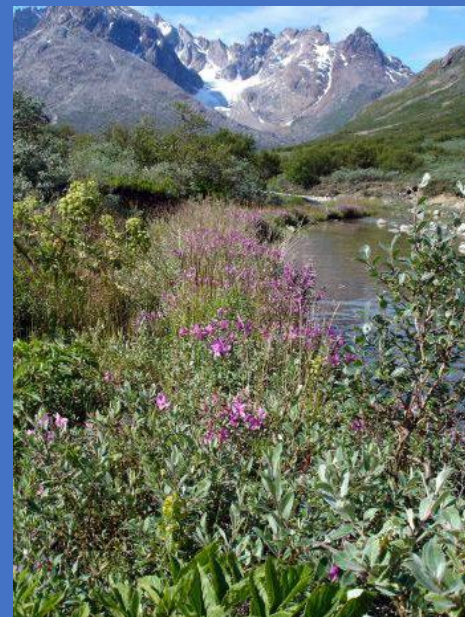
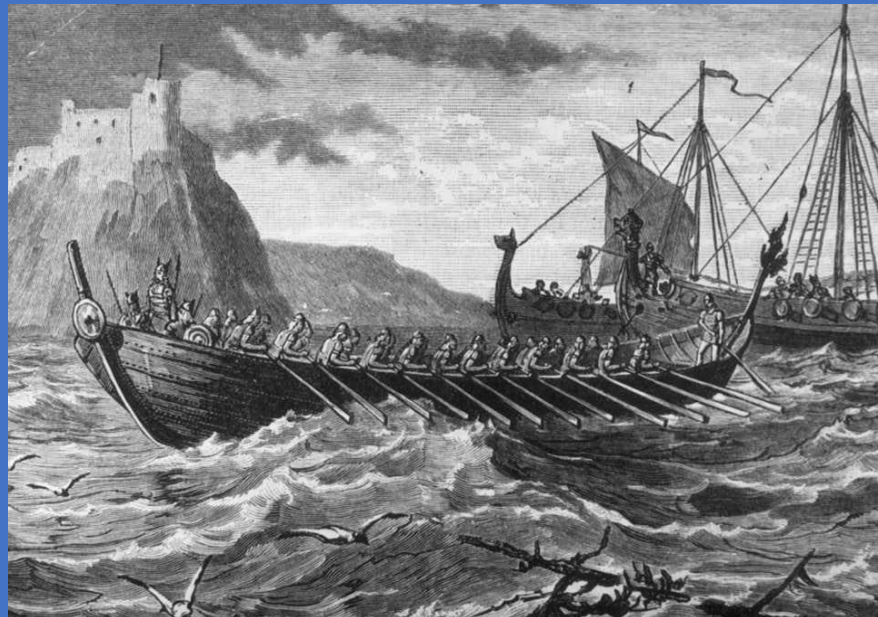
RESEARCH ARTICLE | FEBRUARY 06, 2019

Medieval warmth confirmed at the Norse Eastern Settlement in Greenland

G. Everett Lasher; Yarrow Axford

Geology (2019) 47 (3): 267-270.

<https://doi.org/10.1130/G45833.1> Article history



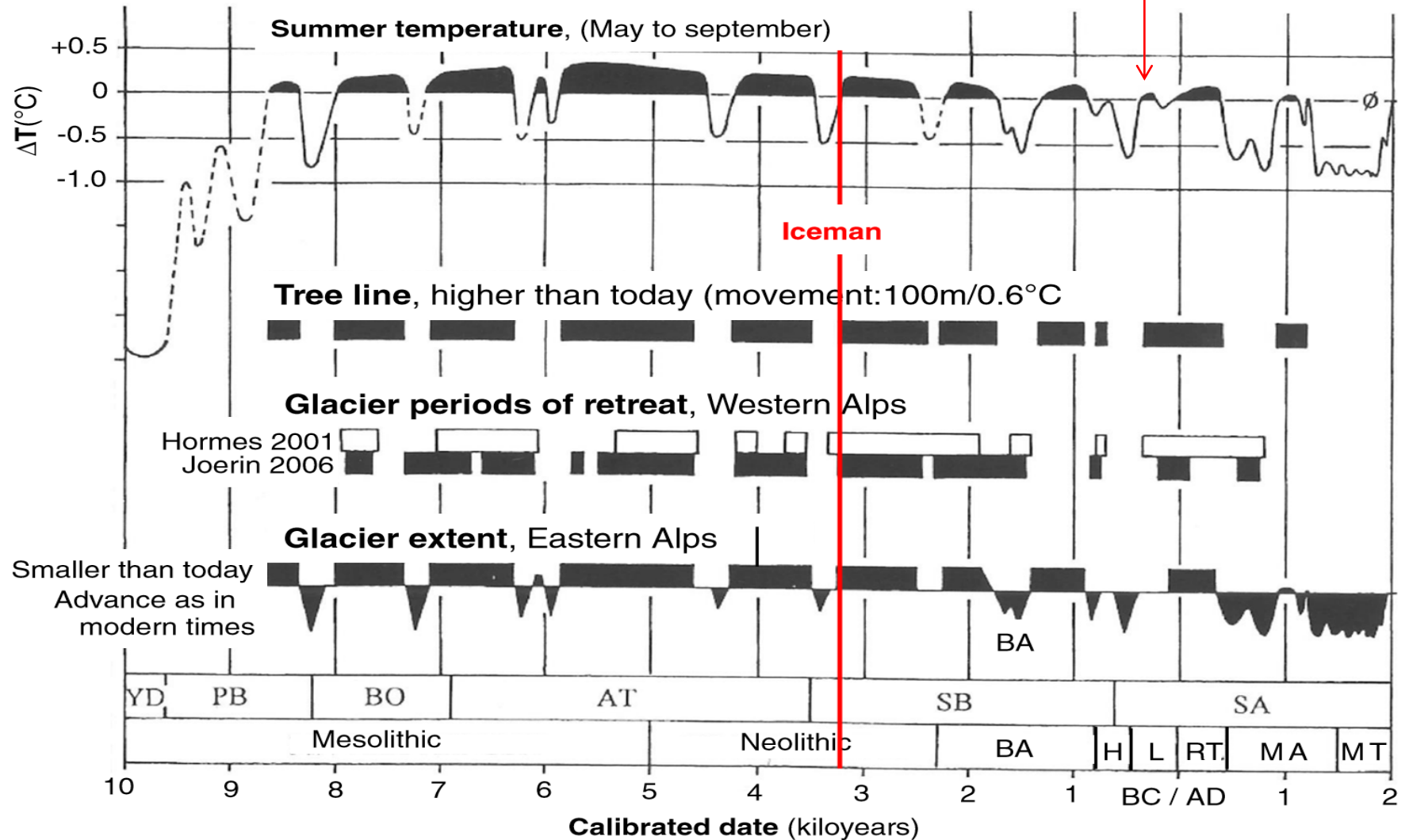
The Qinnua valley



A quasi-millennial oscillation in the Summer temperatures in the European Alps throughout the Holocene



Annibal



Kutschera, W., Patzelt, G., Steier, P., Wild, E.M.: 2017. The tyrolean iceman and his glacial environment during the holocene. Radiocarbon 59(2), pp. 395-405

Trees under the glacials



Melting glaciers in Western Canada are revealing tree stumps up to 7,000 years old where the region's rivers of ice have retreated to a historic minimum, a geologist said today.



Glacier-buried forests from ~1000 years ago uncover a warm Medieval period

Figure 2. Students learn how scientists combine living and dead trees to create millennial-length records of temperature, such as the buried forests emerging here from the wasting margin of Mendenhall Glacier (Credit: Jesse Wiles).

Davi et al., 2019



Il passo di Susten (Svizzera) come è oggi (sopra) e come probabilmente era al tempo dei Romani, 2000 anni fa verde e con diversi boschi (sotto). (Die Alpen / Atelier Thomas Richner based on a draft from Christoph Schlüchter).



Glacier de Mont Miné

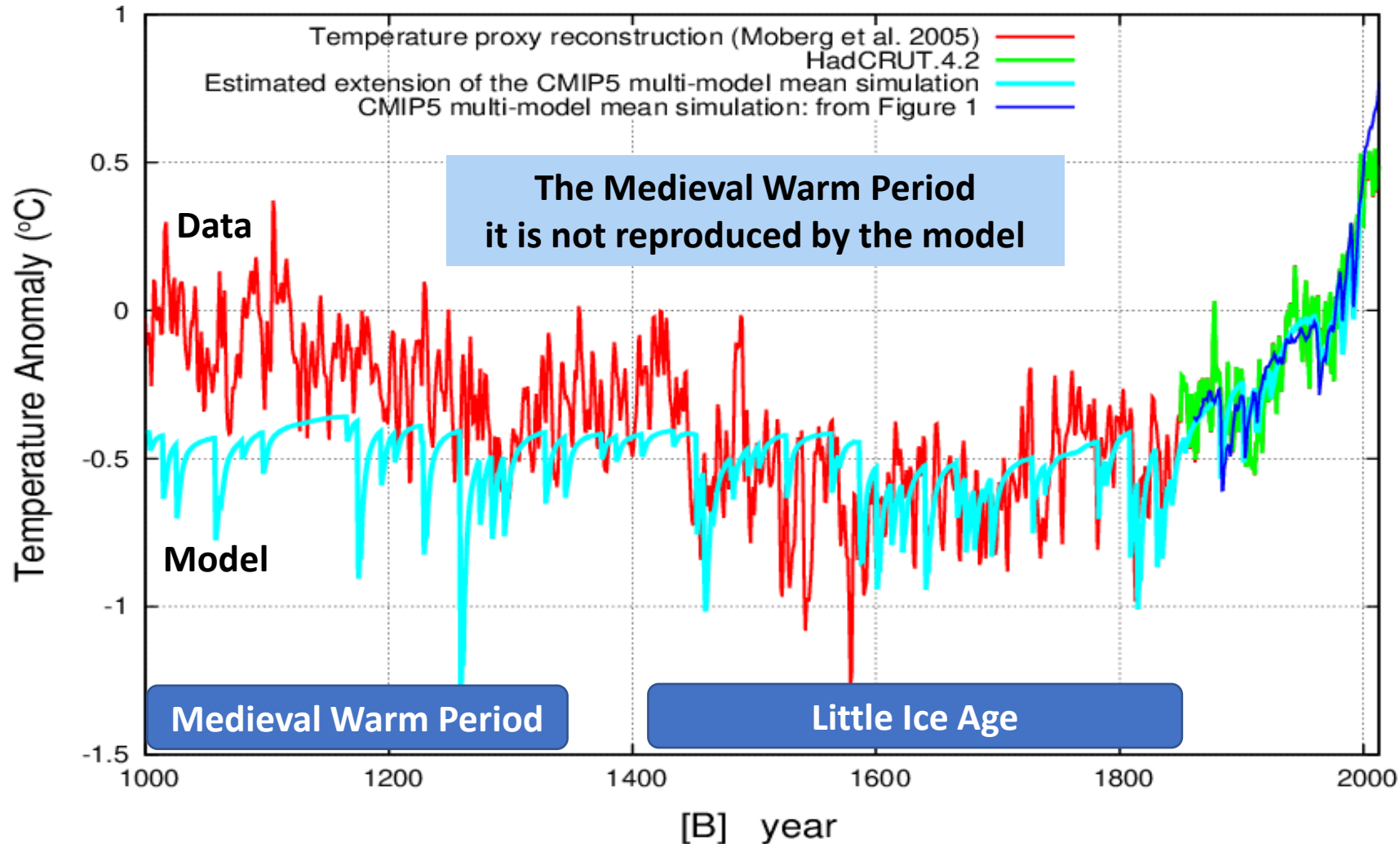


Christian Schlüchter: "Alpen ohne Gletscher? Holz- und Torffunde als Klimaindikatoren", Die Alpen, 6/2004; The Alps with little ice: evidence for eight Holocene phases of reduced glacier extent in the Central Alps, The Holocene, 2001, 11/3: 255-265



Comparison between a simulation of the IPCC Models (light blue and blue) vs the Temperatures (red and green)

Scafetta, N. Reconstruction of the Interannual to Millennial Scale Patterns of the Global Surface Temperature. Atmosphere 2021, 12, 147. <https://doi.org/10.3390/atmos12020147>



IPCC AR6
Figure 3.2
p. 432

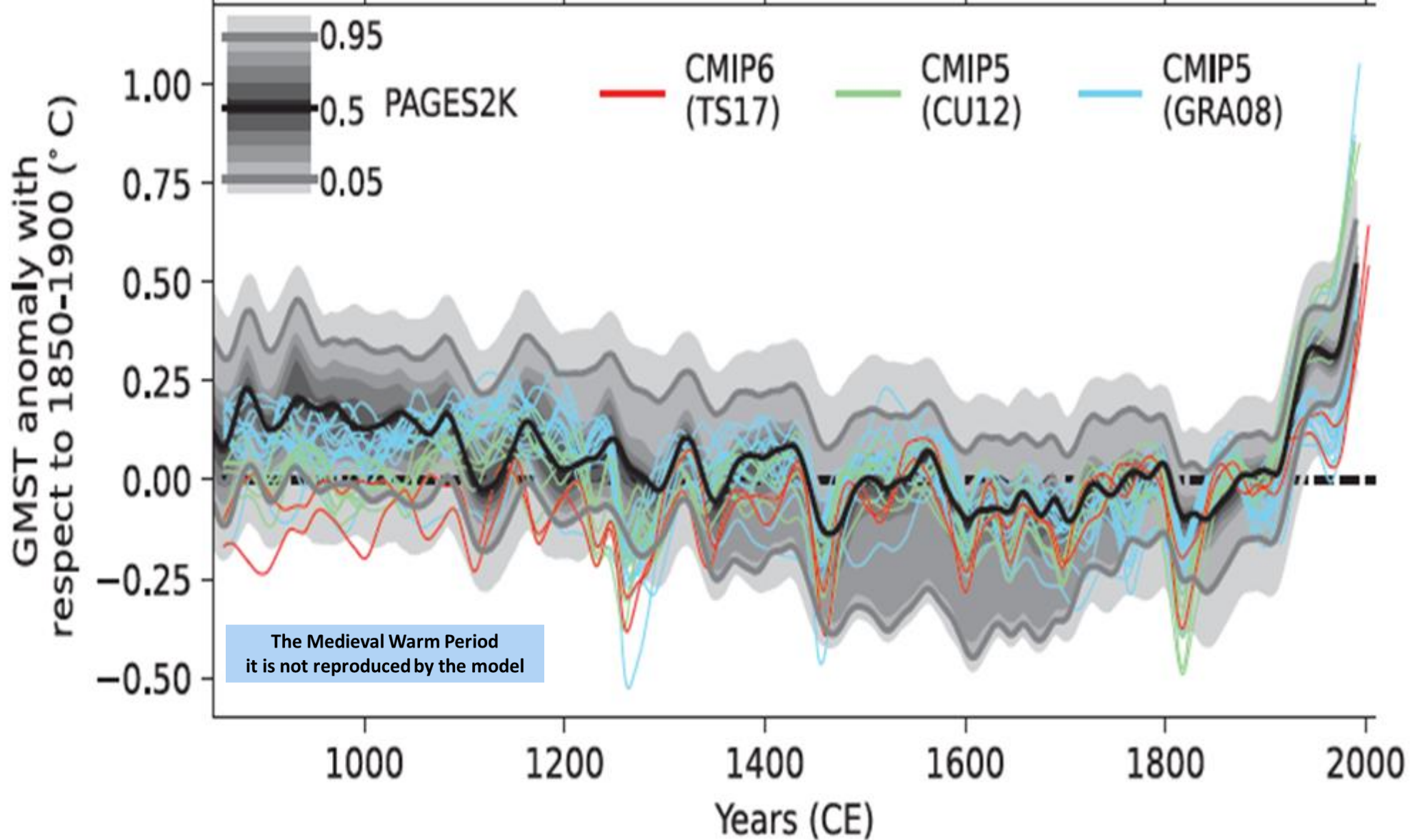
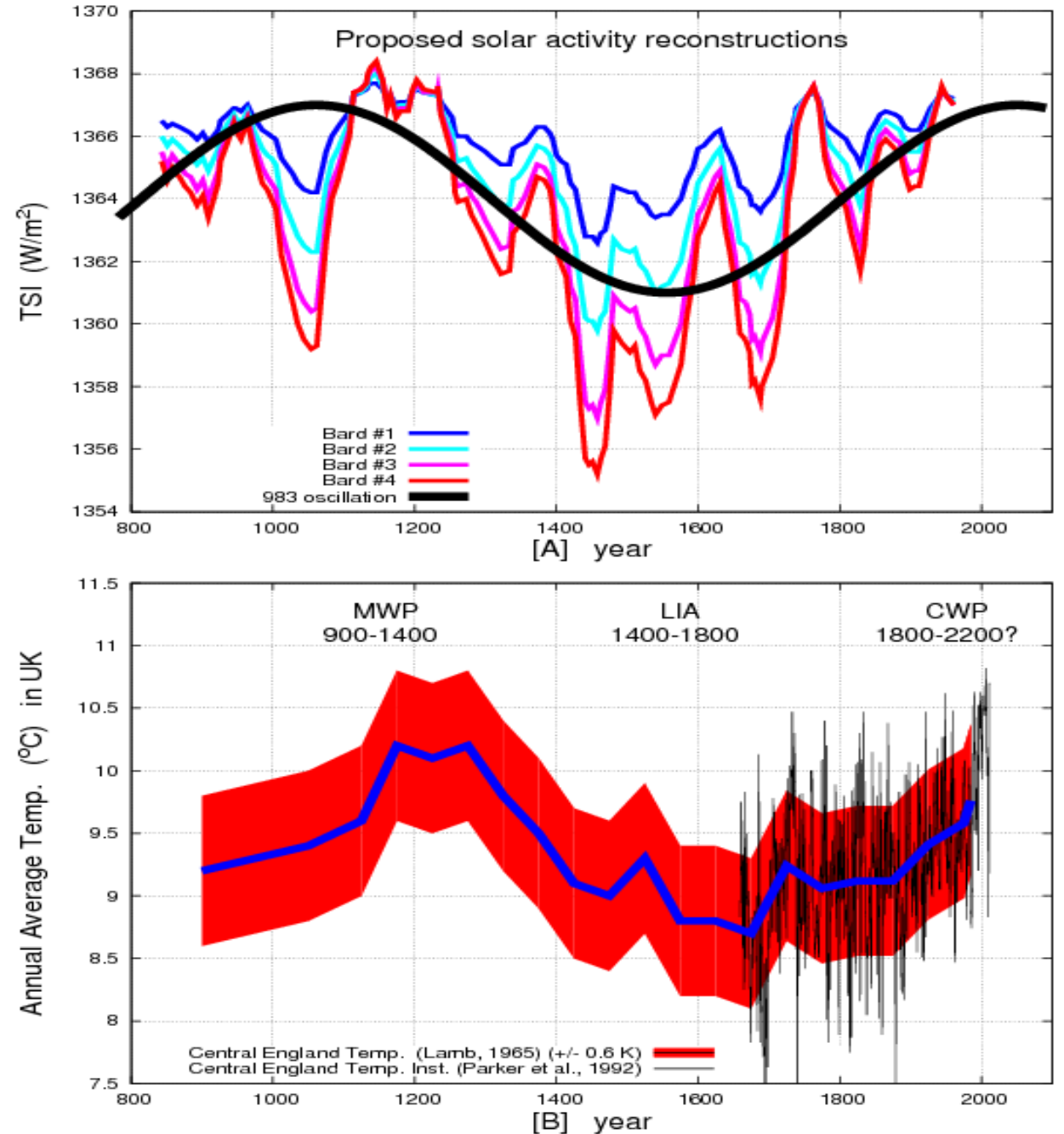


Figure 3.2 | Changes in surface temperature for different paleoclimates. (a) Comparison of reconstructed and modelled surface temperature anomalies for the Last Glacial Maximum over land and ocean in the Tropics (30°N – 30°S). Land-based reconstructions are from Cleator et al. (2020). Ocean-based reconstructions are from Tierney et al. (2020b). Model anomalies are calculated as the difference between Last Glacial Maximum and pre-industrial control simulations of the PMIP3 and PMIP4 ensembles,

- Only solar activity has a millennial cycle.
- Which correlates with the millennial cycle of temperatures

Central England Temperature



- Only solar activity has a millennial cycle.

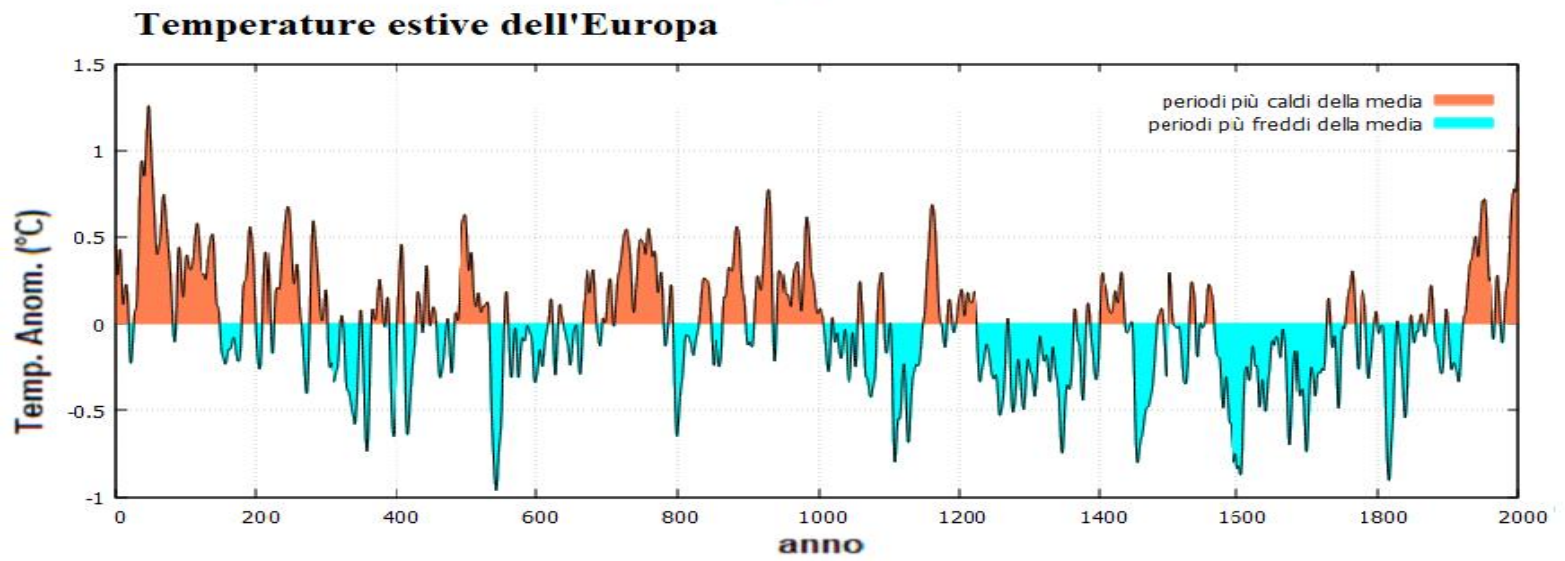
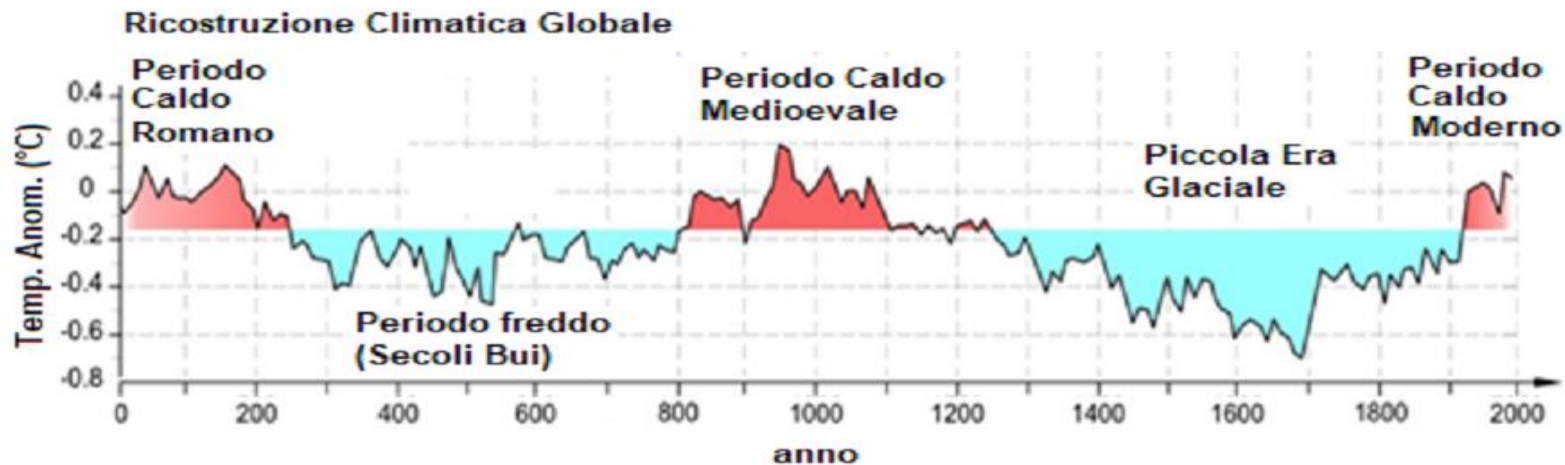
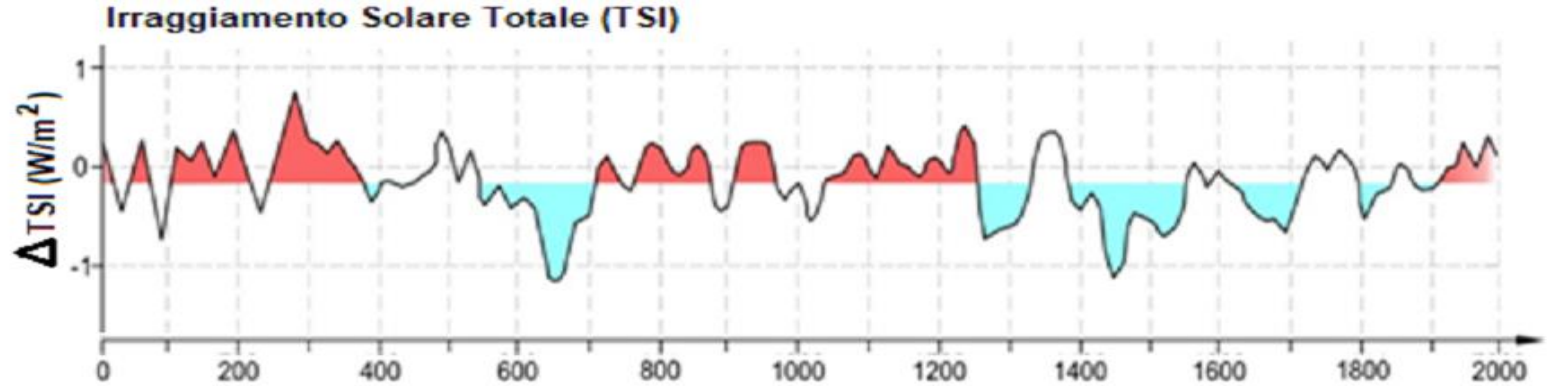
(Steinhilber et al., 2012)

- Which correlates with the millennial cycle of temperatures

(Ljungqvist, 2010)

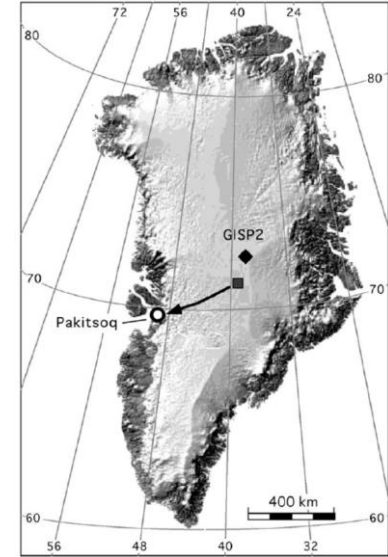
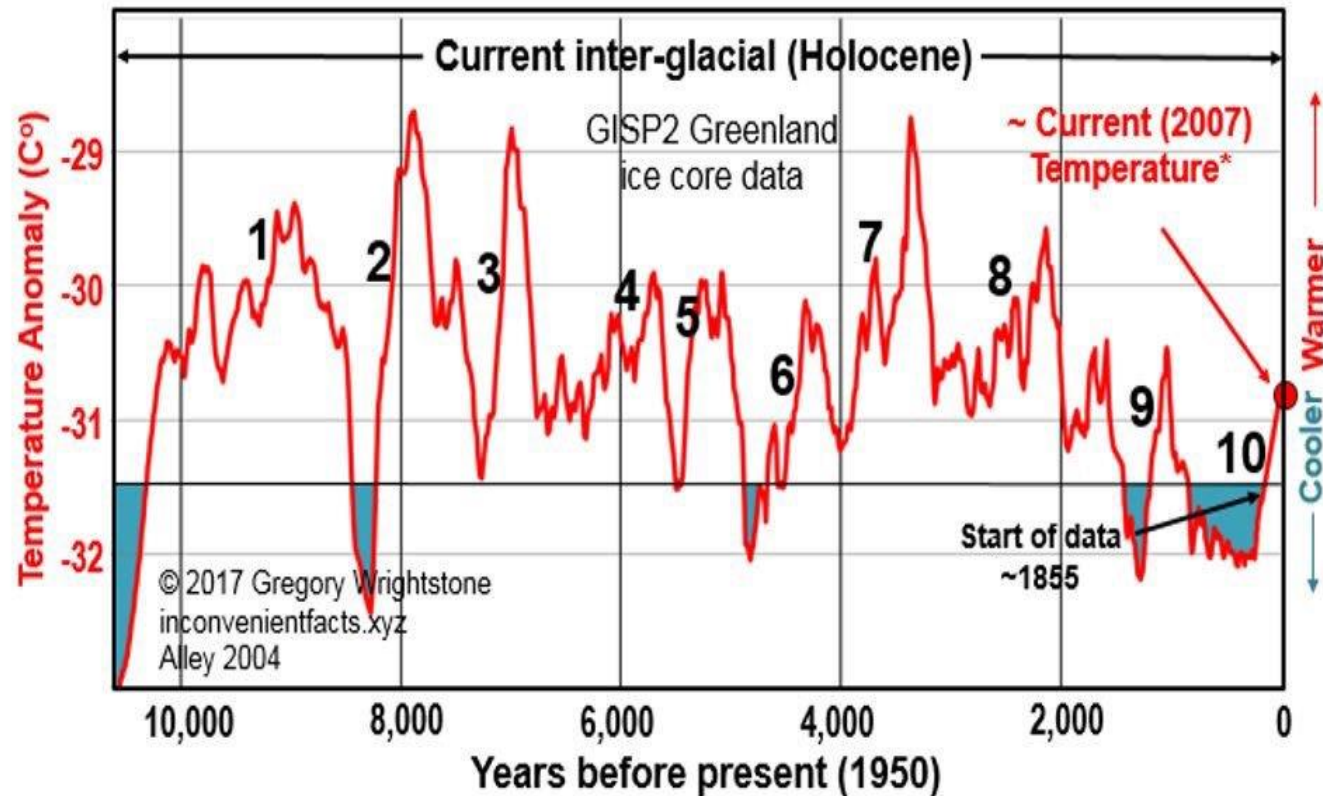
Summer European Temperature

(Luterbacher et al., 2016)



A millennial cycle in Greenland temperatures for 10,000 years.

10,000 years and 9 warming periods remarkably similar to present-day warming (and all warmer)



RESEARCH ARTICLE | FEBRUARY 06, 2019

Medieval warmth confirmed at the Norse Eastern Settlement in Greenland 🛒

G. Everett Lasher; Yarrow Axford

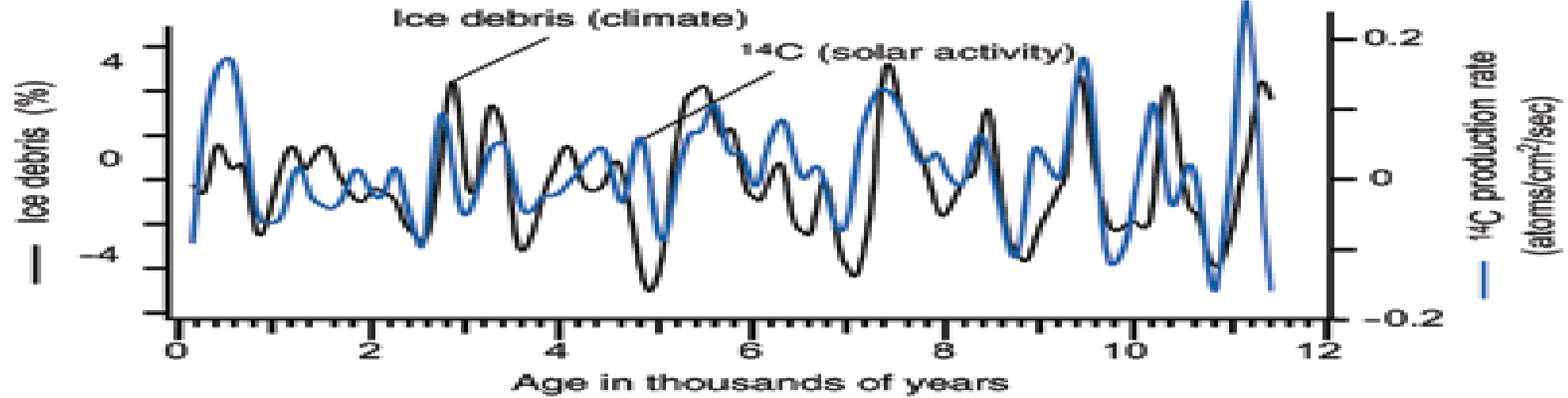
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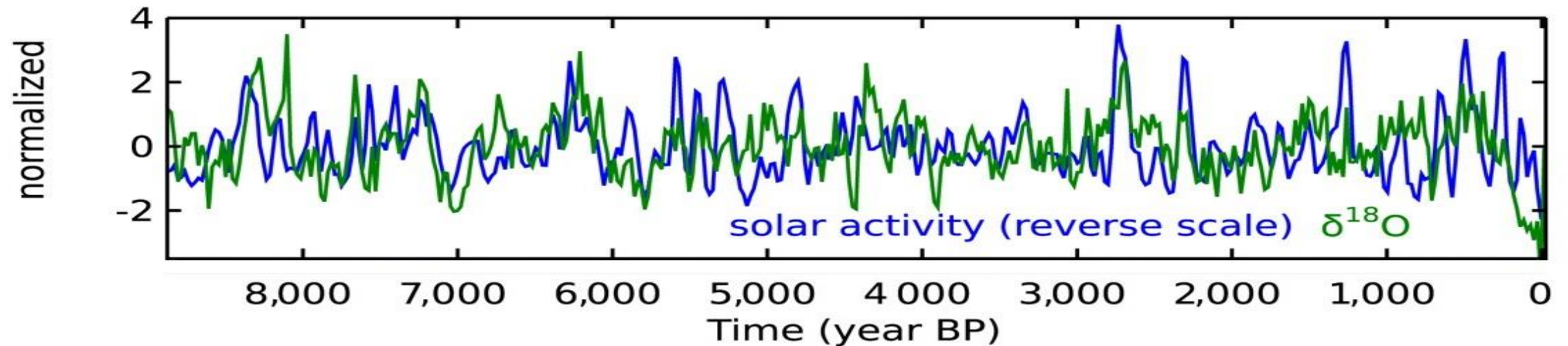
Alley, R.B.. 2004. GISP2 Ice Core Temperature and Accumulation Data. IGBP PAGES/World Data Center for Paleoclimatology Data Contribution Series #2004-013. NOAA/NGDC Paleoclimatology Program, Boulder CO, USA.

Current Temp: Box JE, Yang L, Bromwich DH, Bai L (2009) Greenland Ice Sheet Surface Air Temperature Variability: 1840–2007. American Meteorological Society, Journal of Climate Vol 22, pp 4029 - 4049

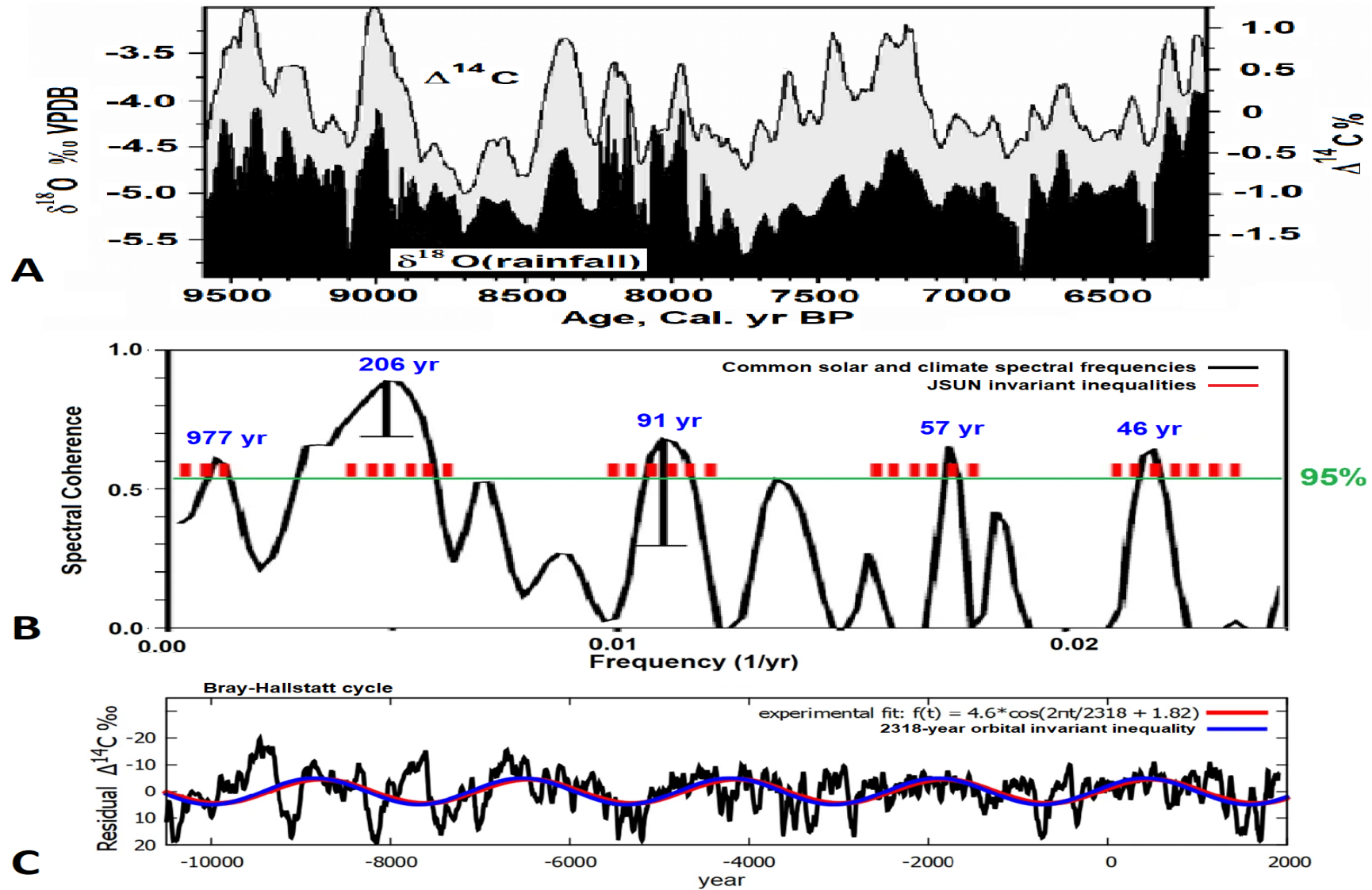
Kerr, R. A., 2001. A variable sun paces millennial climate. *Science*, 294, 1431-1433.



Steinhilber, F., Abreu, J. A., Beer, J., et al., 2012. 9,400 years of cosmic radiation and solar activity from ice cores and tree rings. *PNAS*, 109, 5967-5971, 2012.



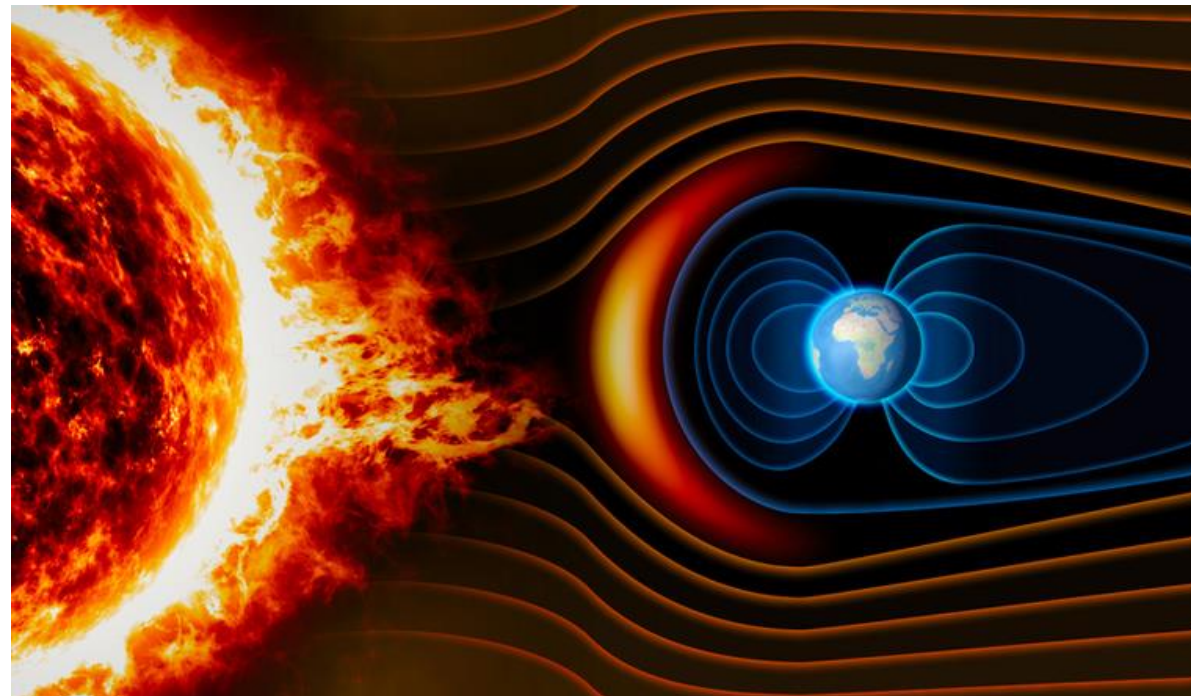
Spectral coherence between temperature records, solar records and gravitational planetary resonances



How does the Sun acts on the climate

- The climate models adopted by the IPCC believe that the role of the sun is marginal
- Empirical evidence suggests that the role of the sun is dominant

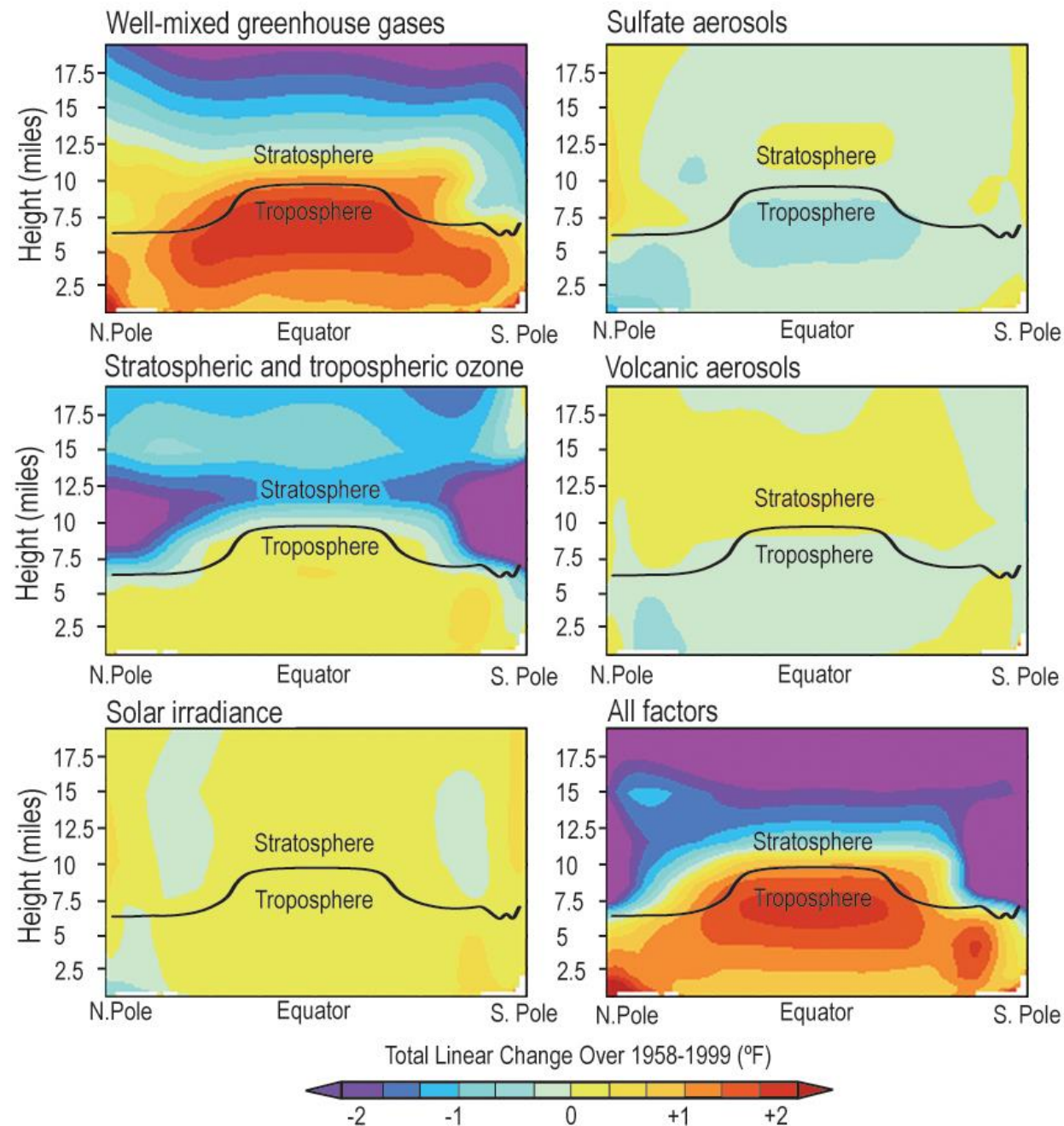
- The apparent contradiction has two possible solutions:
- The models use erroneous solar irradiance forcings
- The Sun acts on the climate predominantly through mechanisms other than those purely associated with radiation such as magnetic ones via cosmic rays, etc.

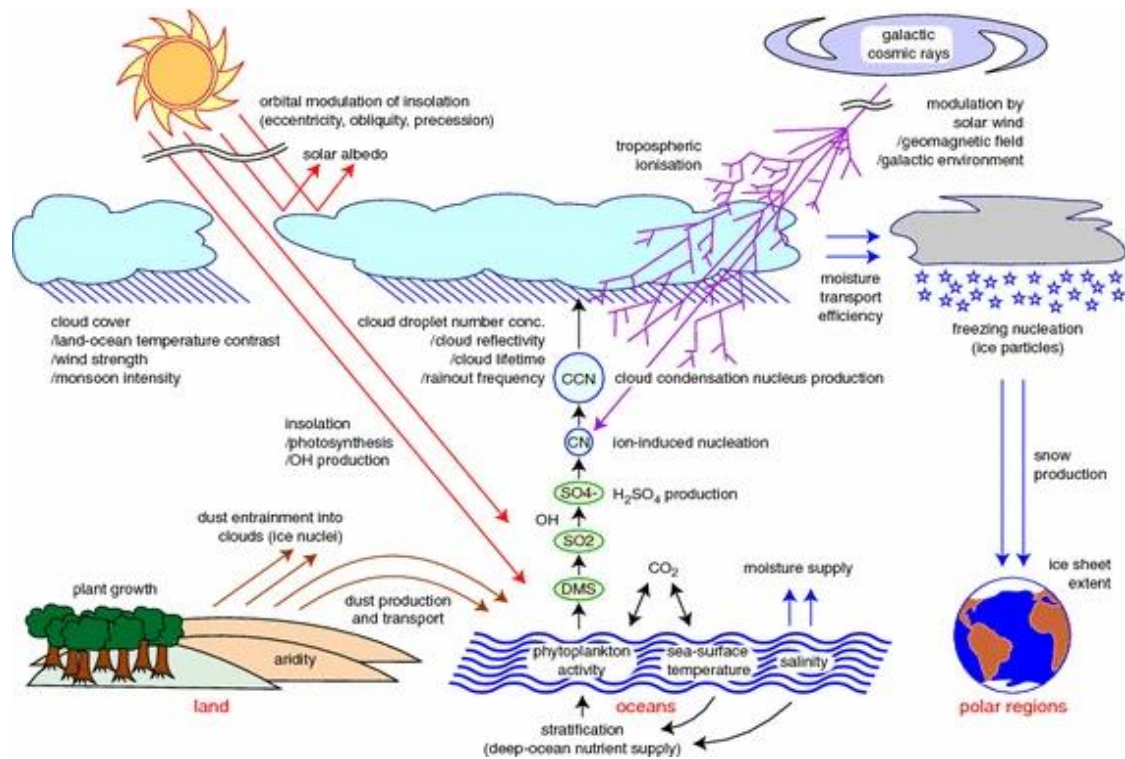


Does the Sun affect the Climate?

Radiative forcing (TSI, UV, etc) alone does not explain the stratospheric cooling.

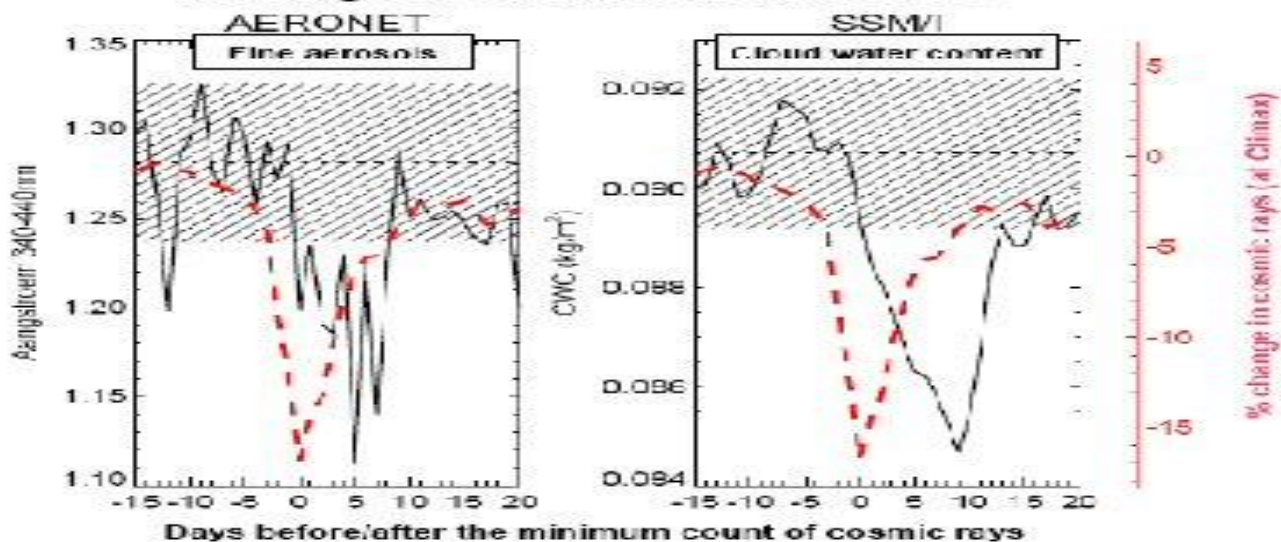
However, the Sun does not act on the climate only as radiative forcing.





Cosmic Rays and Climate

Svensmark, Bondo & Svensmark, 2009
Average of 5 Forbush decreases

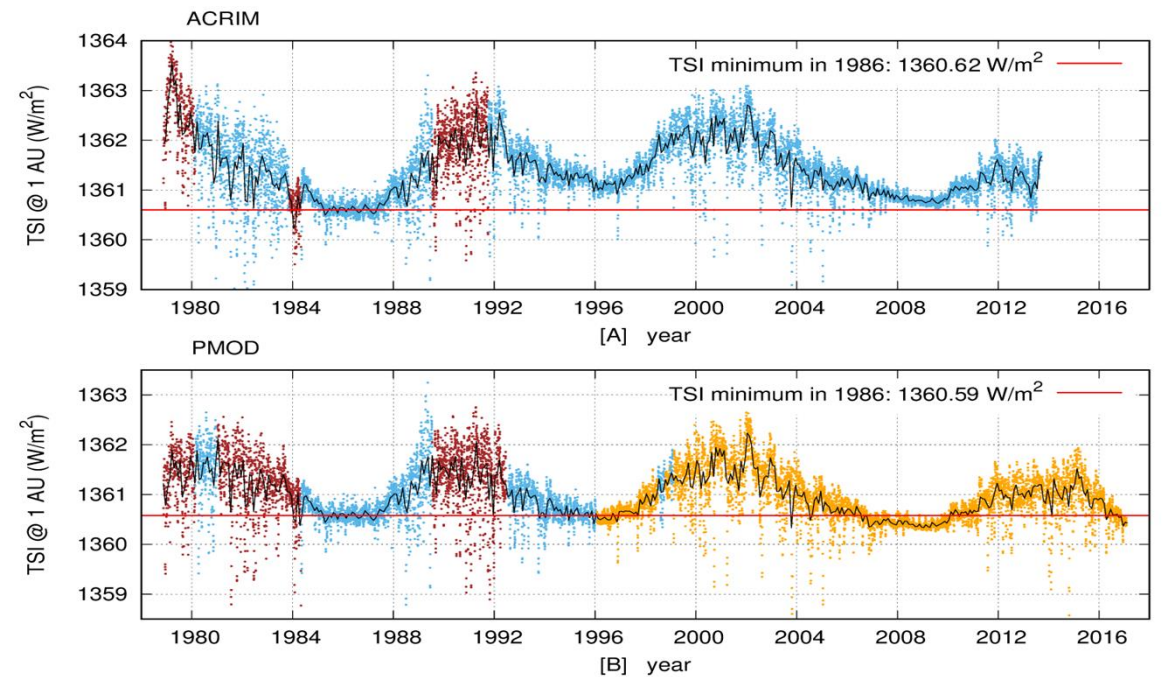
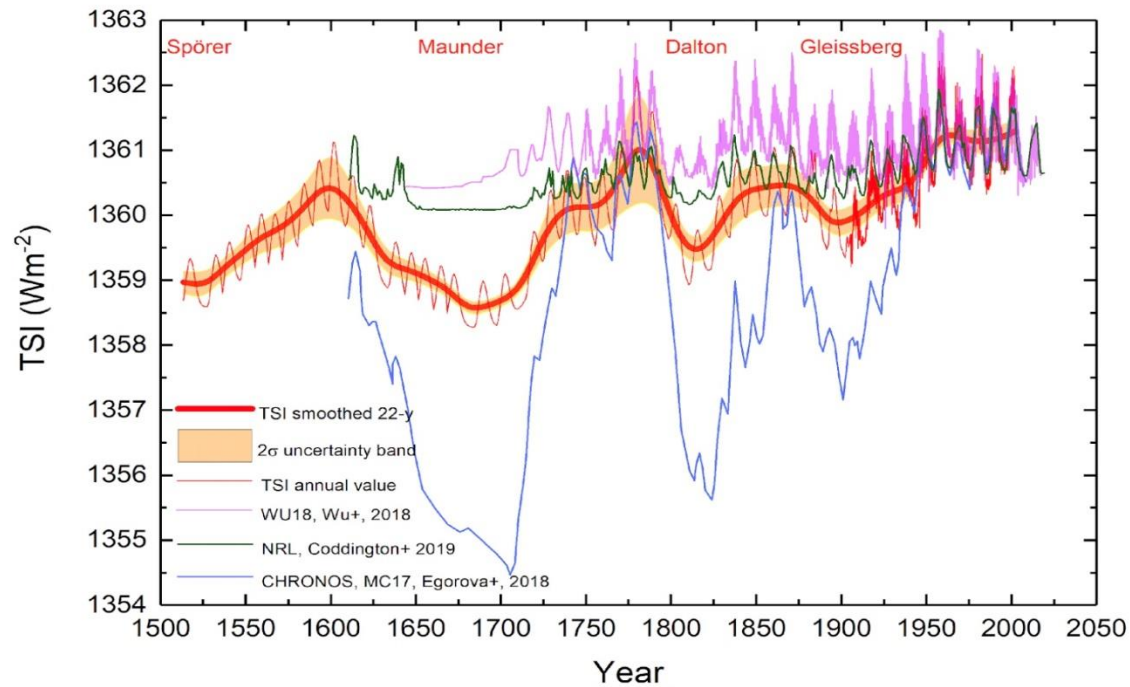


Uncertainties on Total Solar Irradiance

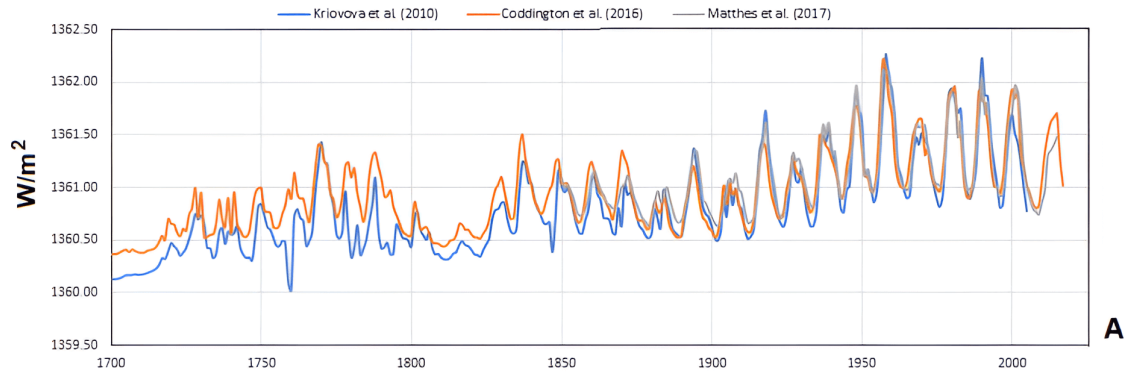
Various secular solar models

• Penza, V., Berrilli, F., Bertello, L., Cantoresi, M., Criscuoli, S., and Giobbi, P. The Astrophysical Journal 937, 84.(2022).

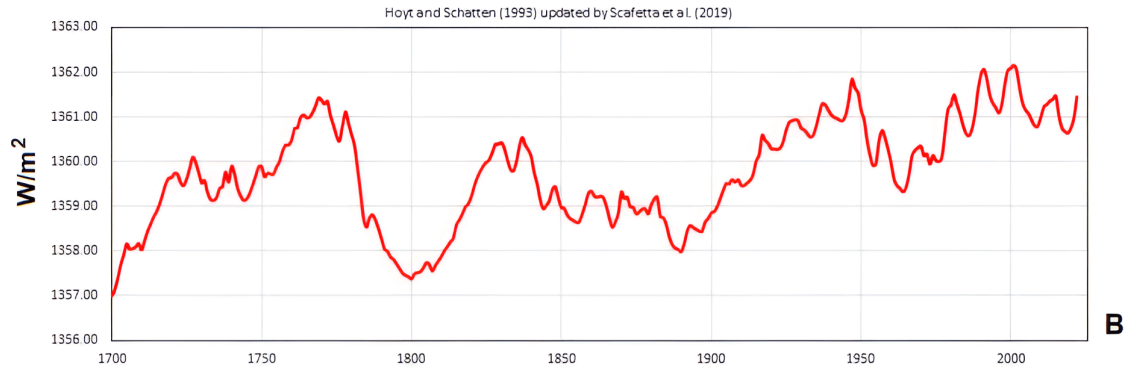
Scafetta, N.; Willson, R.; Lee, J.; Wu, D. Remote Sensing 2019, 11, 2569. doi:10.3390/rs11212569.



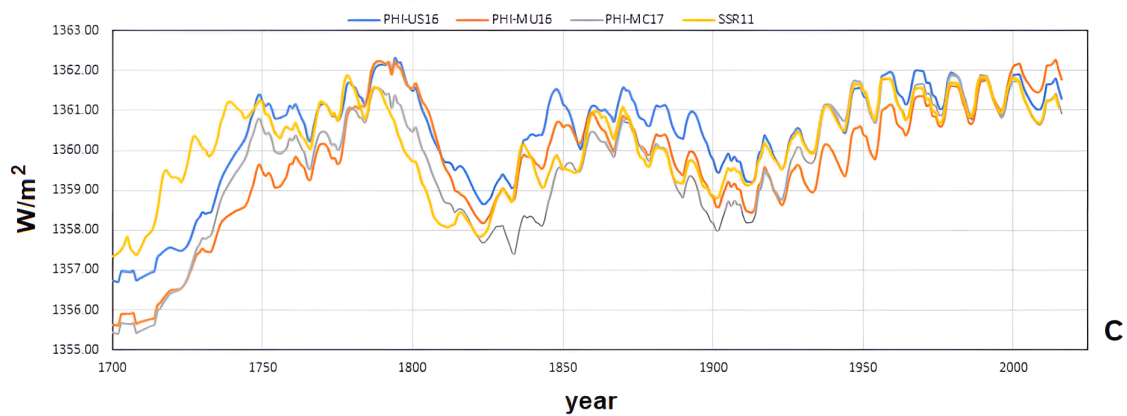
Understanding the role of the Sun in climate change



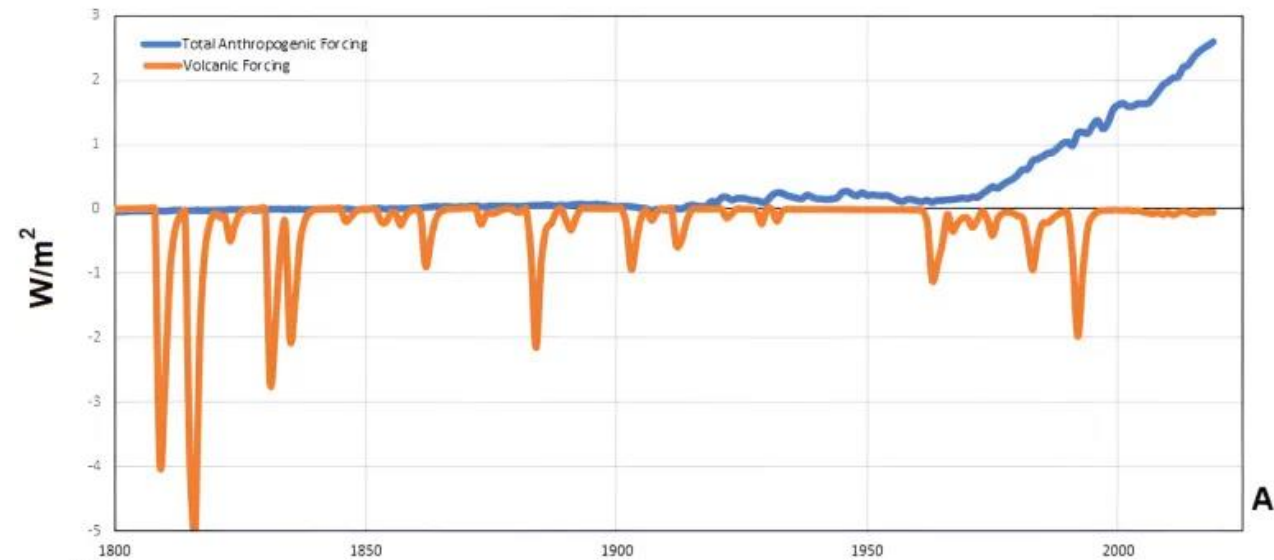
A



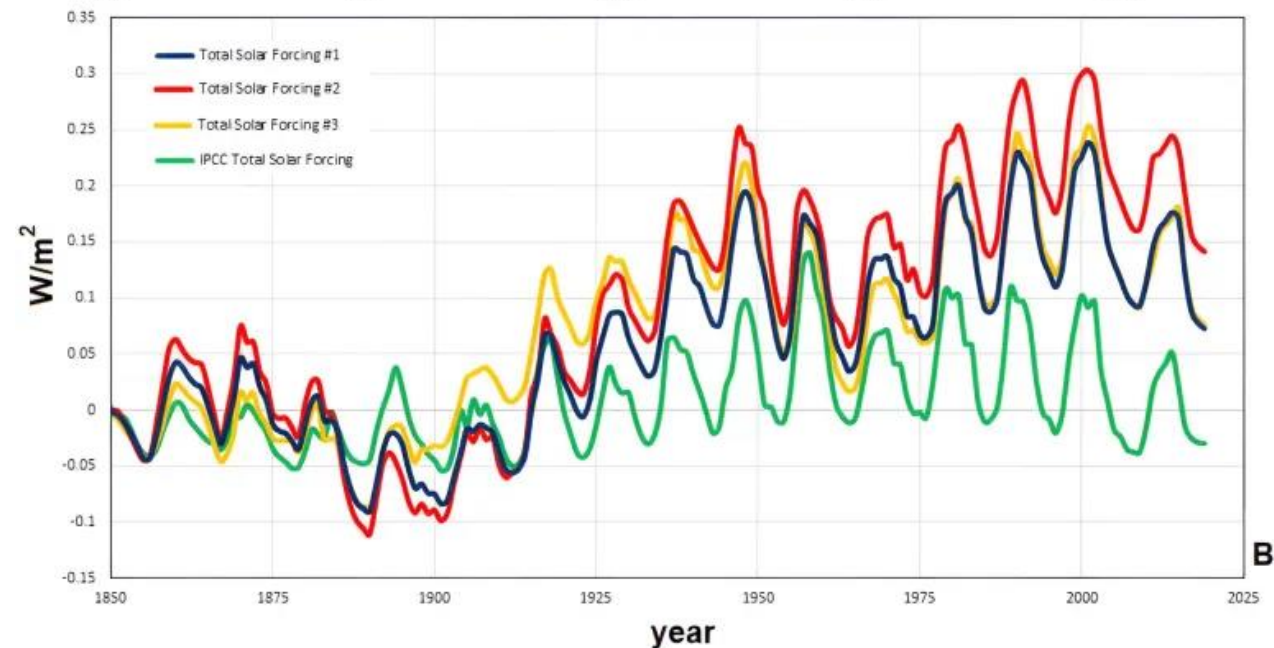
B



C

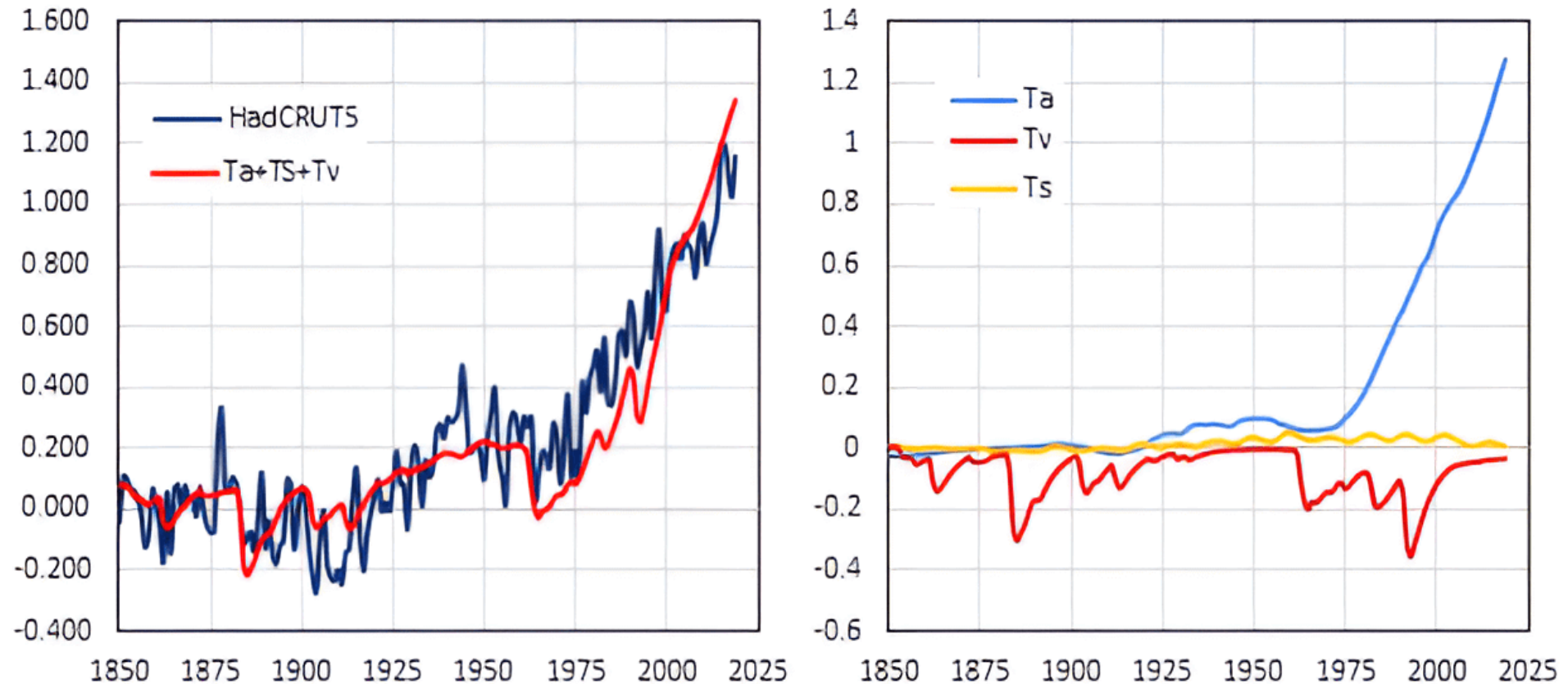


A



B

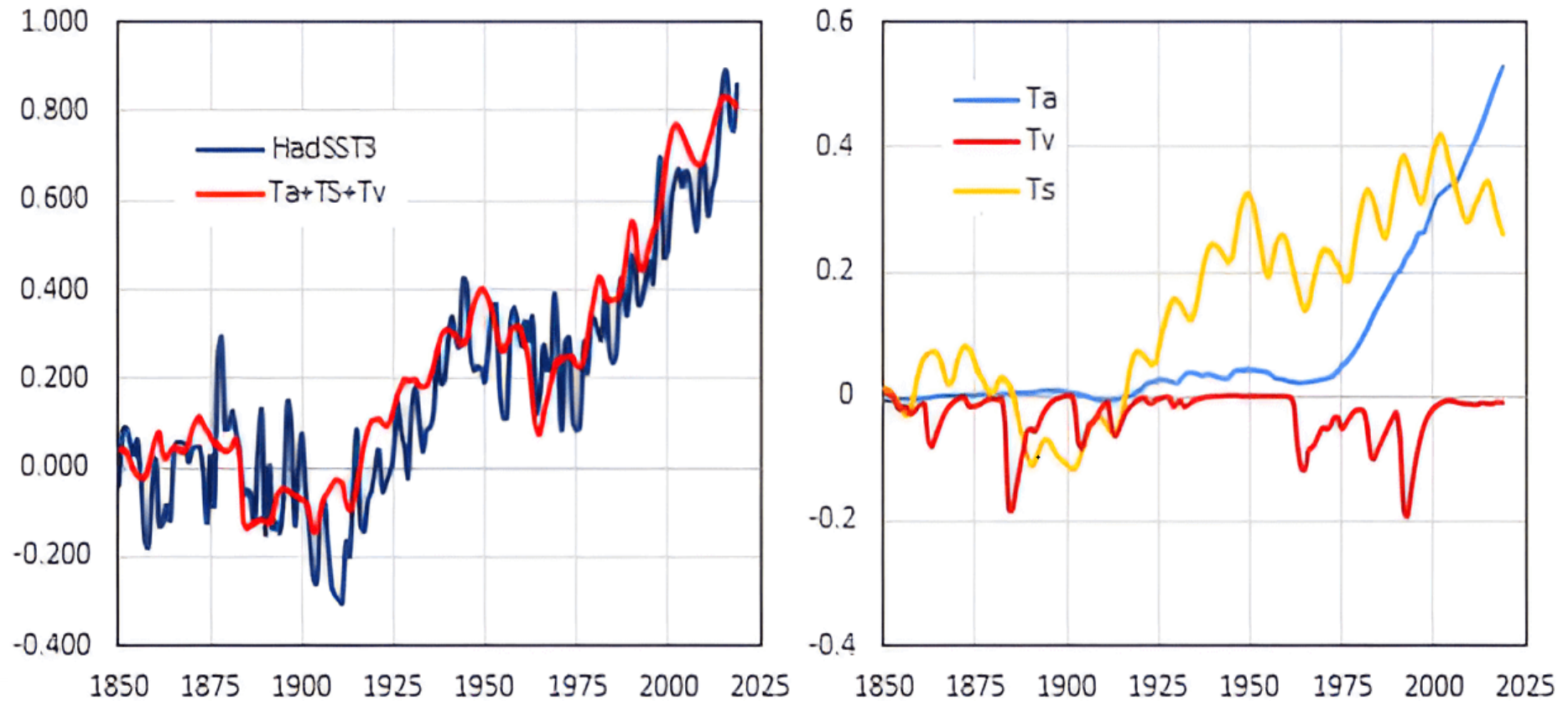
Results using the same forcings of the CMIP6 models adopted by the IPCC calibrated assuming only radiation forcings and the global surface temperature record HadCRUT5



ECS from 1.4 to 2.8 °C, mean 2.1 °C

Results using the same anthropogenic and volcanic forcings as the CMIP6 models adopted by the IPCC + an alternative solar irradiance record calibrated assuming that solar forcing is a model of total solar activity (radiation + magnetism + whatever).

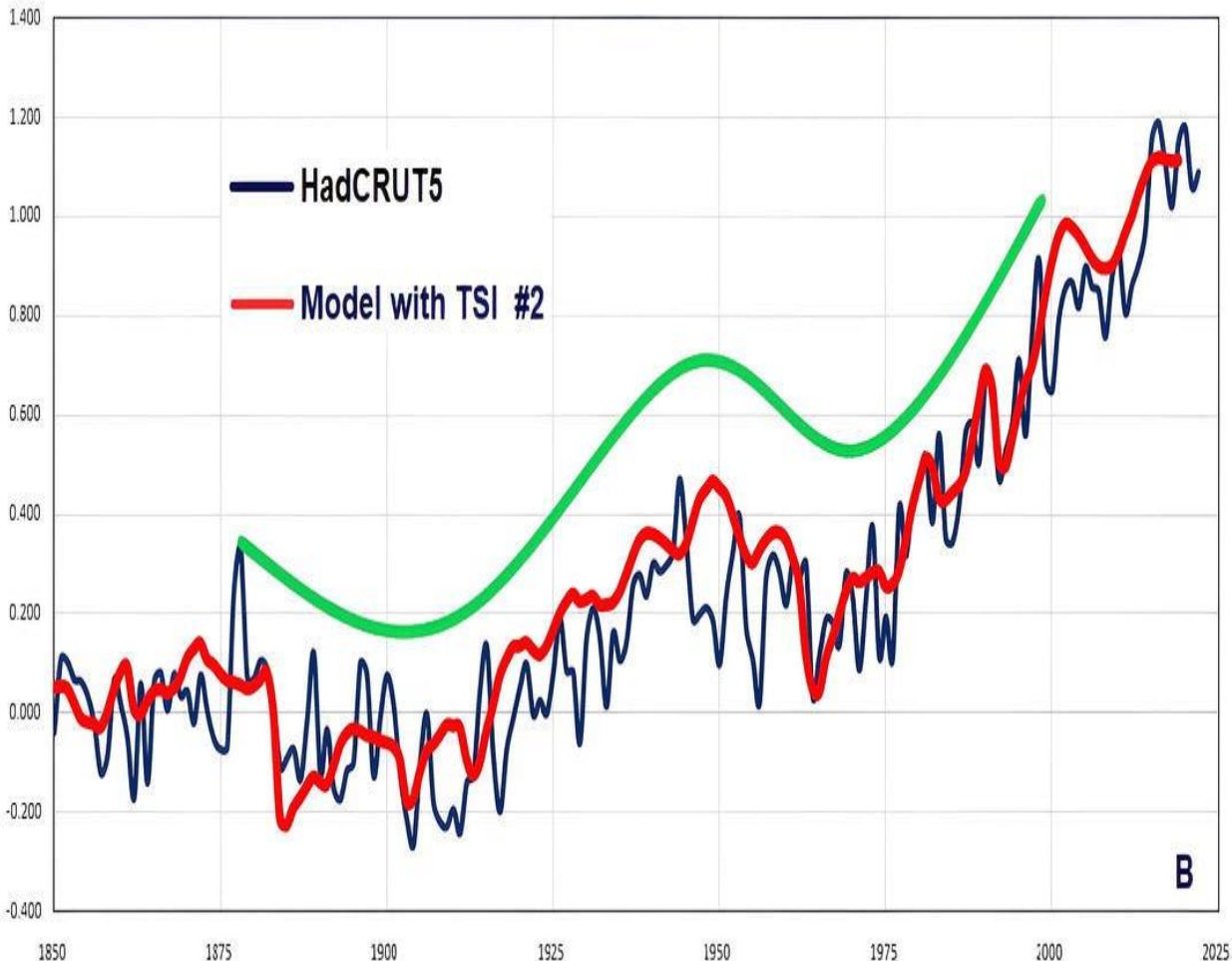
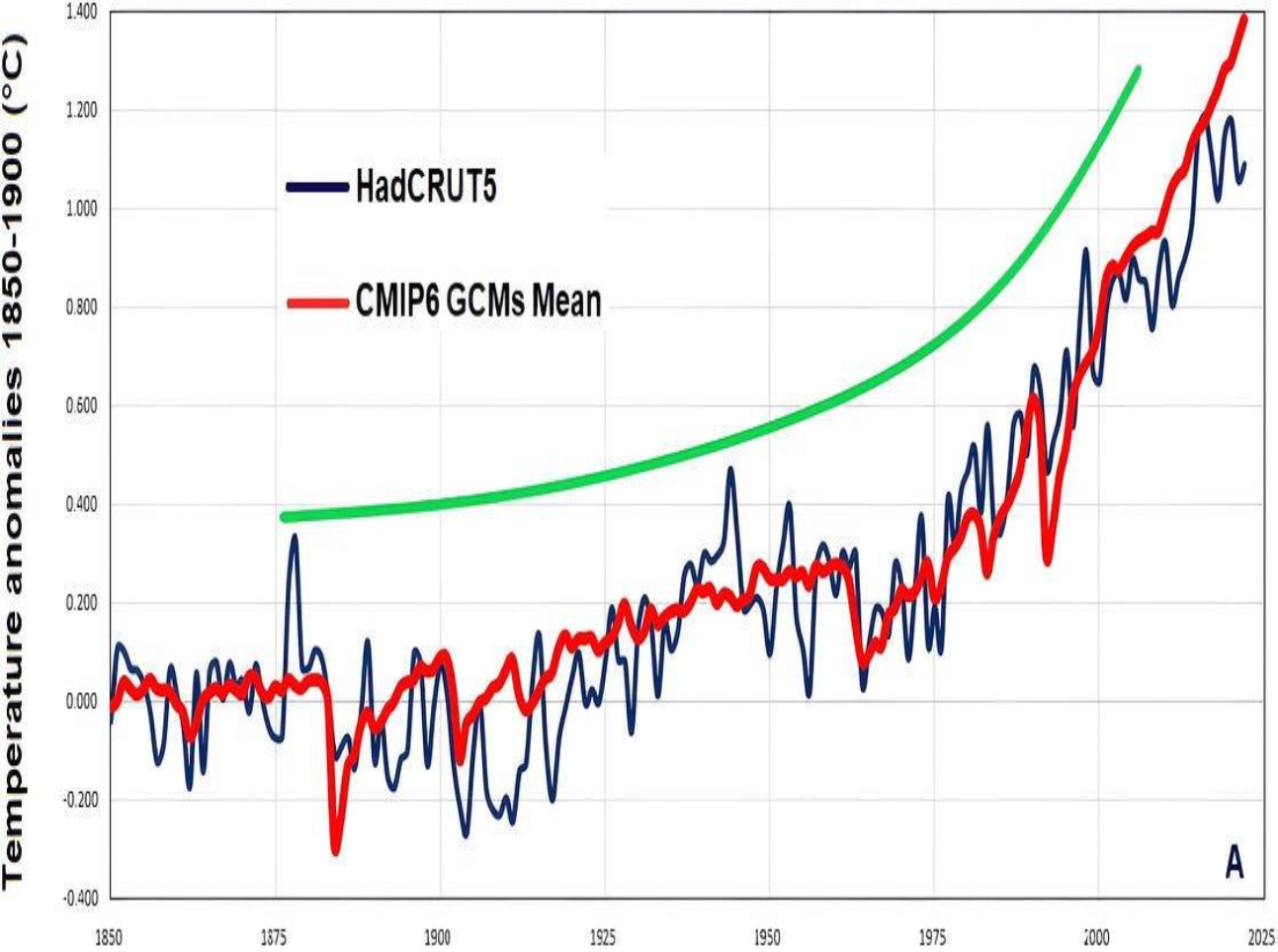
The global sea surface temperature record HadSST3 is used



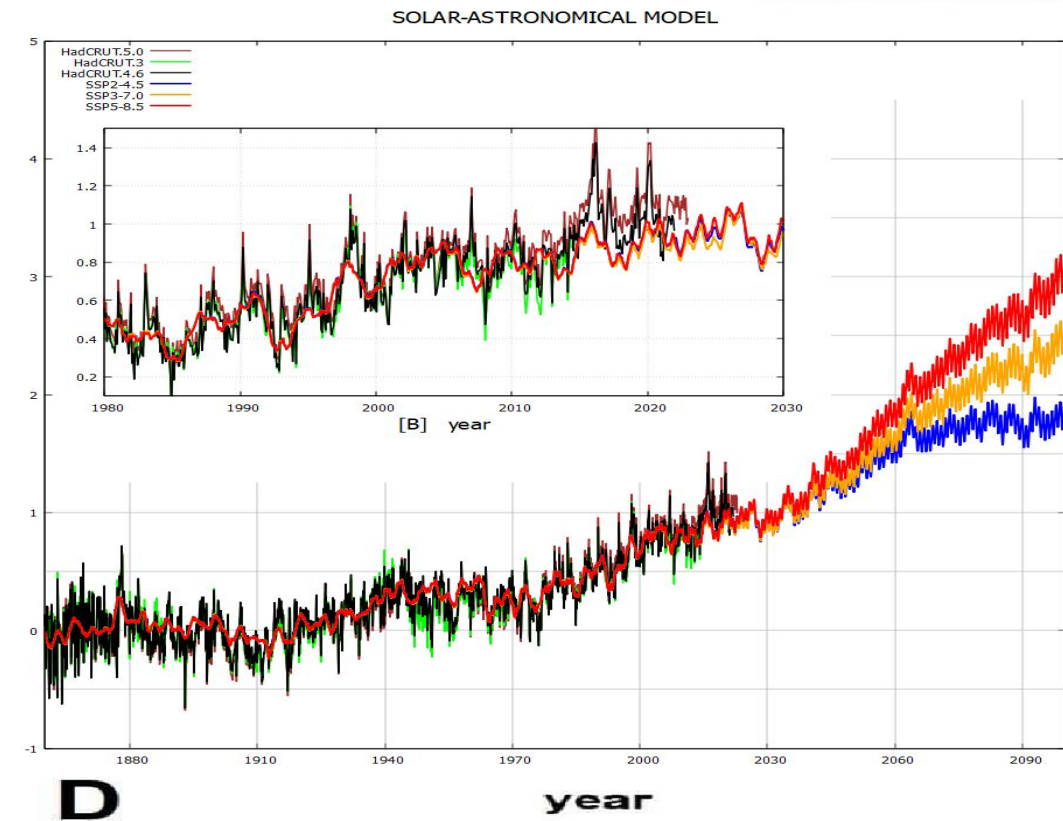
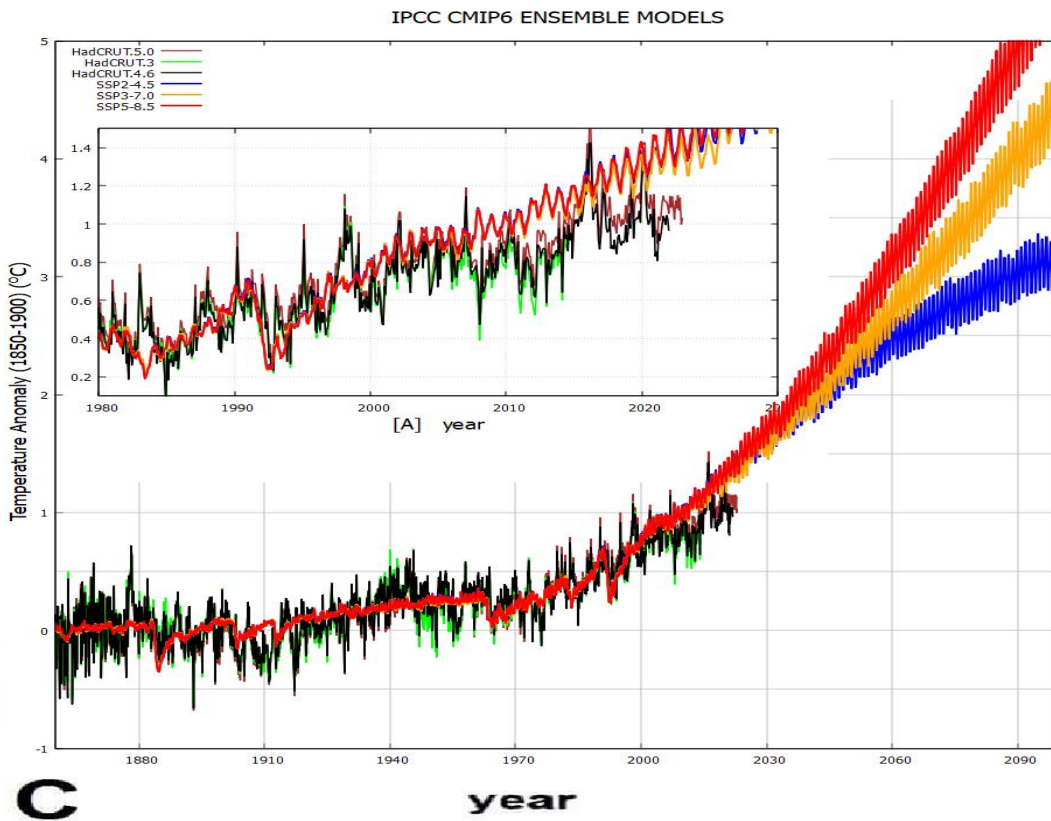
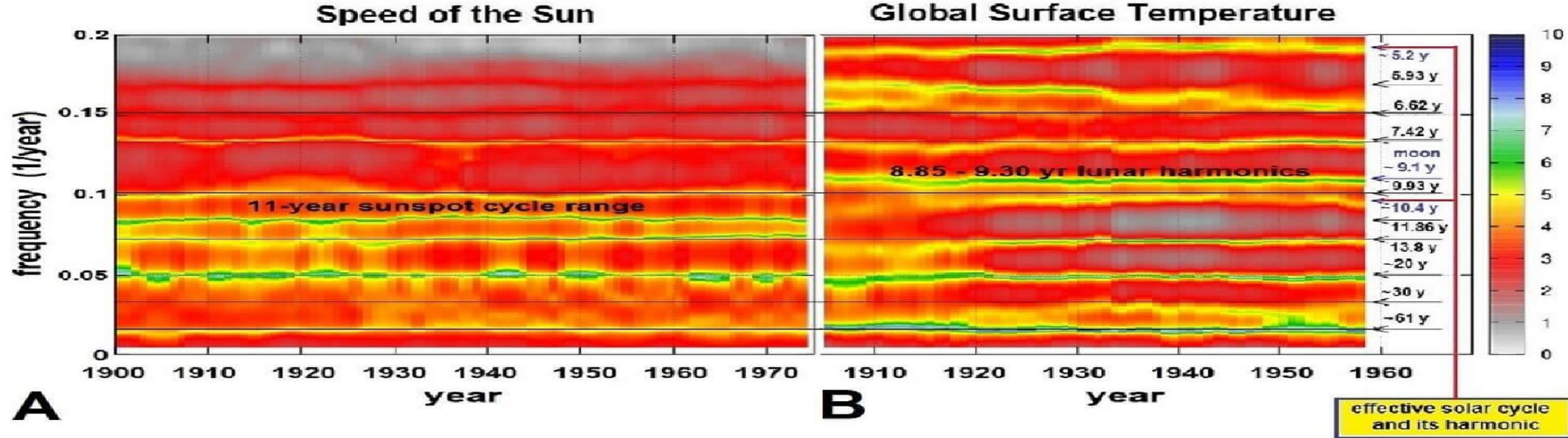
ECS from 0.7 to 1.3 °C, mean 1.0 °C

Scafetta, N.: Empirical assessment of the role of the Sun in climate change using balanced multi-proxy solar records. Geoscience Frontiers 14(6), 101650, 2023. Pagina Web: <https://doi.org/10.1016/j.gsf.2023.101650>

About 80% of the solar influence on climate may not be induced by forcing of total solar irradiance alone, but rather by other processes of solar climate



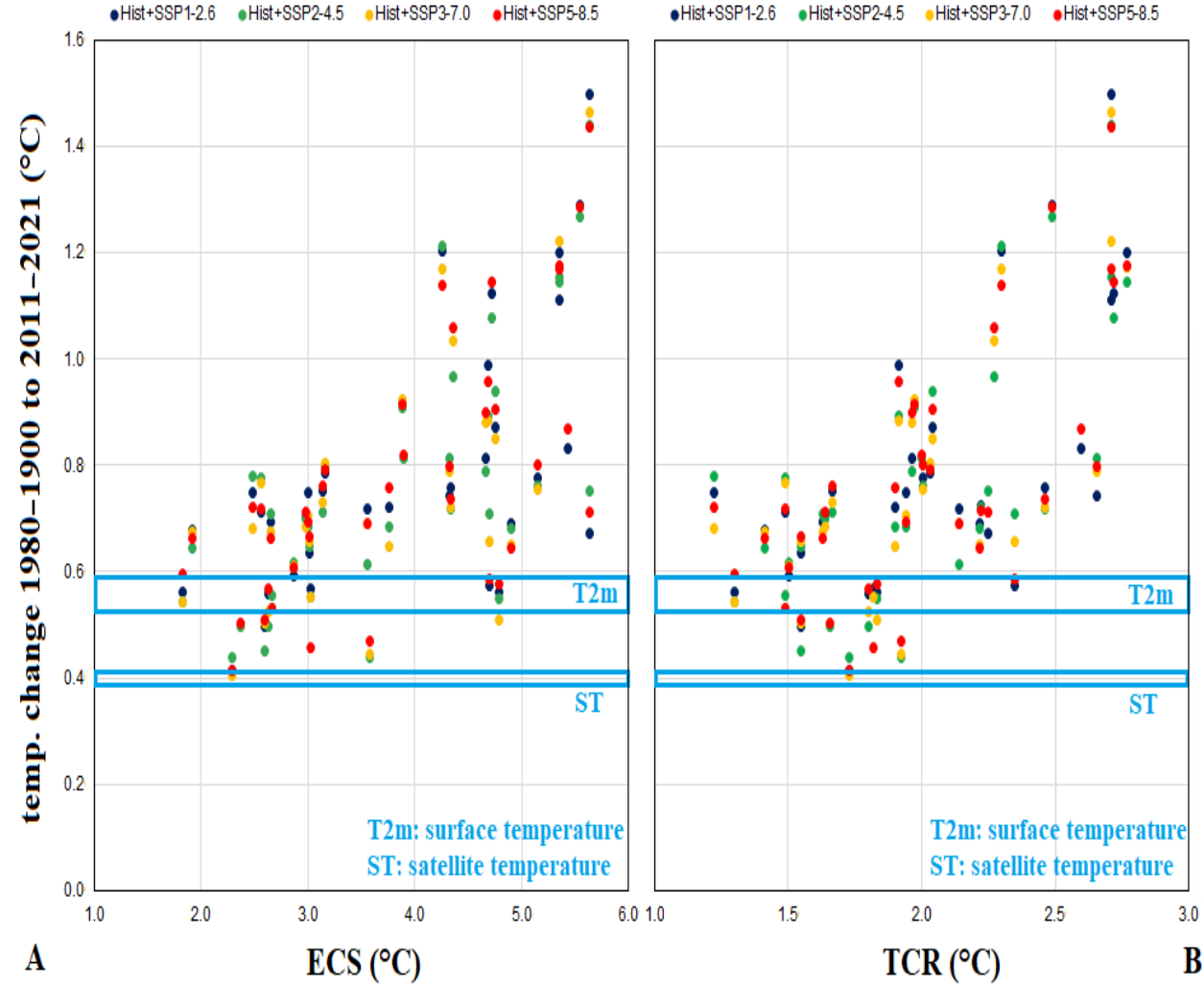
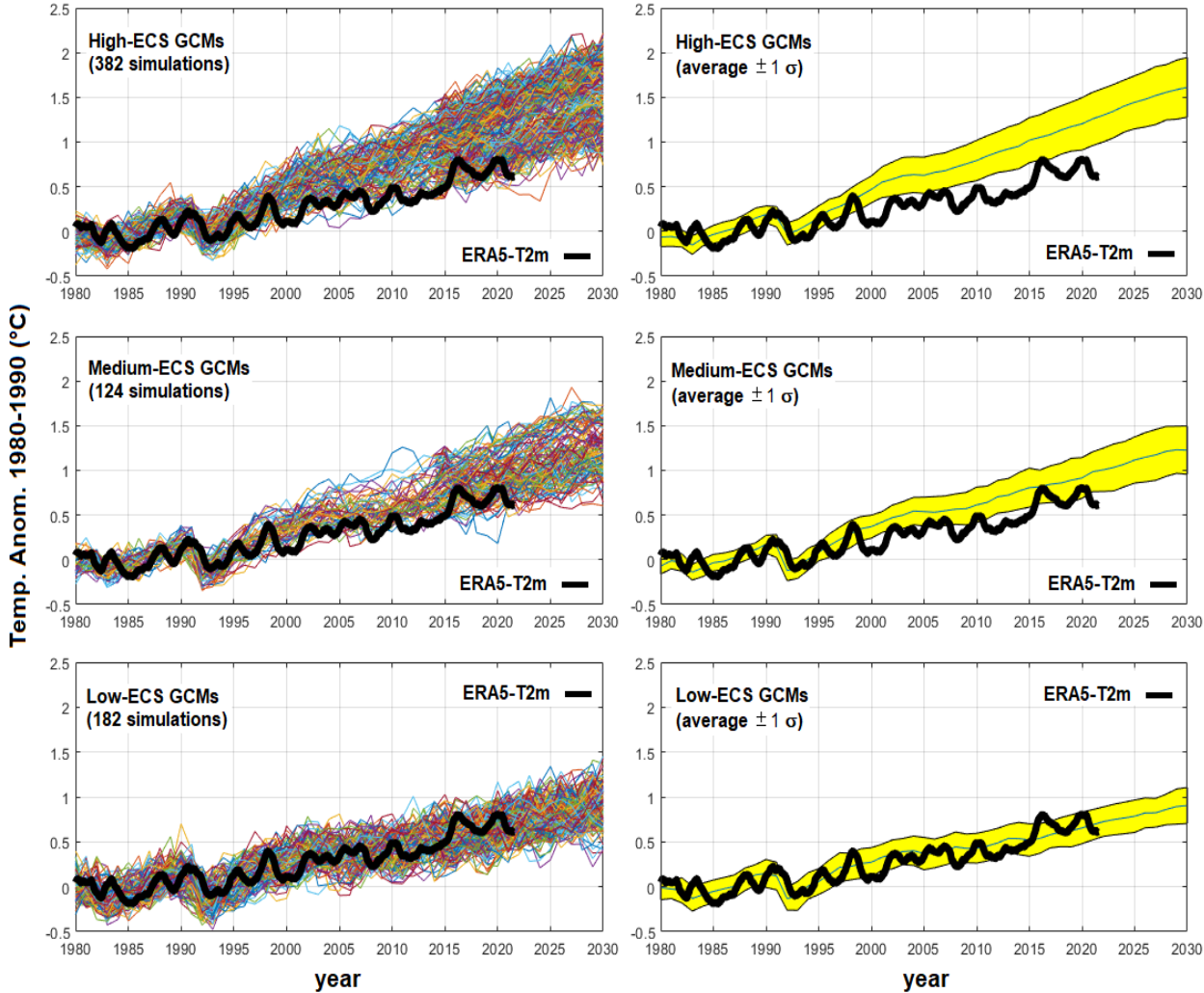
Scafetta, N., and Bianchini, A. (2022). The Planetary Theory of Solar Activity Variability: A Review. *Frontiers in Astronomy and Space Sciences* 9, DOI: 10.3389/fspas.2022.937930



From 1980 al 2021 : GCM vs. Data

Scafetta, N. CMIP6 GCM ensemble members versus global surface temperatures. *Clim Dyn* (2022). <https://doi.org/10.1007/s00382-022-06493-w>

Scafetta, N. CMIP6 GCM Validation Based on ECS and TCR Ranking for 21st Century Temperature Projections and Risk Assessment. *Atmosphere* 2023, 14, 345. <https://doi.org/10.3390/atmos14020345>

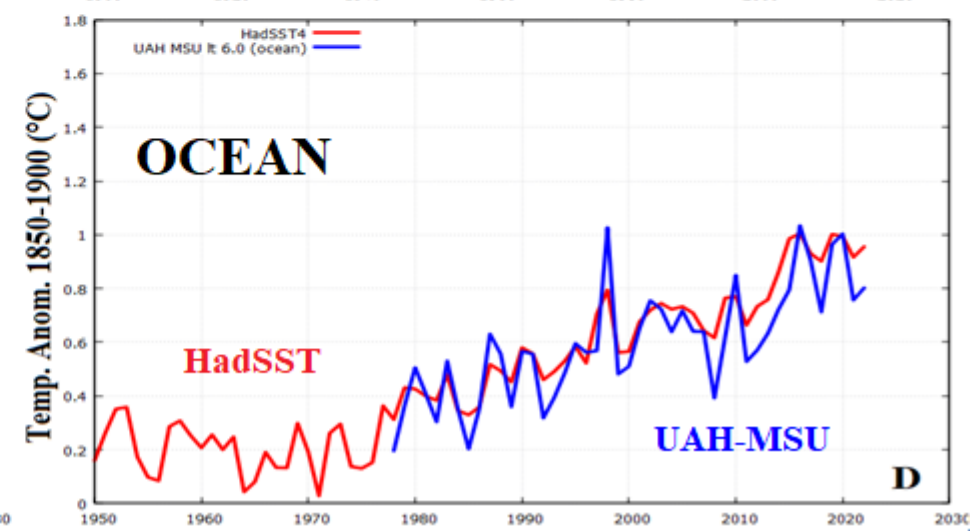
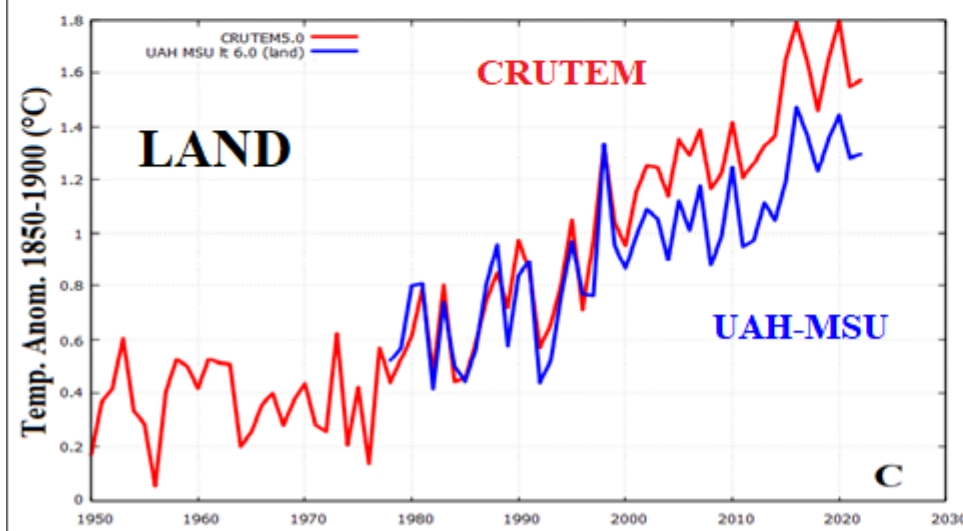
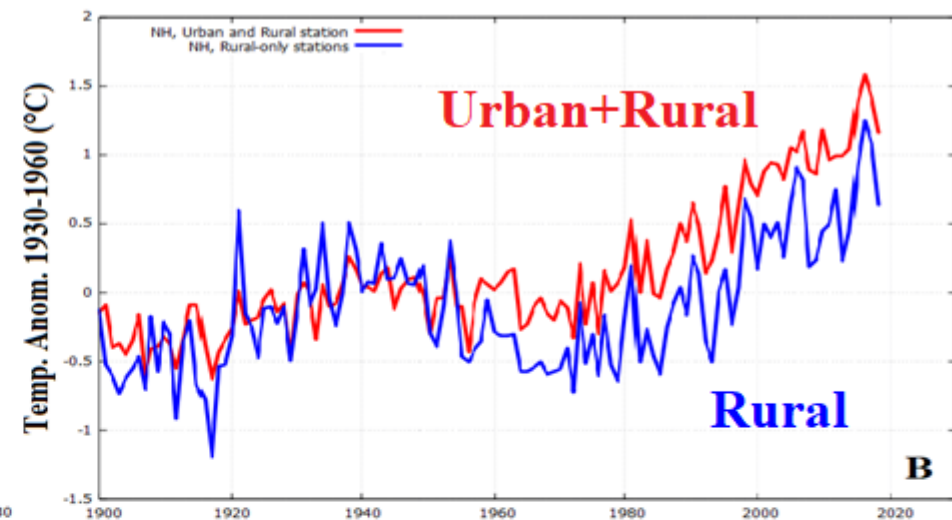
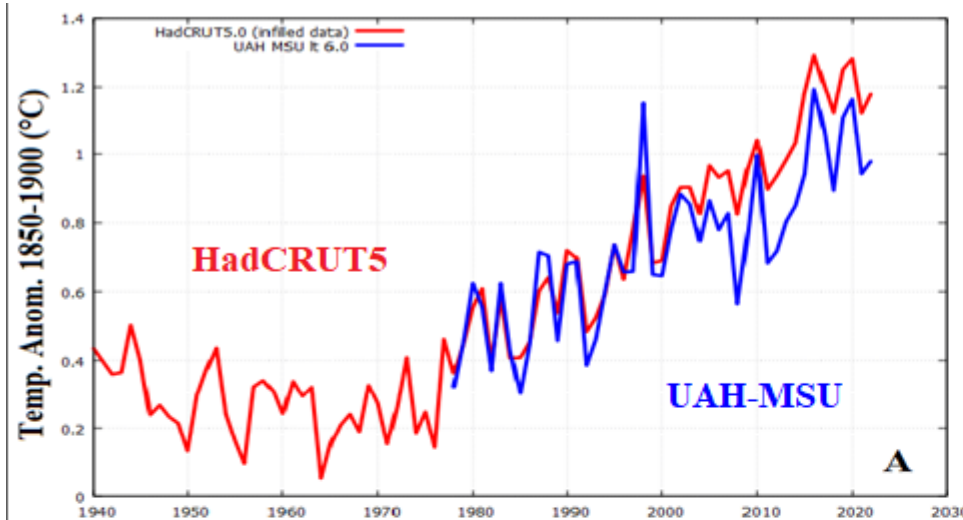
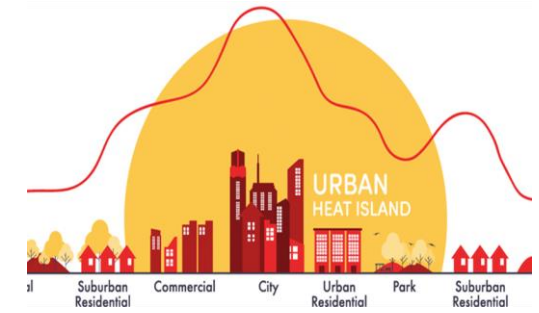


Urban Heat and other non climatic effect could be warm-biasing the global surface temperature records

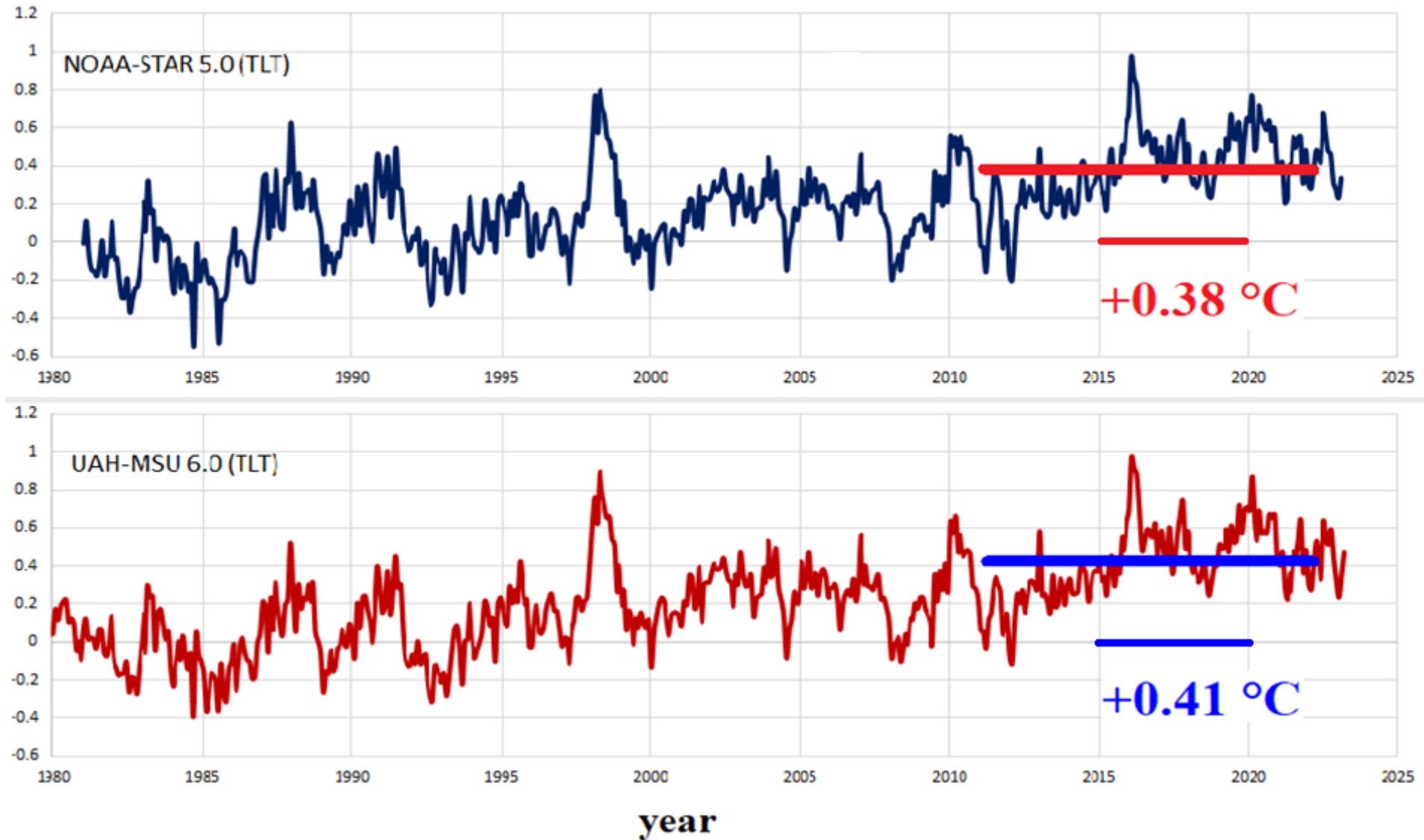
Scafetta, N.: Clim Dyn 56, 2959–2982 (2021).

Scafetta, N.: Atmosphere 14, 345 (2023).

Scafetta, N. Clim Dyn (2023). doi.10.1007/s00382-022-06493-w



Low troposphere warming is +0.40 °C (from 1980-1990 to 2011-2021)

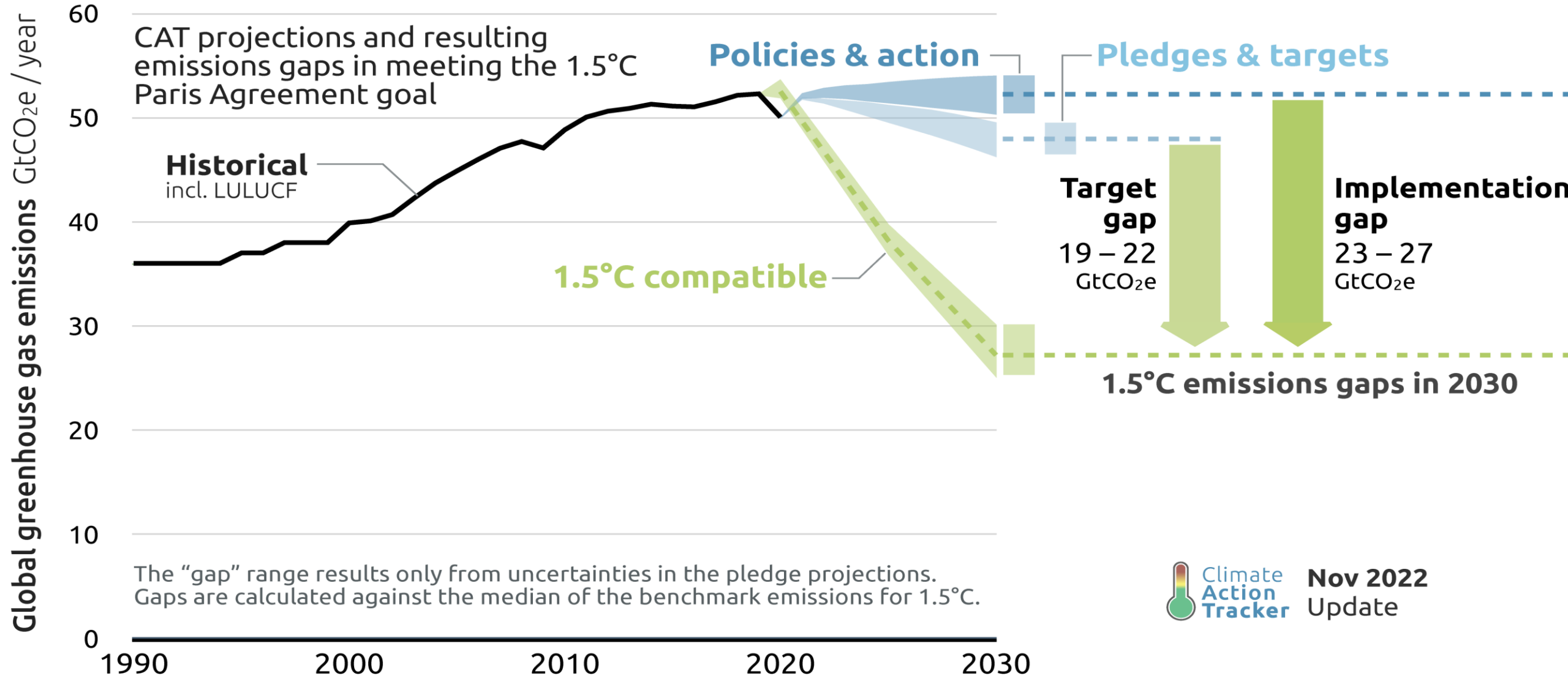


Zou, C.-Z., Xu, H., Hao, X., Liu, Q. (2023). Mid-tropospheric layer temperature record derived from satellite microwave sounder observations with backward merging approach. *Journal of Geophysical Research: Atmospheres*, 128, e2022JD037472. [https://doi.org/10.1029/2022JD037472]
















Spencer, R.W., Christy, J.R., Braswell, W.D. (2017). UAH version 6 global satellite temperature products: Methodology and results. *Asia-Pacific Journal of the Atmospheric Sciences*, 53(1), 121–130. https://doi.org/10.1007/s13143-017-0010-y

Paris agreement (1.5 °C) is not realistic

2030 EMISSIONS GAPS



EDGAR - Emissions Database for Global Atmospheric Research

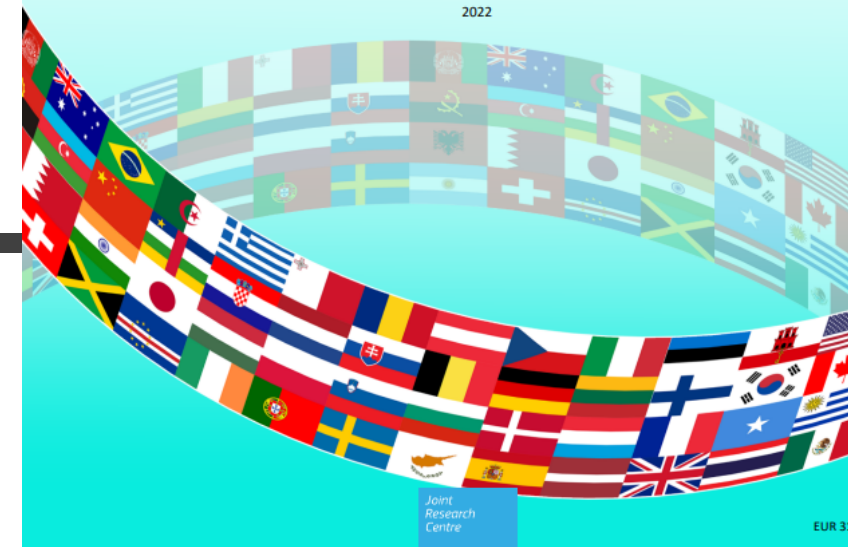
	Globe 2021 vs 1990 (fossil CO ₂)	EU27 2021 vs 1990 (fossil CO ₂)
 Power industry	 + 87 %	 - 39 %
 Other industrial combustion	 + 65 %	 - 41 %
 Buildings	 + 2 %	 - 32 %
 Transport	 + 65 %	 + 16 %
 Other sectors	 + 101 %	 - 23 %

CO₂ emissions of all world countries

JRC/IEA/PBL 2022 Report

Crippa M., Guizzardi D., Banja M., Solazzo E., Muntean M., Schaaf E., Pagani F., Monforti-Ferrario F., Olivier, J.G.J., Quadrelli, R., Risquez Martin, A., Taghavi-Moharamli, P., Grassi, G., Rossi, S., Oom, D., Branco, A., San-Miguel, J., Vignati, E.

2022

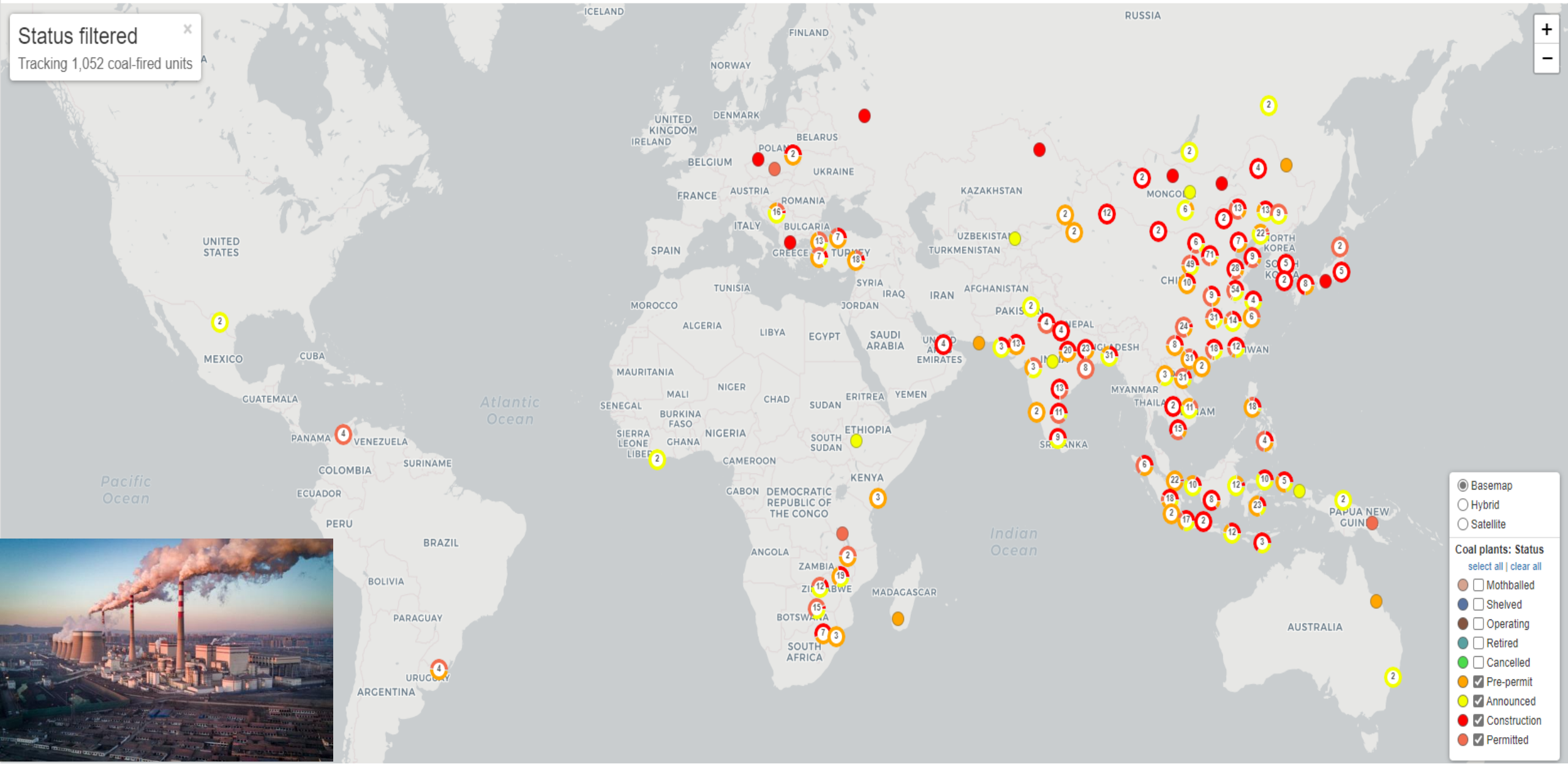


New coal-fired power plants under construction or planned

Map Table About Summaries Restart

Search for

Status filtered
 Tracking 1,052 coal-fired units



● Basemap
 ○ Hybrid
 ○ Satellite

Coal plants: Status
 select all | clear all

- Mothballed
- Shelved
- Operating
- Retired
- Cancelled
- Pre-permit
- Announced
- Construction
- Permitted

Are electric cars the future? Well, in the 19th century....

The Latest and Best



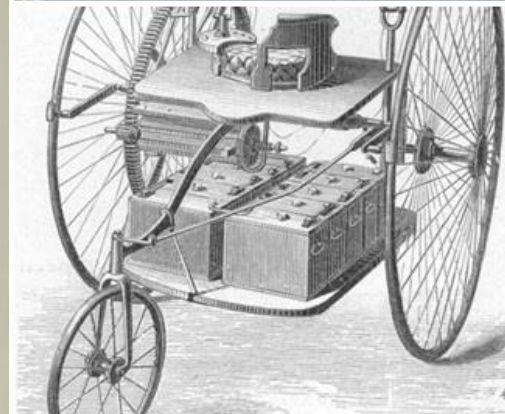
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Conclusions

The models on which the "anthropic" theory of global warming observed from 1850-1900 is based are not scientifically validated, they contradict each other and, therefore, cannot be considered reliable for future climate forecasts according to the various emission scenarios proposed by the IPCC.

Historical and paleoclimate evidence suggests natural climate variability induced by the sun and other astronomical factors that is much greater than that predicted by the IPCC models (CMIP3, CMIP5 and CMIP6).

The inclusion of natural climatic cycles and non-climatic forms of warming (e.g.: UHI) has the effect of reducing the anthropogenic component from 50% to 70%.

The observed warming from 1850-1900 could be 50% due to the sun, 30% to humans and 20% is spurious because it is due to urbanization and urban heat not corrected in the climate data.