



UNIWERSYTET
WARSZAWSKI

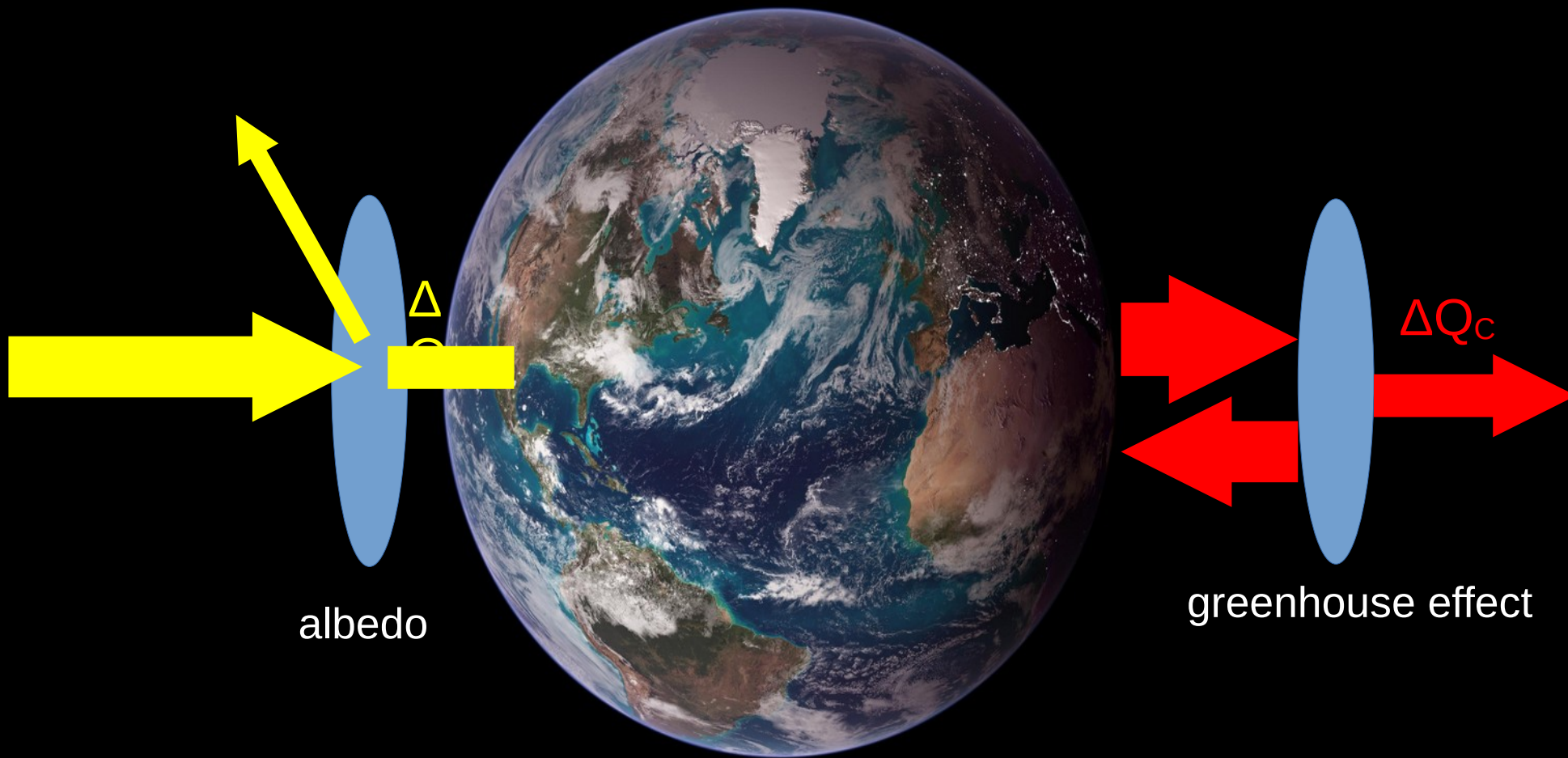


NAUKA O KLIMACIE
DLA SCEPTYCZNYCH

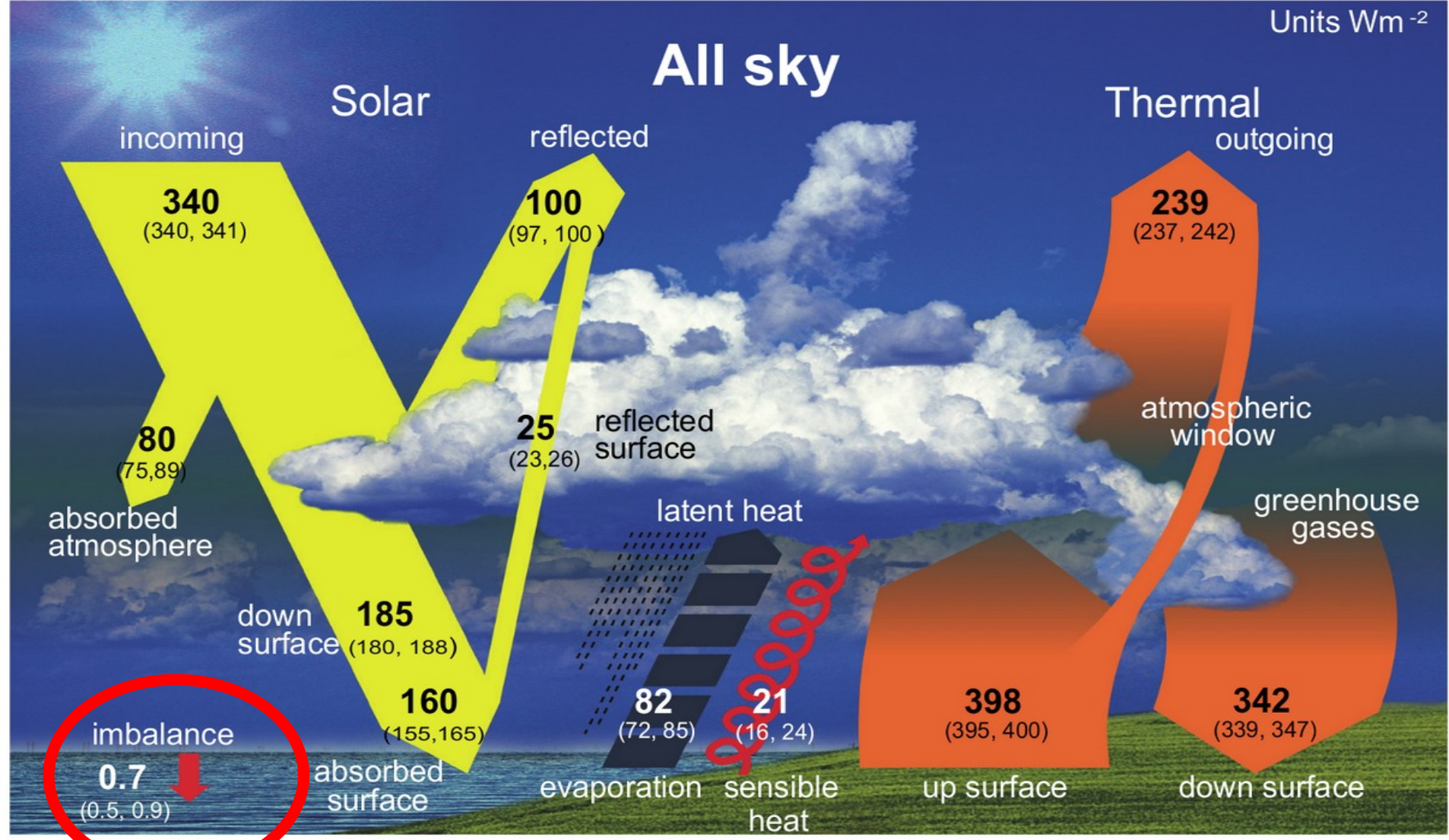
Climate change update 2023

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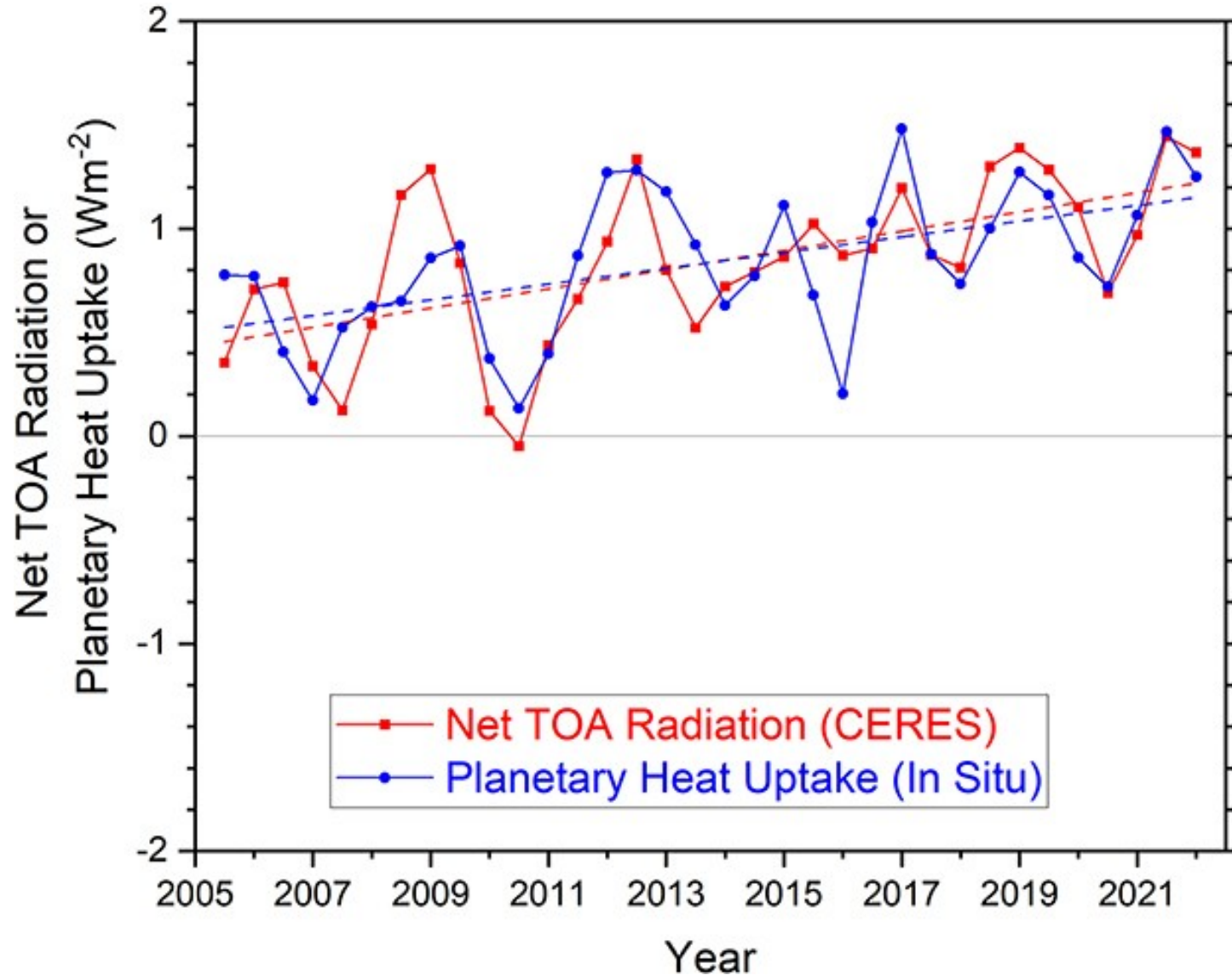


All sky

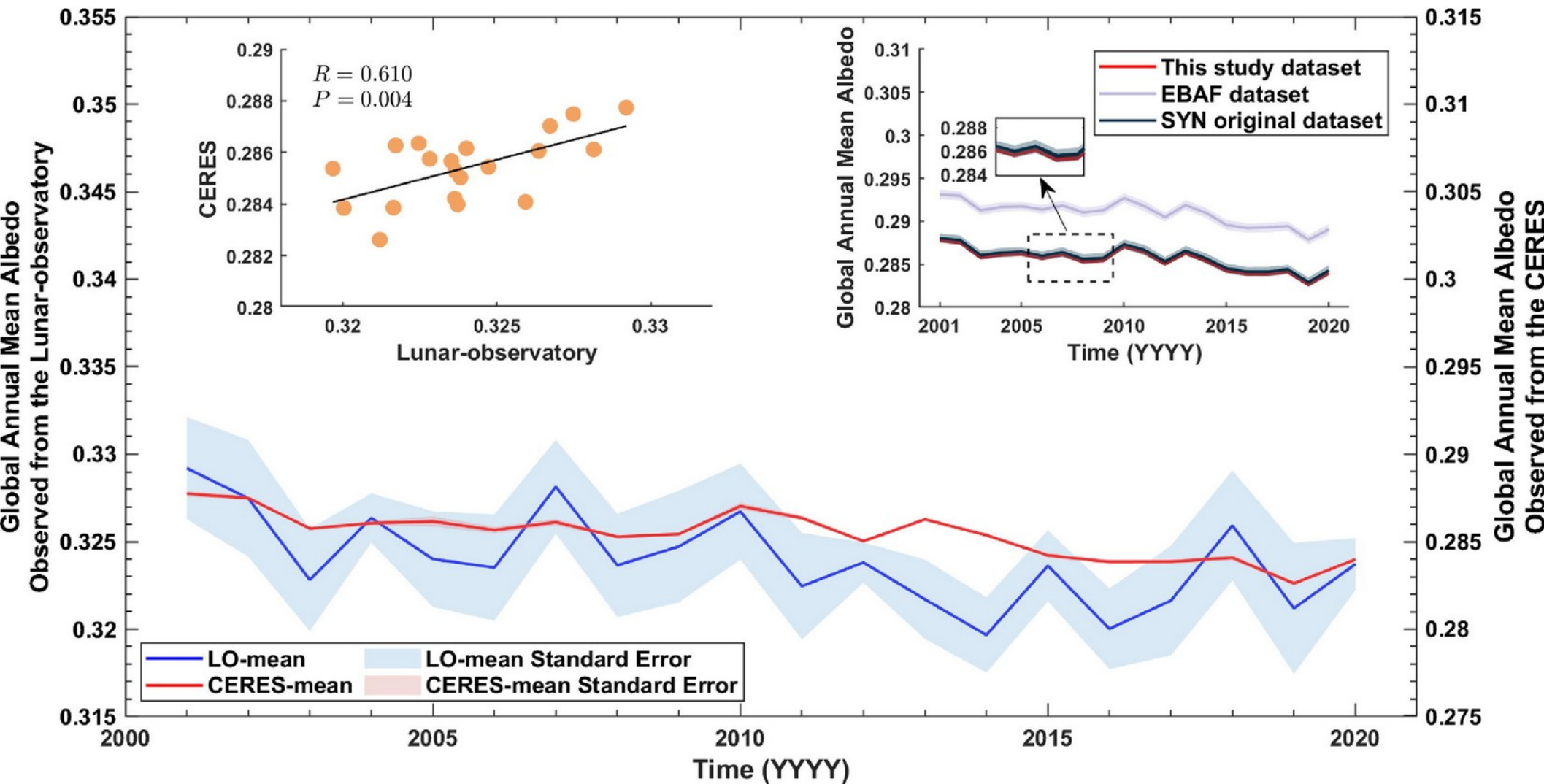


Averaged energy balance of the climate system in W/m^2 .

Energy imbalance increases ...

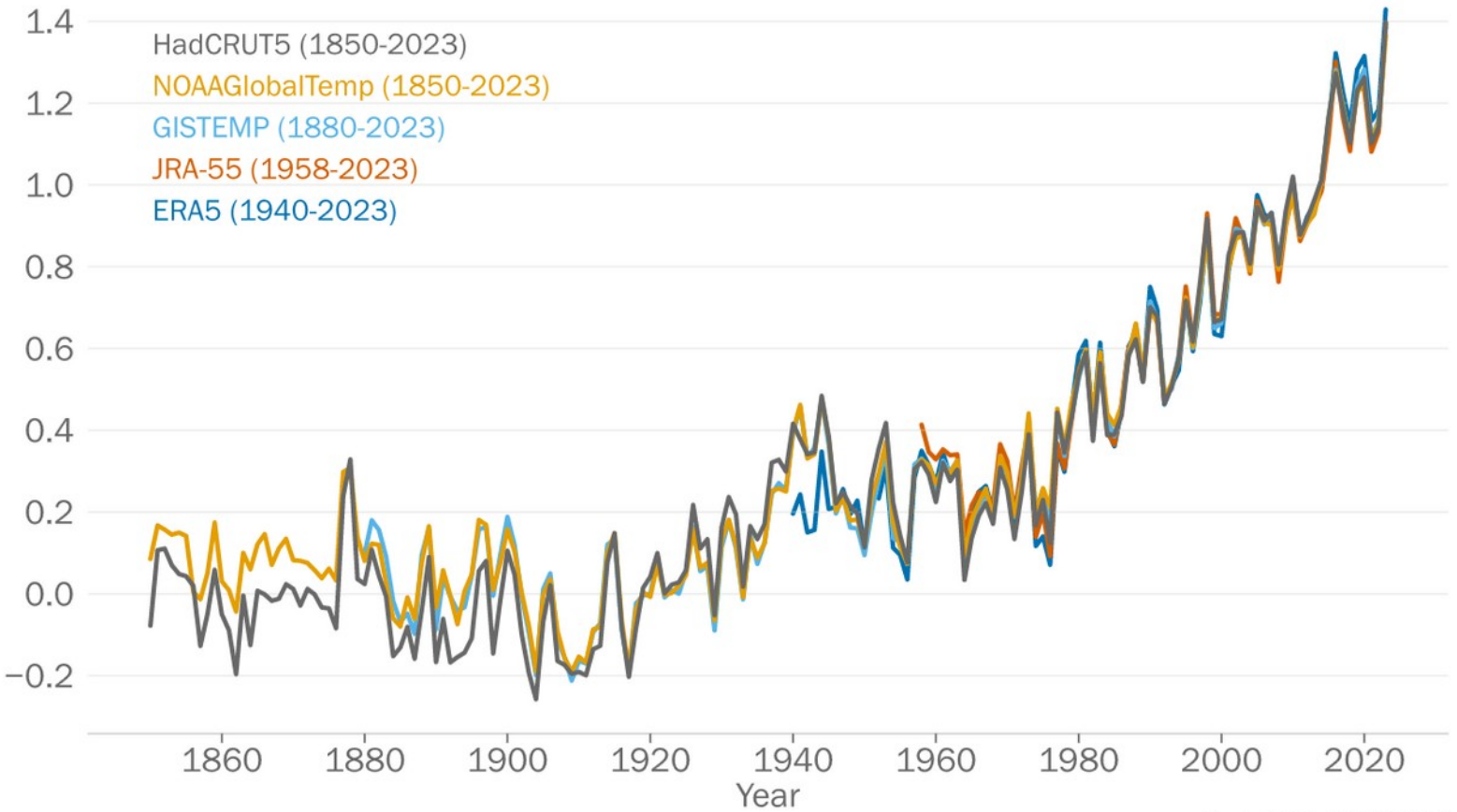


Schmidt GA, et al., 2023, CERESMIP: a climate modeling protocol to investigate recent trends in the Earth's Energy Imbalance. *Front. Clim.* 5:1202161.
<https://doi.org/10.3389/fclim.2023.1202161>



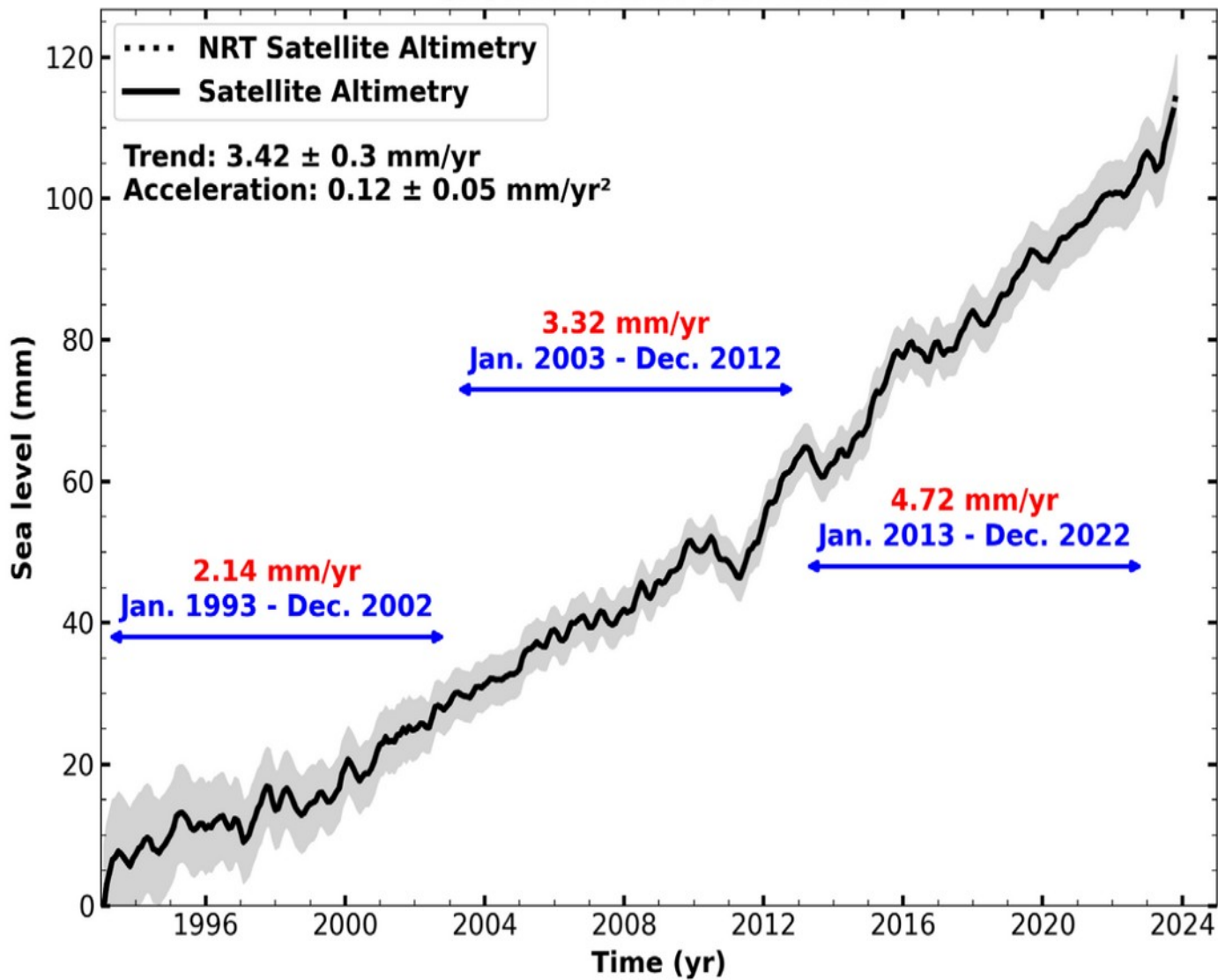
... and surface temperature increases.

Global Mean Temperature Difference (°C) Compared to 1850-1900 average



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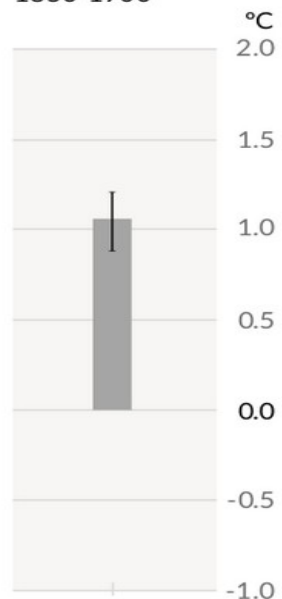
GLOBAL MEAN SEA LEVEL



Observed warming is driven by emissions from human activities, with greenhouse gas warming partly masked by aerosol cooling

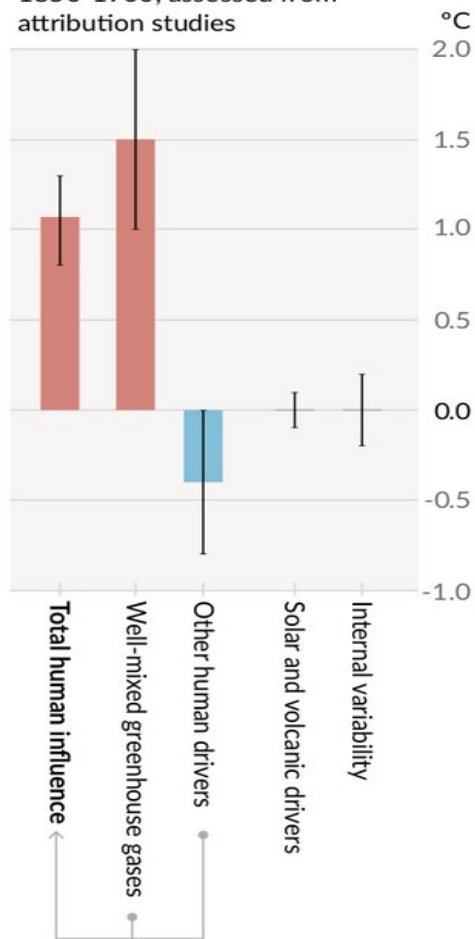
Observed warming

a) Observed warming 2010-2019 relative to 1850-1900

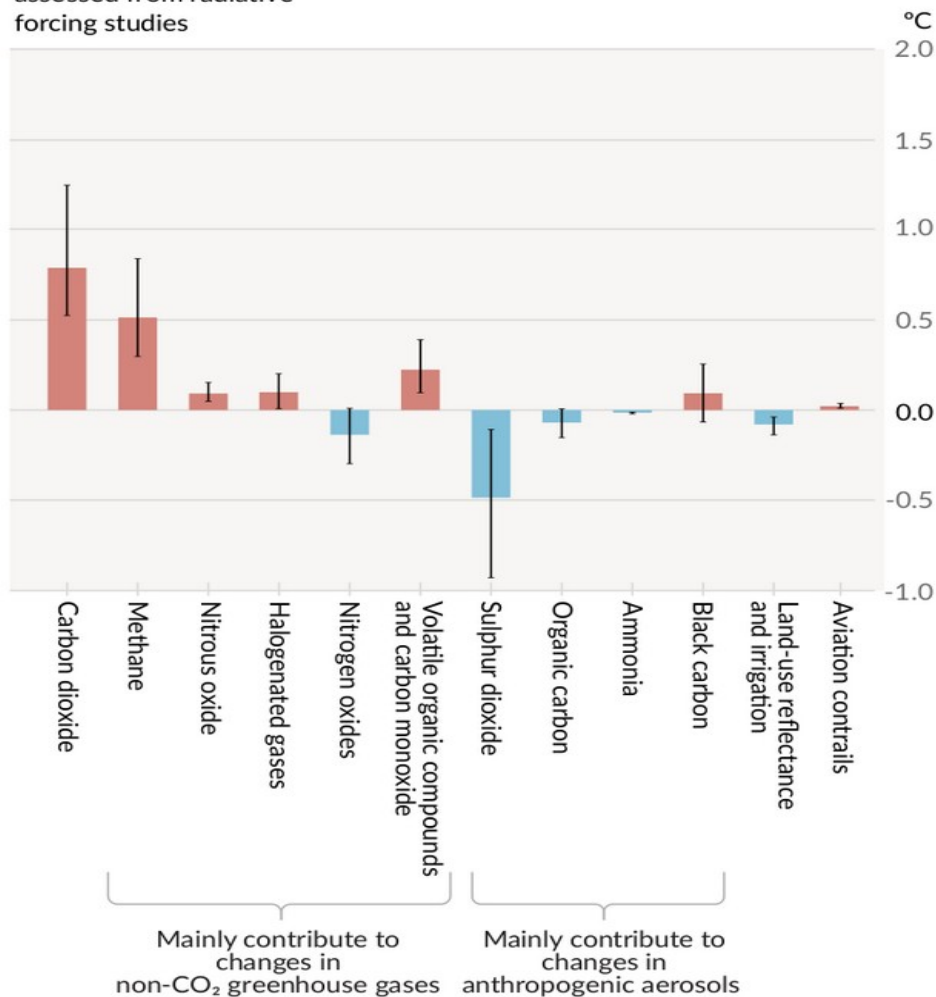


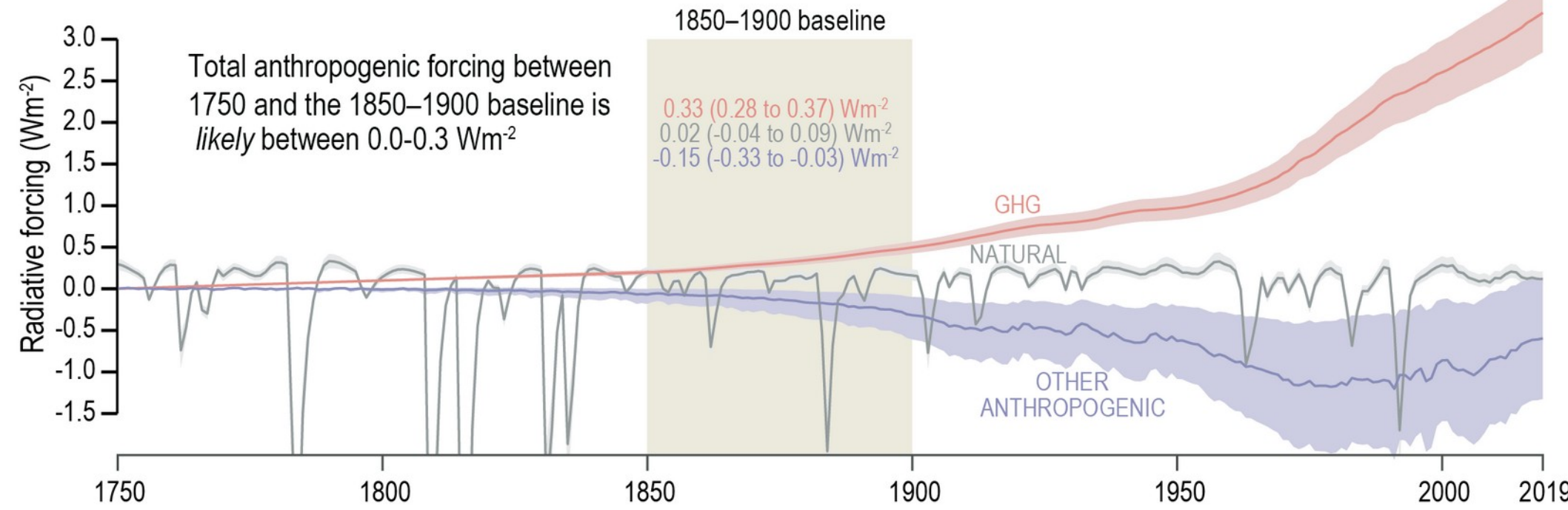
Contributions to warming based on two complementary approaches

b) Aggregated contributions to 2010-2019 warming relative to 1850-1900, assessed from attribution studies



c) Contributions to 2010-2019 warming relative to 1850-1900, assessed from radiative forcing studies



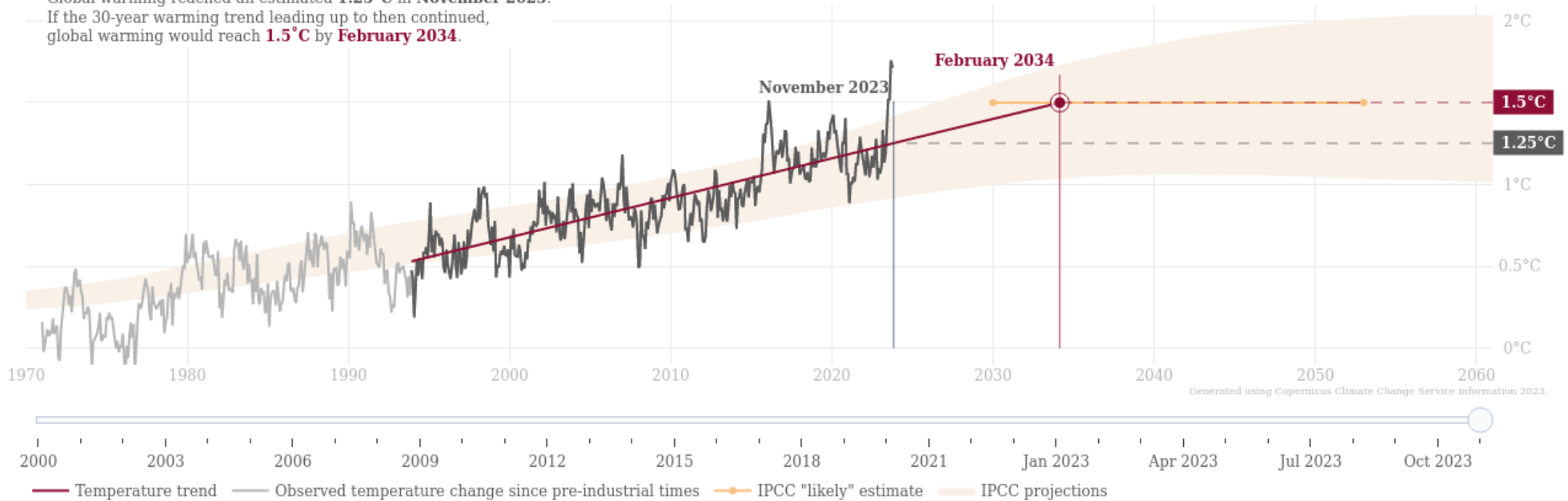


How close are we to reaching a global warming of 1.5°C?

Reaching 1.5°C of global warming - a limit agreed under the Paris agreement - may feel like a very distant reality, but it might be closer than you think. Experts suggest it is likely to happen between 2030 and the early 2050s. See where we are now and how soon we would reach the limit if the warming continued at today's pace. **Use the slider to explore how the estimate changes in time.**

Explore the app in the CDS

Global warming reached an estimated **1.25°C** in **November 2023**.
If the 30-year warming trend leading up to then continued,
global warming would reach **1.5°C** by **February 2034**.



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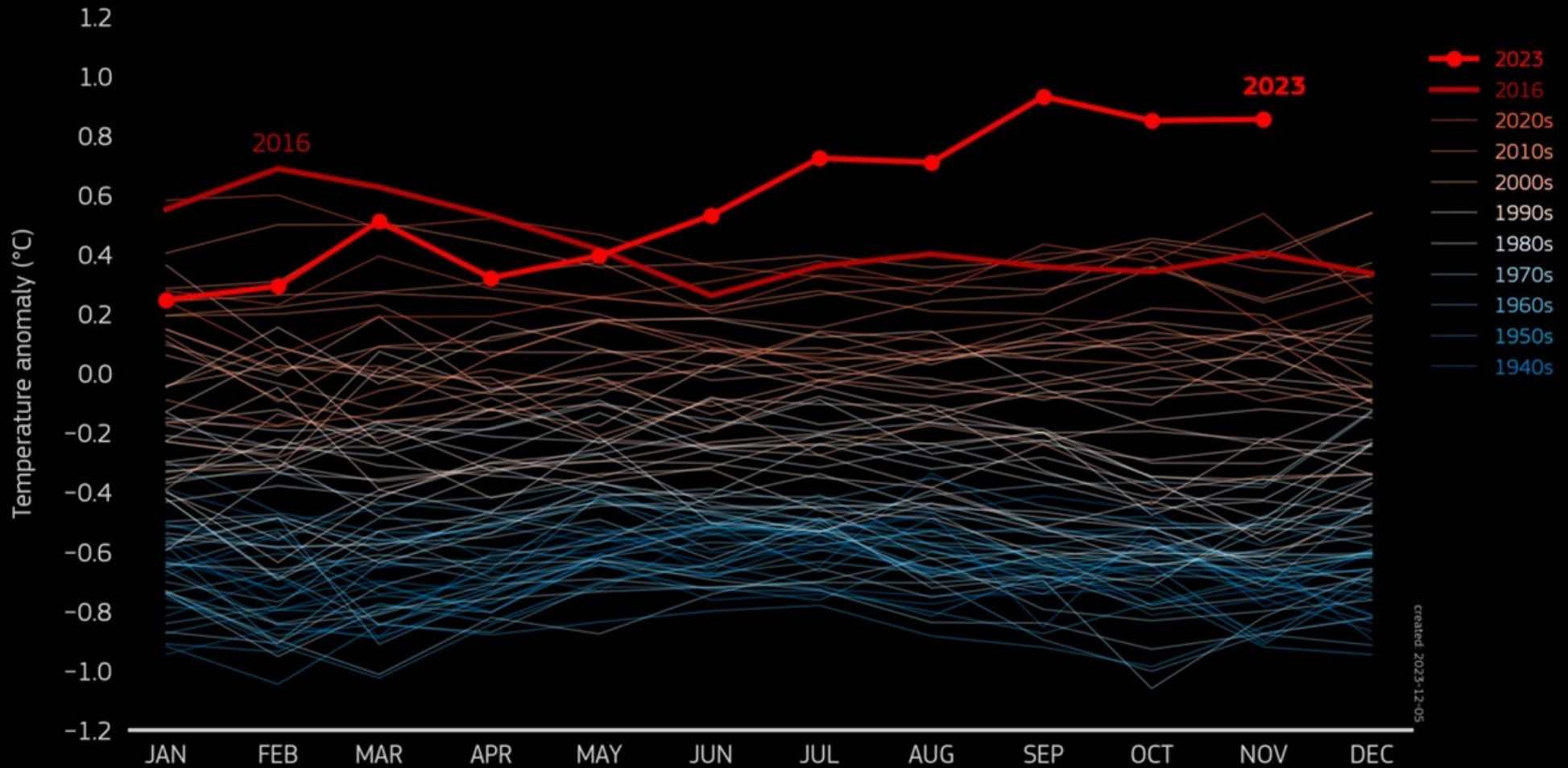
GLOBAL SURFACE AIR TEMPERATURE ANOMALIES

Data: ERA5 1940-2023 • Reference period: 1991-2020 • Credit: C3S/ECMWF



Climate Change Service

climate.copernicus.eu



PROGRAMME OF THE EUROPEAN UNION



IMPLEMENTED BY ECMWF

SST World (60S-60N)

Data Source: NOAA OISST V2.1 | Image Credit: ClimateReanalyzer.org, Climate Change Institute, University of Maine

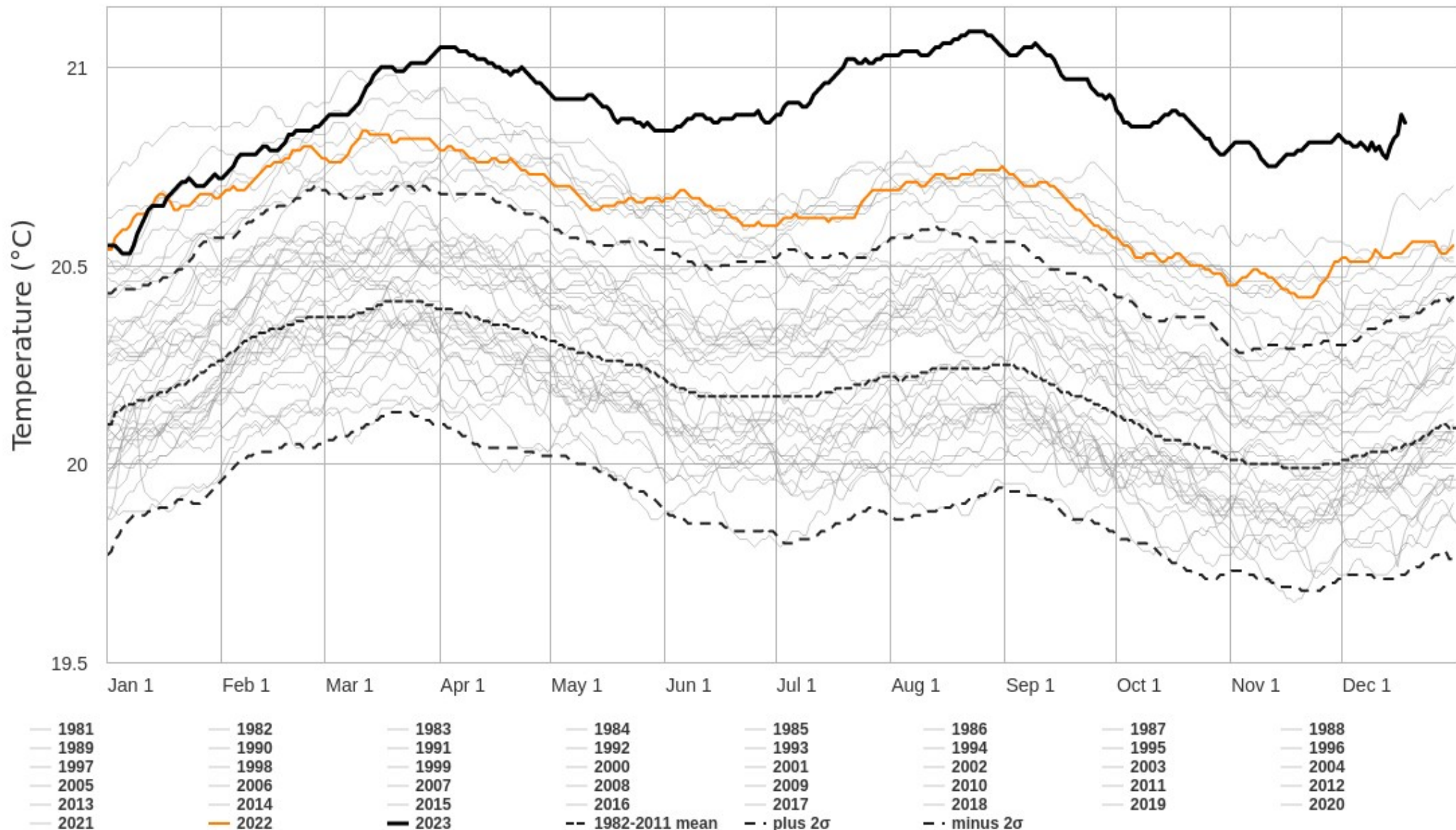
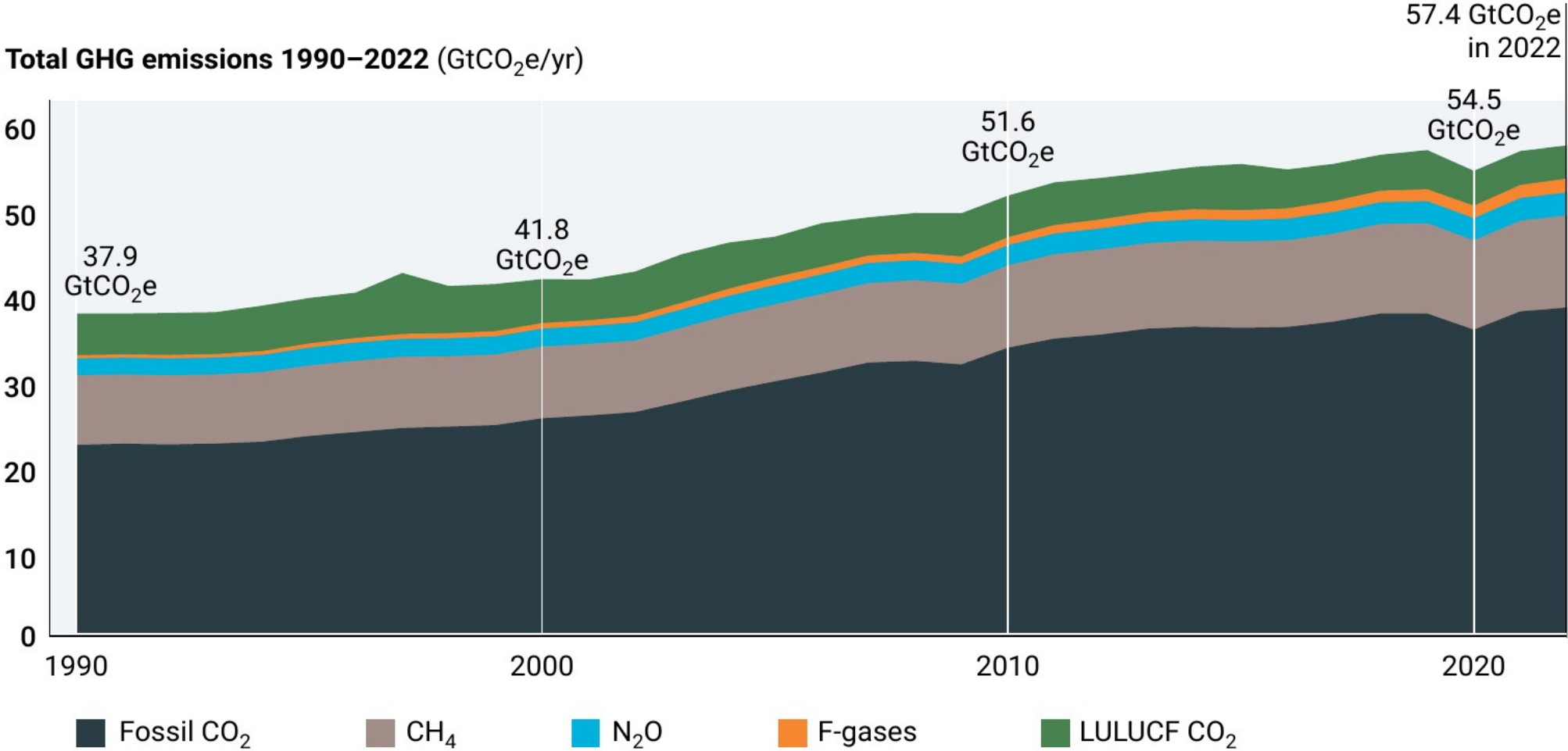


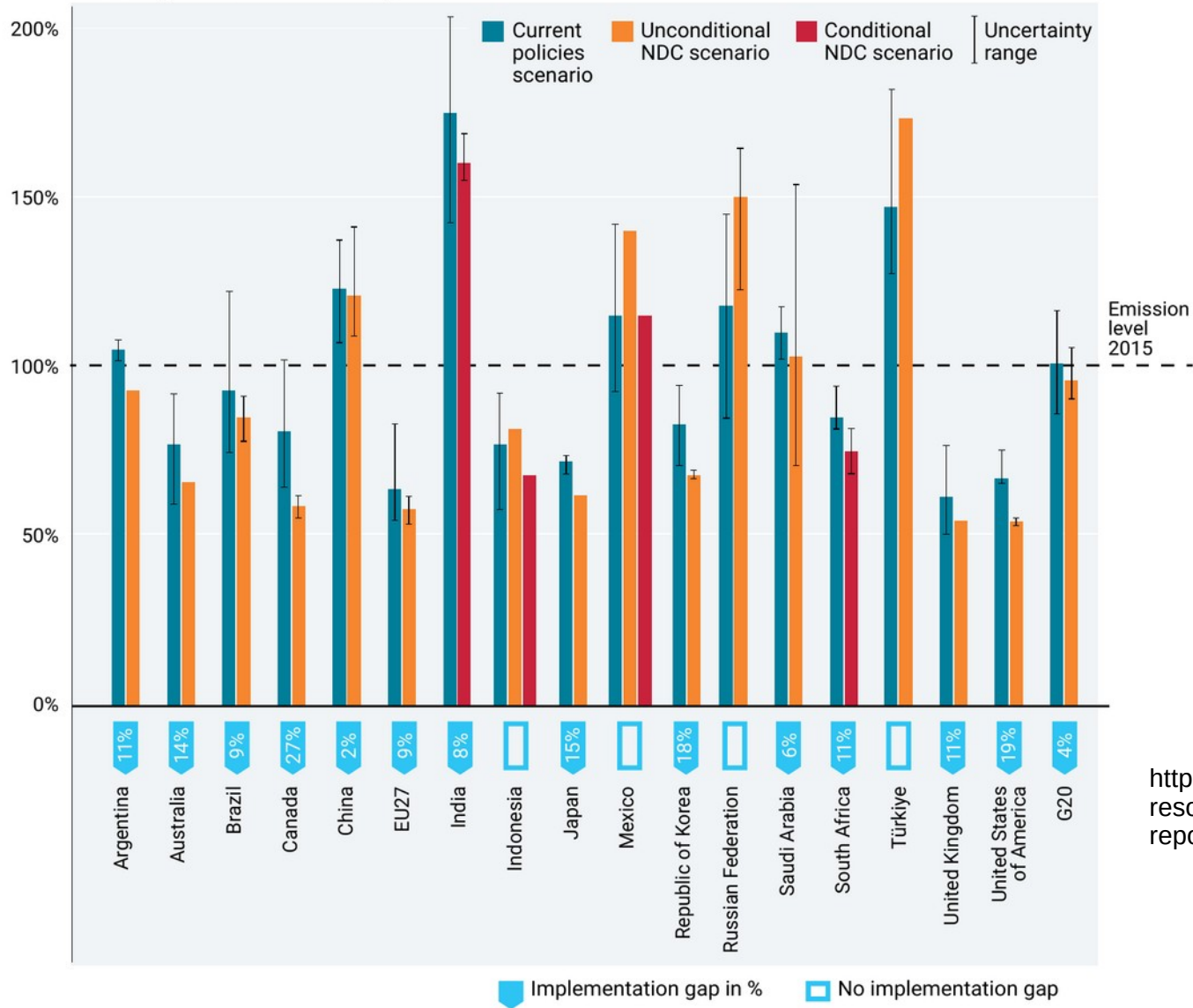
Figure ES.1 Total net anthropogenic GHG emissions, 1990–2022



<https://www.unep.org/resources/emissions-gap-report-2023>

Figure ES.3 Implementation gaps between current policies and NDC pledges for the G20 members collectively and individually by 2030, relative to 2015 emissions

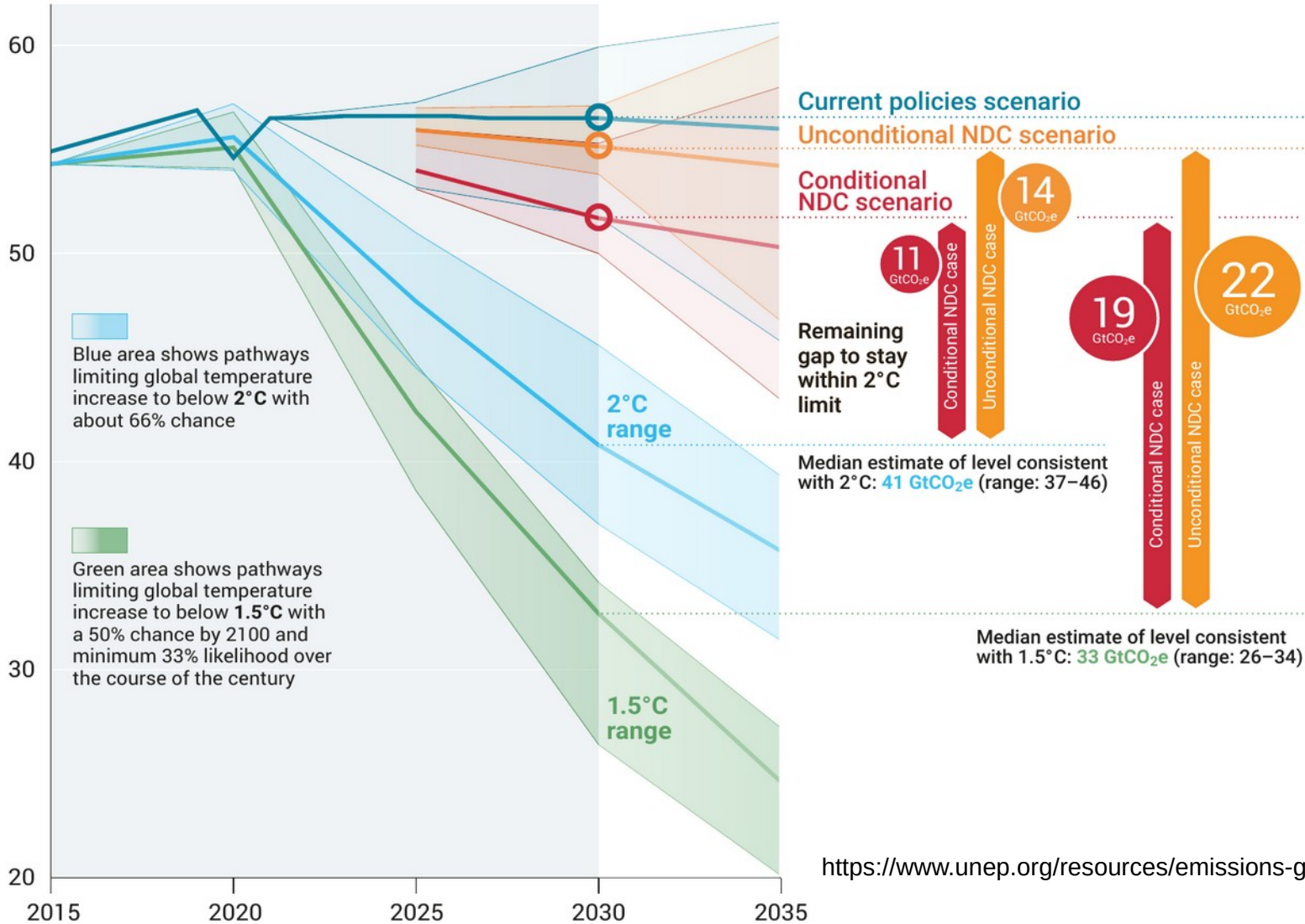
GHG emissions (relative to 2015 = 100%)



<https://www.unep.org/resources/emissions-gap-report-2023>

Figure ES.4 Global GHG emissions under different scenarios and the emissions gap in 2030 and 2035 (median estimate and tenth to ninetieth percentile range)

GtCO₂e



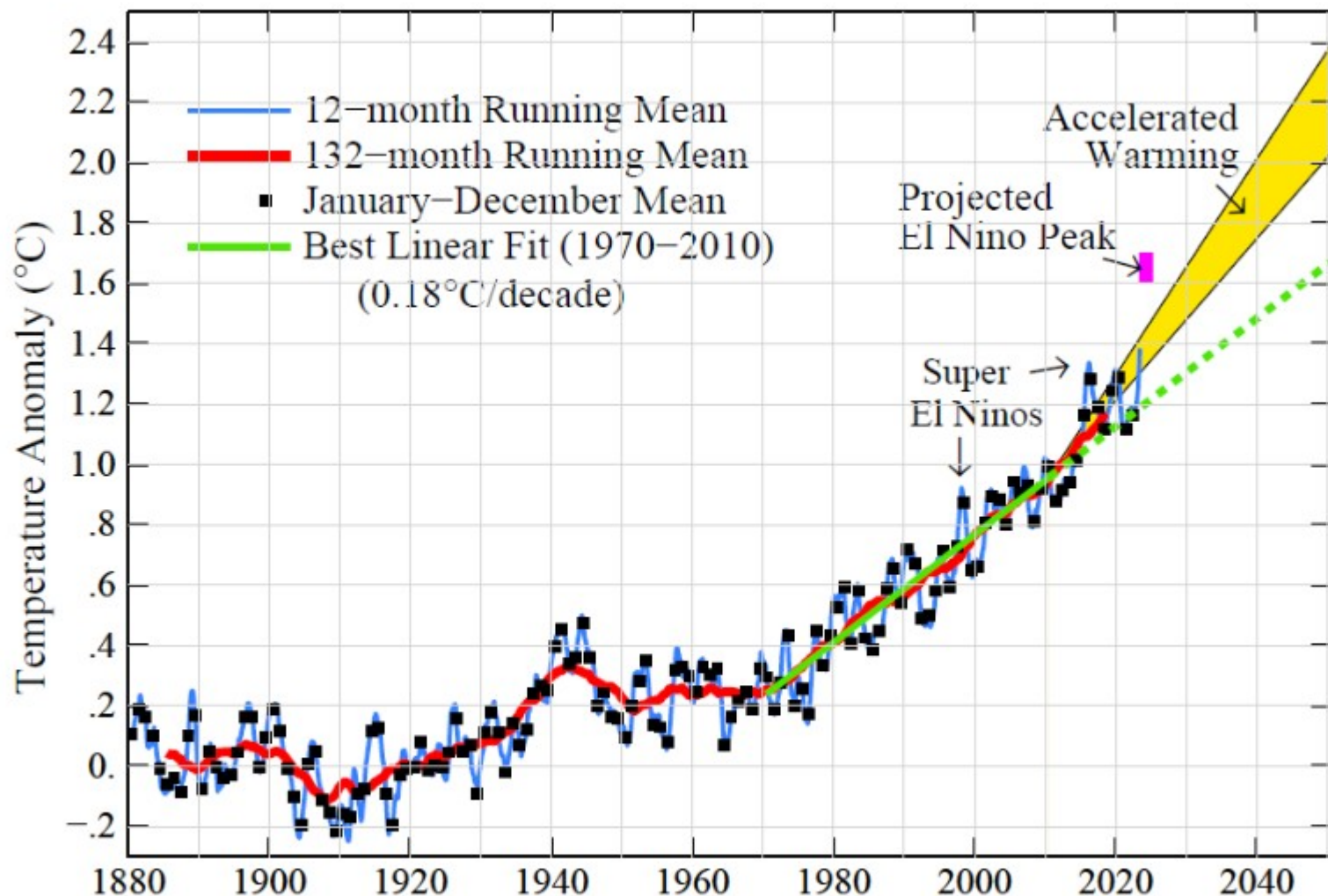


Fig. 4. Global temperature relative to 1880-1920 based on the GISS analysis.^{18,19}

<https://www.unep.org/resources/emissions-gap-report-2023>

<https://library.wmo.int/records/item/56335-wmo-provisional-state-of-the-global-climate-2022>

<https://climate.copernicus.eu/>

<https://climatereanalyzer.org/>

<https://www.gov.uk/government/publications/final-report-the-economics-of-biodiversity-the-das-gupta-review>

<https://global-tipping-points.org/>

<https://www.imf.org/en/Publications/FM/Issues/2023/10/10/fiscal-monitor-october-2023>

<http://www.columbia.edu/~jeh1/mailings/2023/Miracle.2023.12.07.pdf>