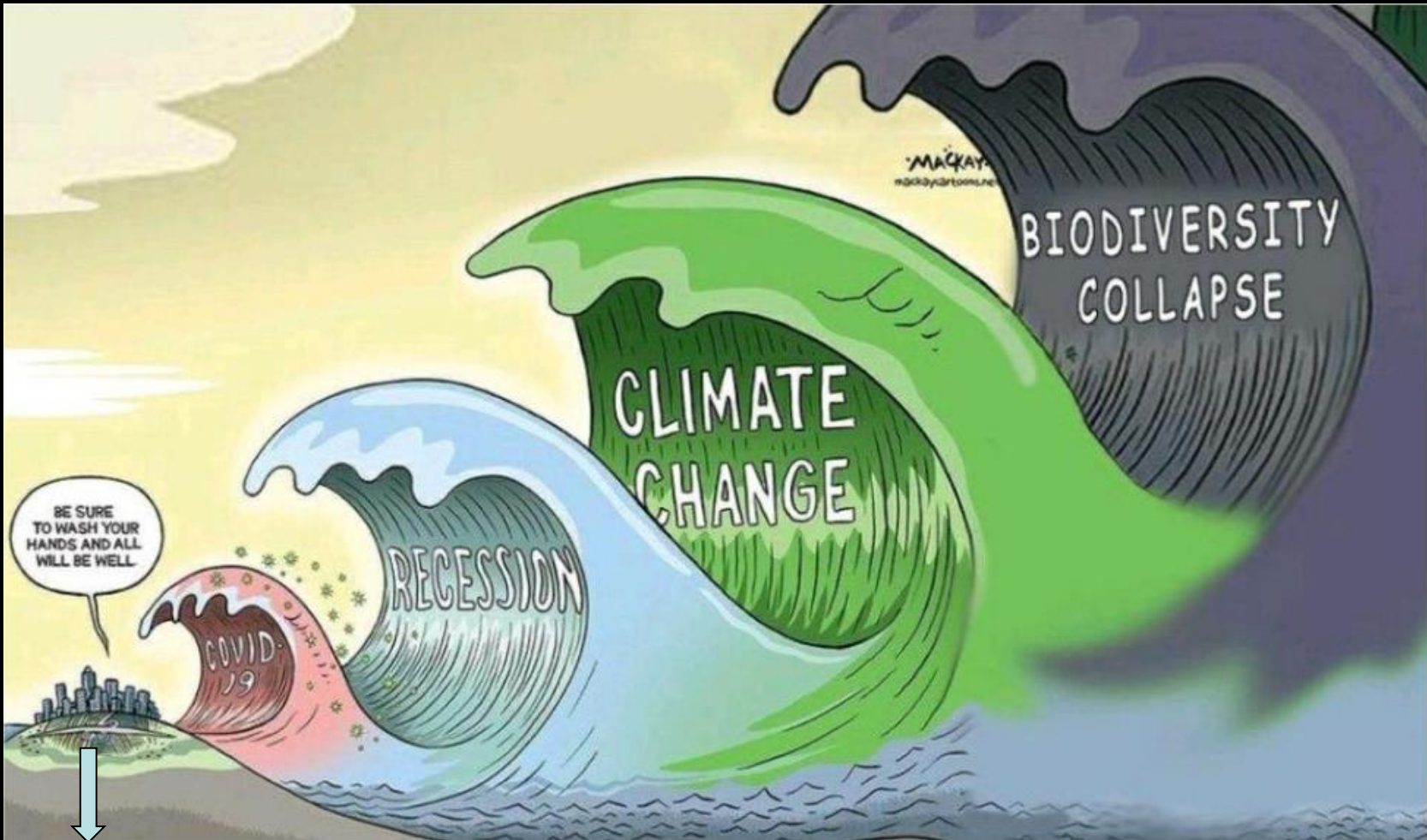


# Fim do mundo ou mudança de época?



“Não deixe de lavar bem as mãos e tudo ficará bem”

**PENSAR O MUNDO EM TEMPOS DE PANDEMIA**

Diálogos para não voltar ao “velho normal”    Ativistas | Pensadorxs | Artistas  
De 14 a 17/10, das 14h às 21h    [www.outraspalavras.net/metamorfozes](http://www.outraspalavras.net/metamorfozes)

Inscрева-sel

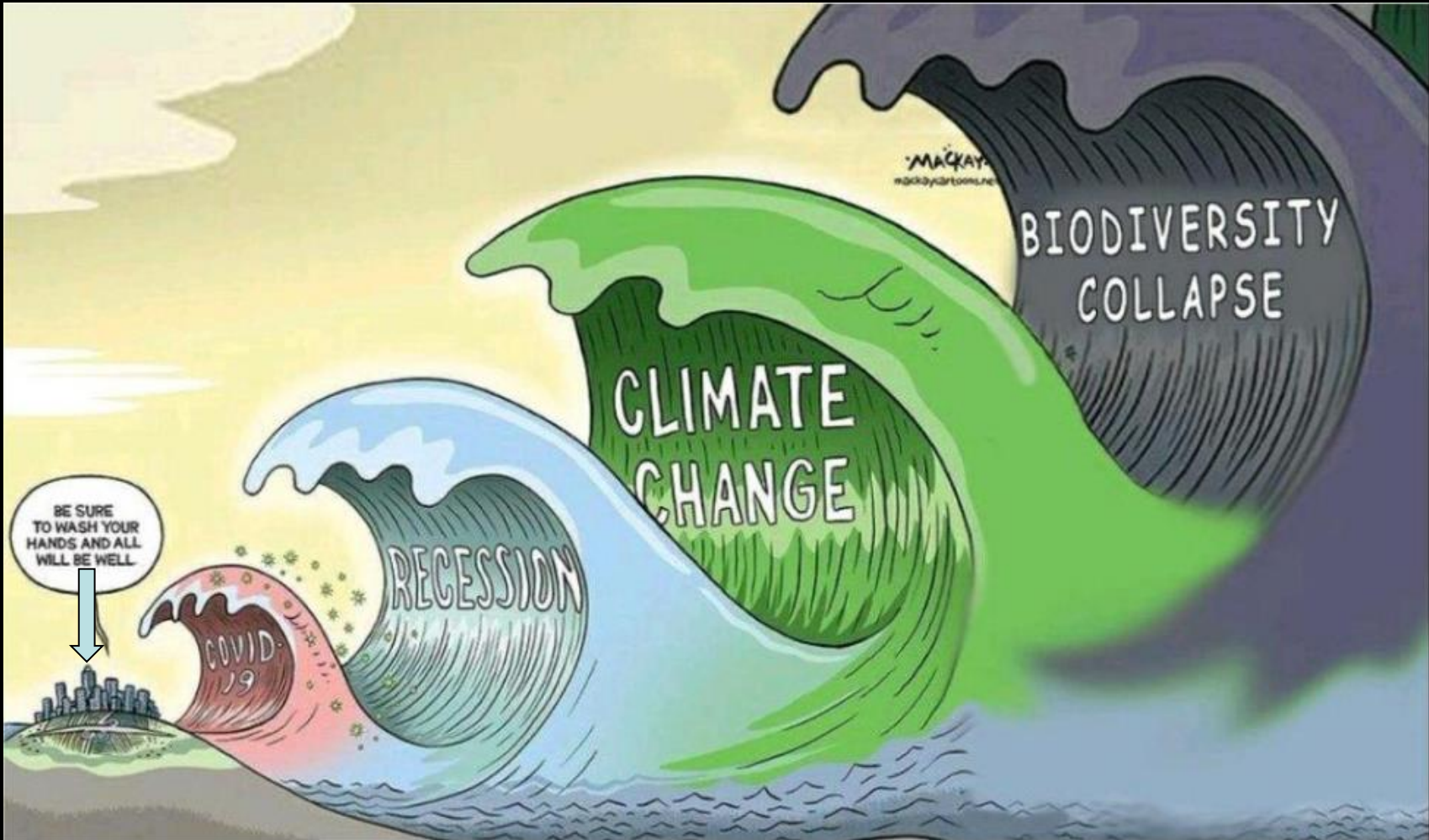
**M E T A  
M O R  
F O S E S**

Luiz Marques

[luiz.marques4@gmail.com](mailto:luiz.marques4@gmail.com)

# Falso senso de segurança

“Não deixe de lavar bem as mãos e tudo ficará bem”



# Falso senso de segurança

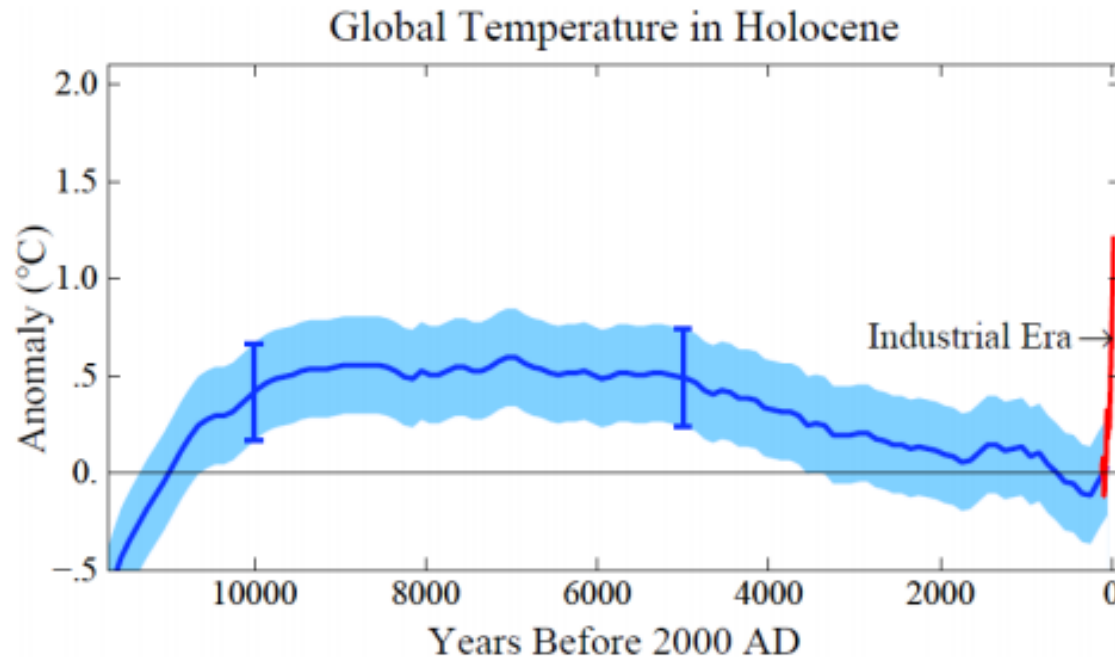
Owen Gaffney, Stockholm Resilience Centre:



“As sociedades industriais receberam da enganosa estabilidade do Holoceno - os últimos 11.700 anos -, um falso senso de segurança. Agora, **ejetamos a Terra de seu envelope interglacial e estamos entrando em território desconhecido**”.

Owen Gaffney, “Anthropocene now”. *New Scientist*, 22/IV/2017, pp. 24-25: “Industrial societies have been given a false sense of security by the deceptive stability of the Holocene, the last 11,700 years. Now we have ejected Earth from the interglacial envelope and are heading into uncharted territory”

# Os anos 2014-2020 rompem a estabilidade climática do Holoceno e excedem o Holoceno máximo

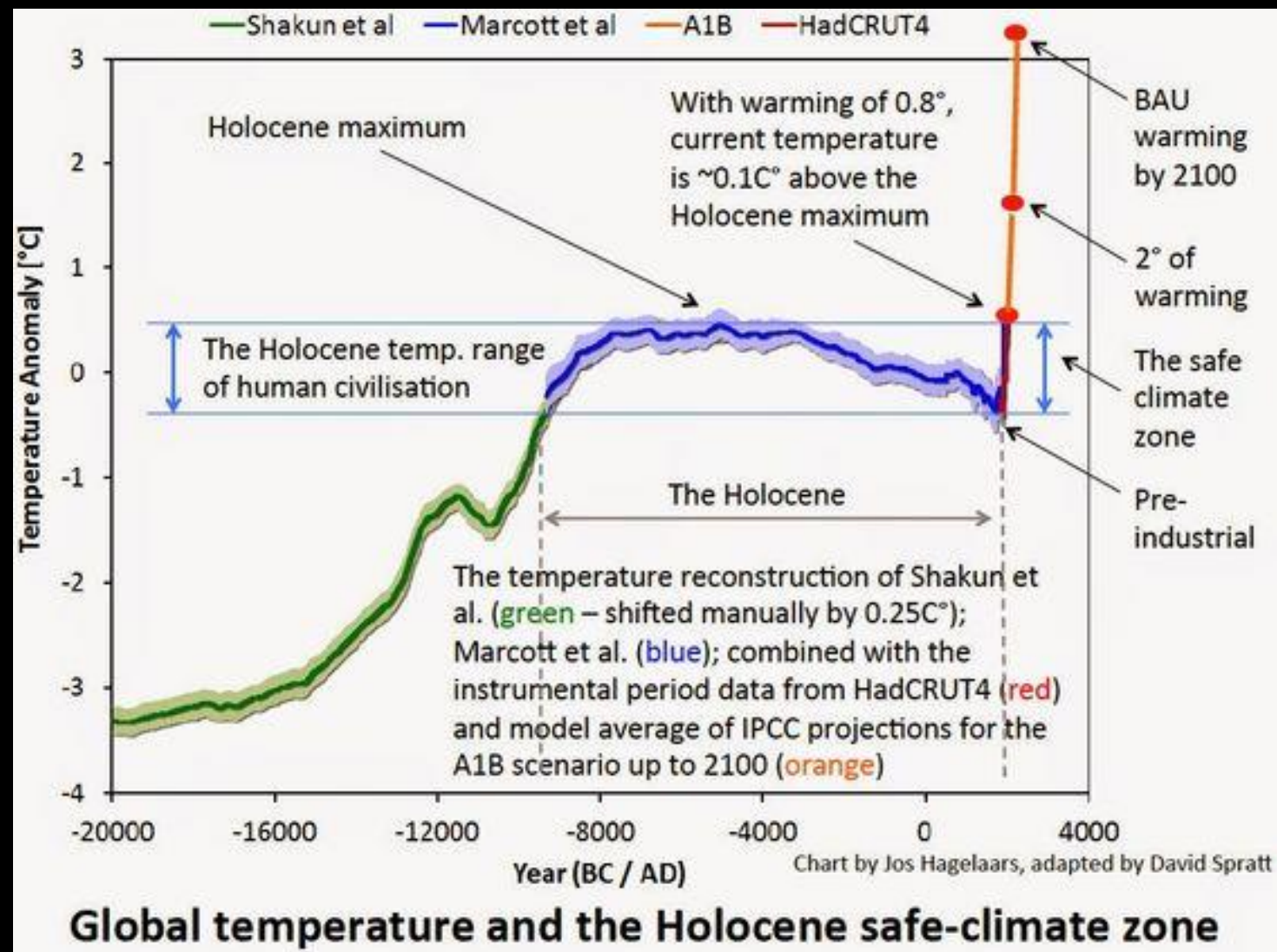


**Fig. 25.1. Global temperature in the Holocene relative to 1880-1920 average.**<sup>1</sup> Blue data are proxy temperature analysis of co-authors Shaun Marcott, Jeremy Shakun. Red line is from instrumental data for 1880-2020. Proxy data have 100-year smoothing. Light blue area is formal 95 percent confidence range.

James Hansen *et al.*,

<http://www.columbia.edu/~jeh1/SophiePlanet/Planet.Chapter25.pdf>

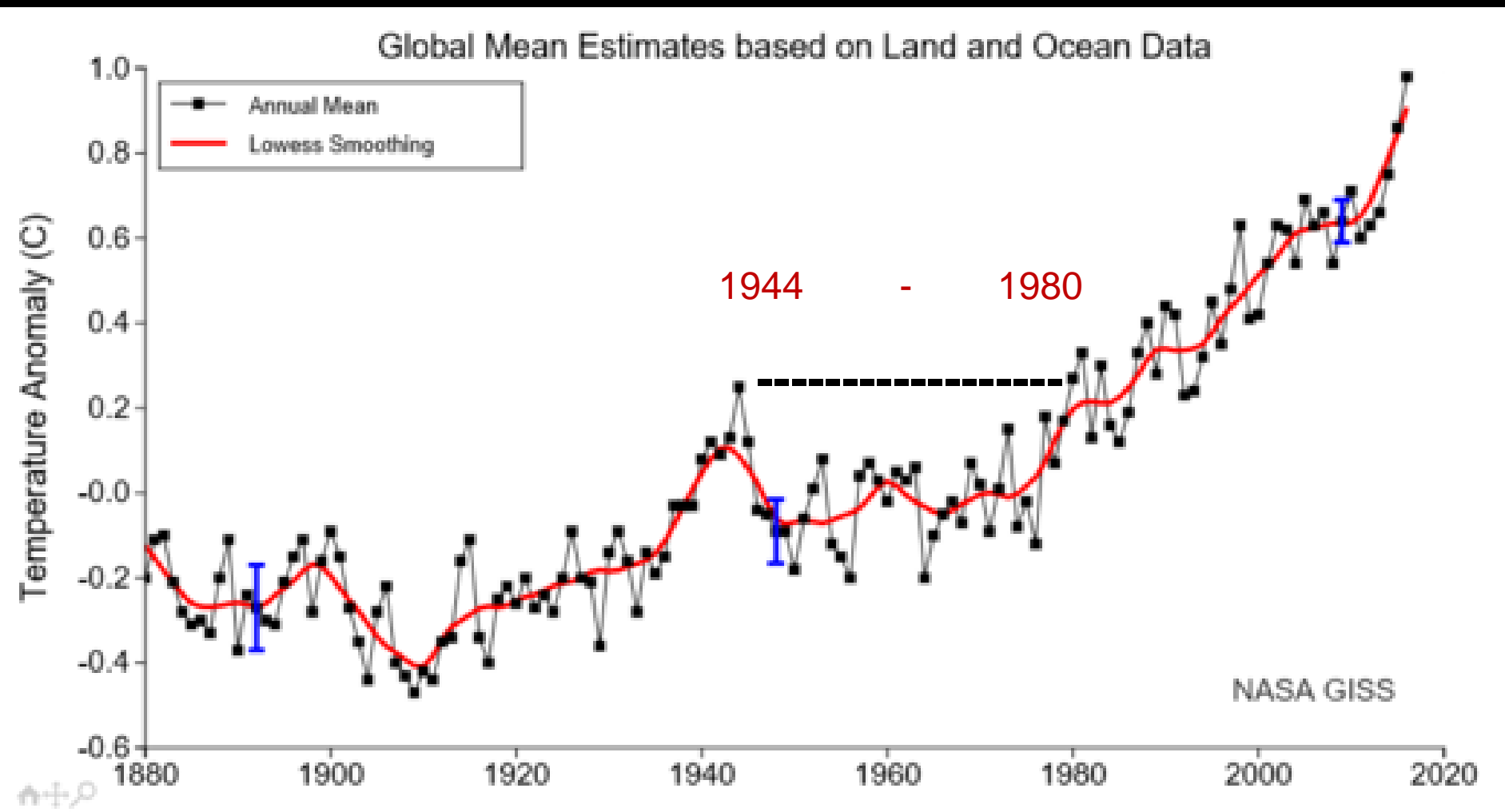
+0,8°C (2012) já foi ~0,1°C acima do Holoceno máximo



Shaun A. Marcott *et al.* "A Reconstruction of Regional and Global Temperature for the Past 11,300 Years". *Science*, 339, 6124, 8/III/2013, pp. 1198-1201.

<http://www.guyonclimate.com/2018/01/29/extreme-temperature-diary-january-29-2018-graphic-putting-global-warming-in-perspective/>

Mas até os anos 1970, o aquecimento global não parecia uma ameaça real



Global Temperature Trends 1880–2017



**1975:** Wallace Broecker cunha o termo  
*global warming*



Climate is an angry beast and we are  
poking at it with sticks

— *Wallace Smith Broecker* —

Wallace S. Broecker, “Are We on the Brink of a Pronounced **Global Warming?**”. *Science*, 189, 4201, 8 / VIII / 1975, pp. 460-463.

**1977:** o temor era ainda o de um retorno à próxima glaciação

**2006:** a capa da revista *Time* estampa o aquecimento global



1977



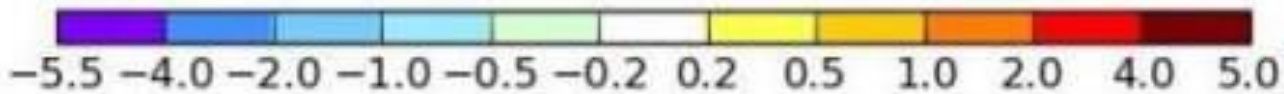
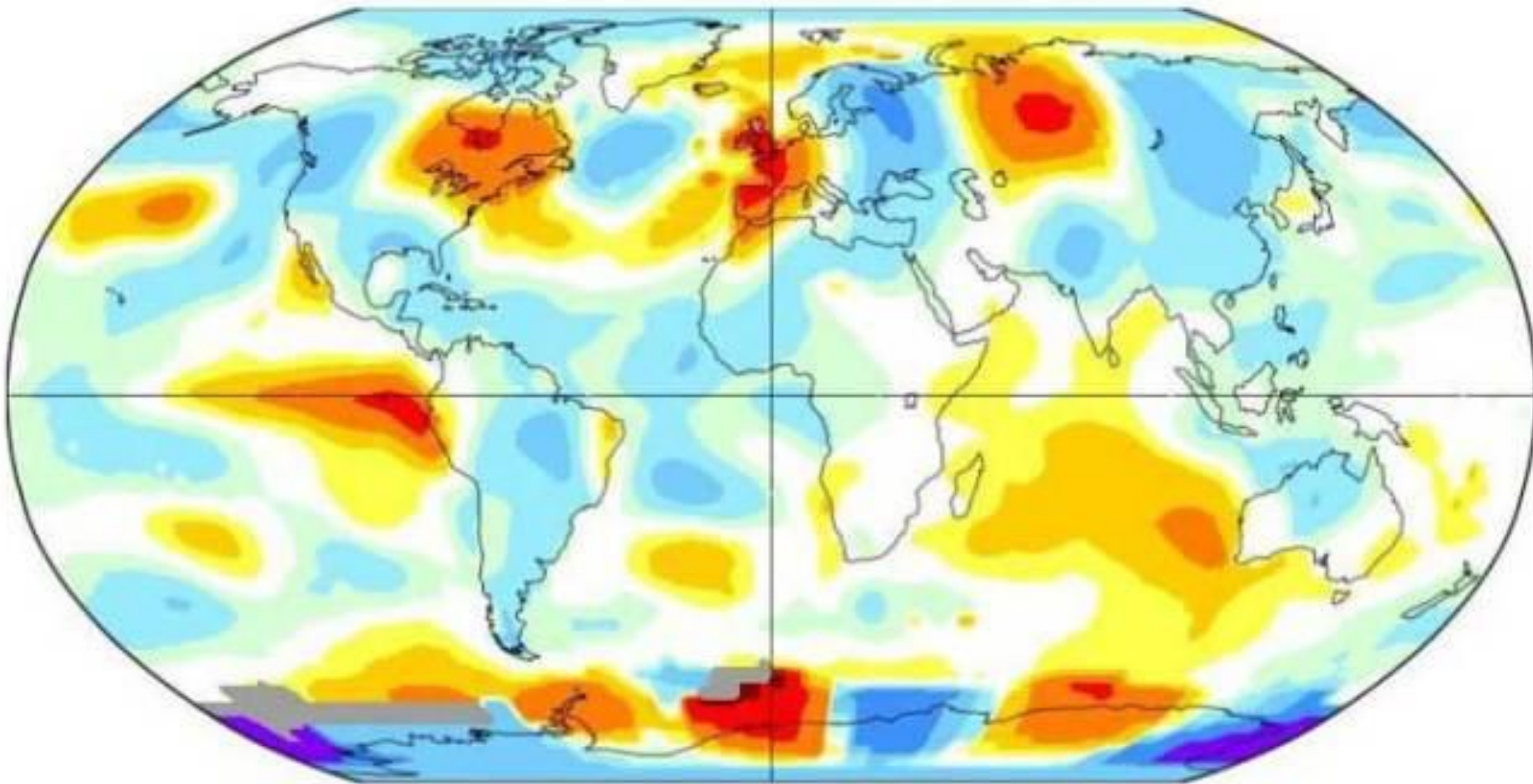
2006



June 1976

L-OTI(°C) Anomaly vs 1951-1980

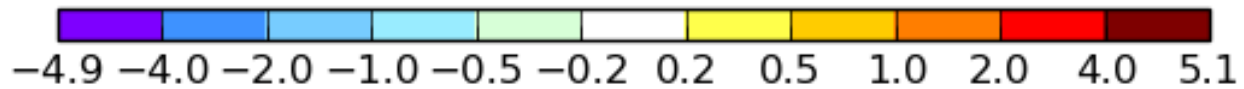
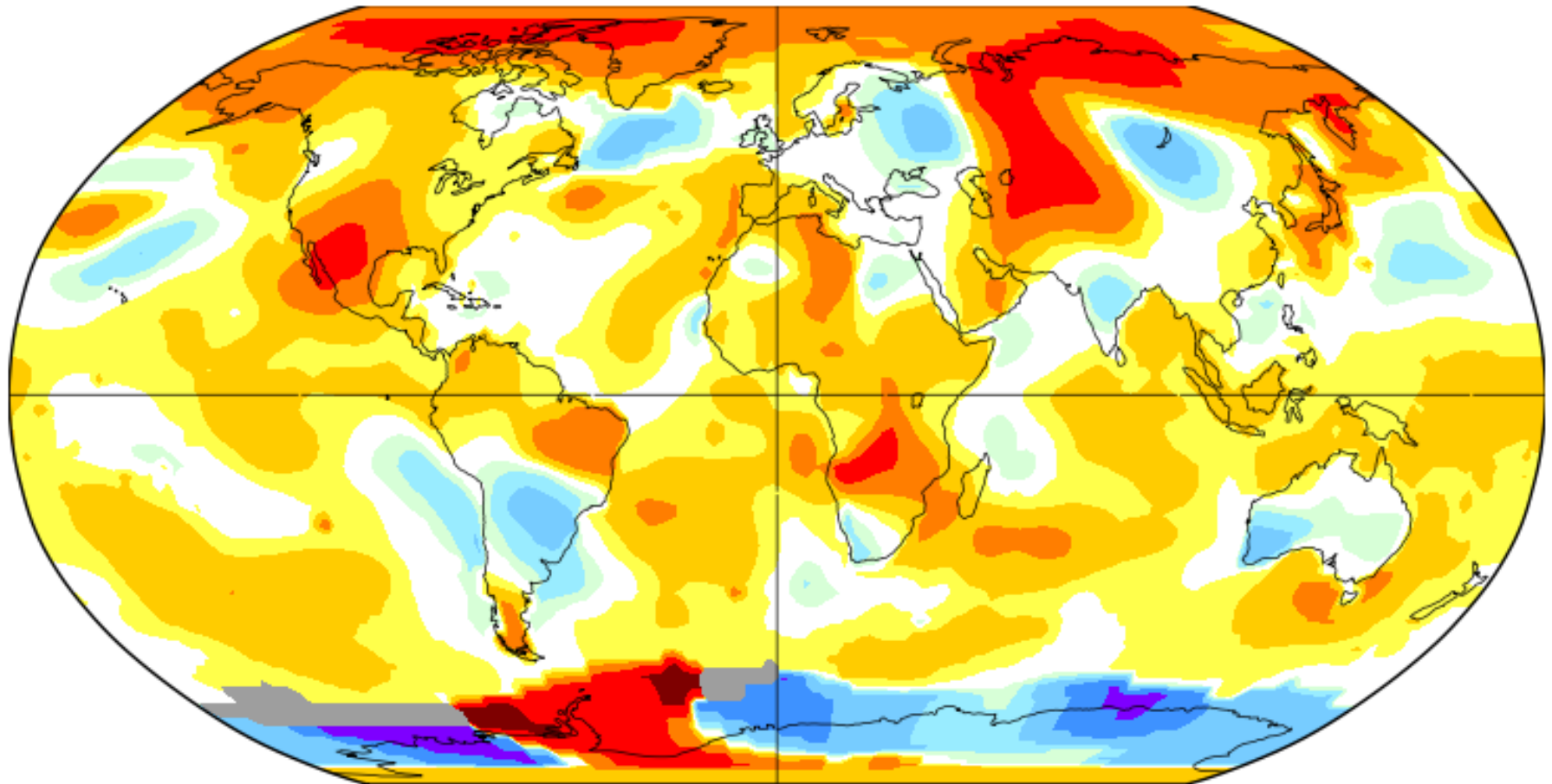
-0.15



June 1990

L-OTI(°C) Anomaly vs 1951-1980

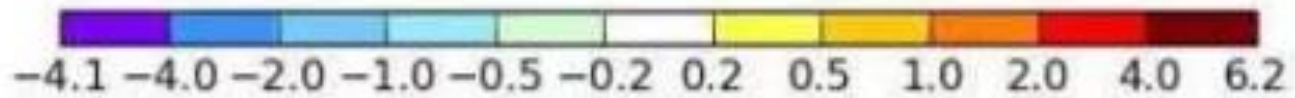
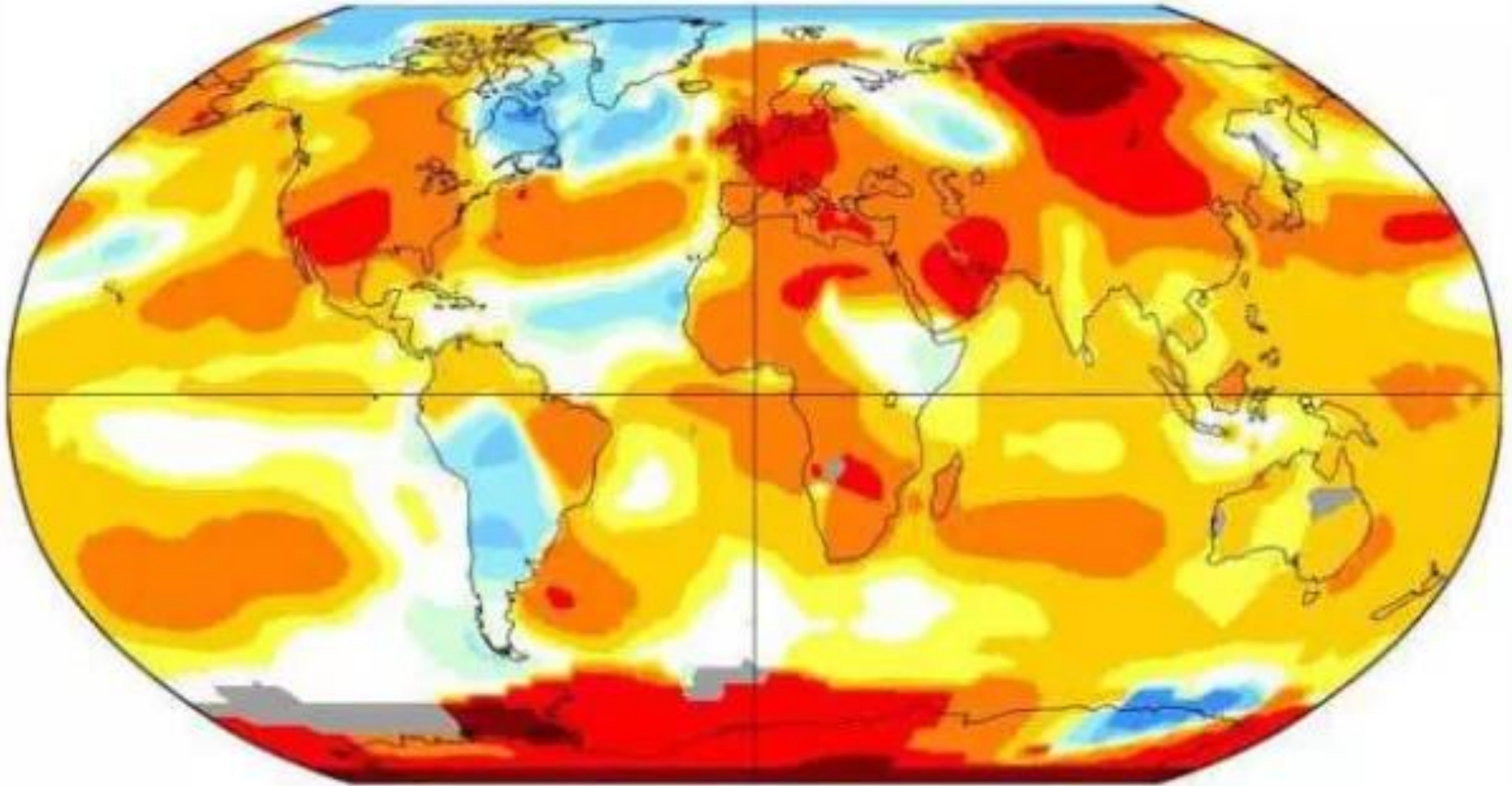
0.37



June 2018

L-OTI(°C) Anomaly vs 1951-1980

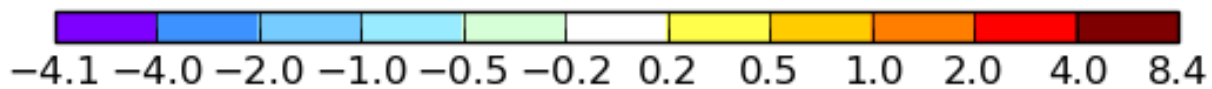
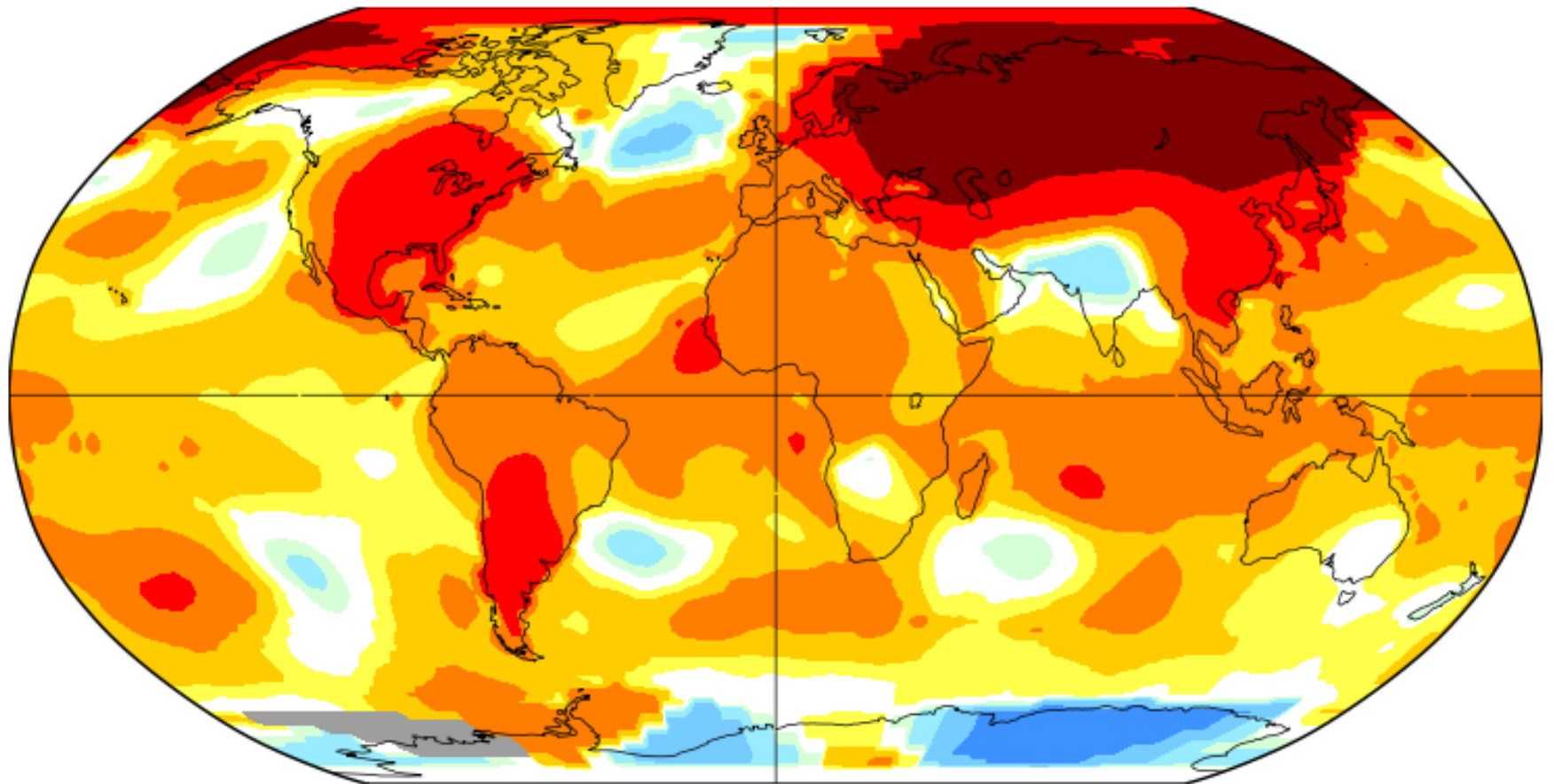
0.78



March 2020

L-OTI(°C) Anomaly vs 1951-1980

1.18



*Note:* Gray areas signify missing data.

*Note:* Ocean data are not used over land nor within 100km of a reporting land station.

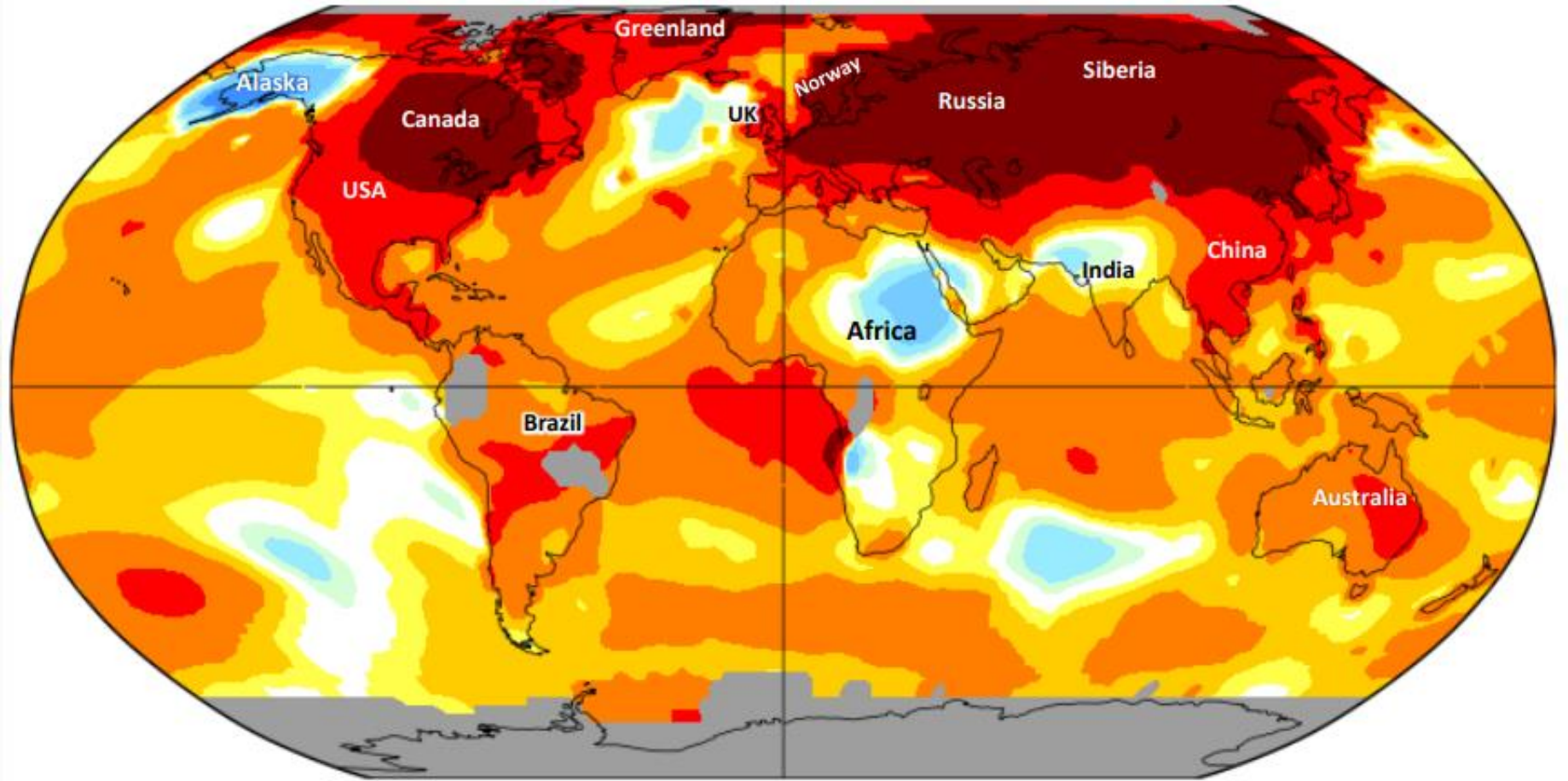
# JANUARY 2020

## Global Average Surface Temperature Increase 1.51°C

January 2020

L-OTI(°C) Anomaly vs 1881-1920

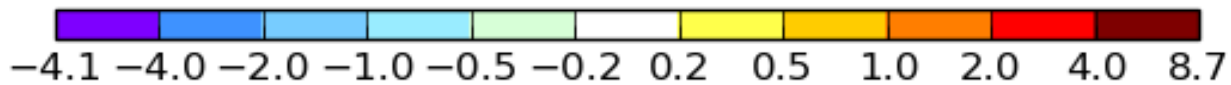
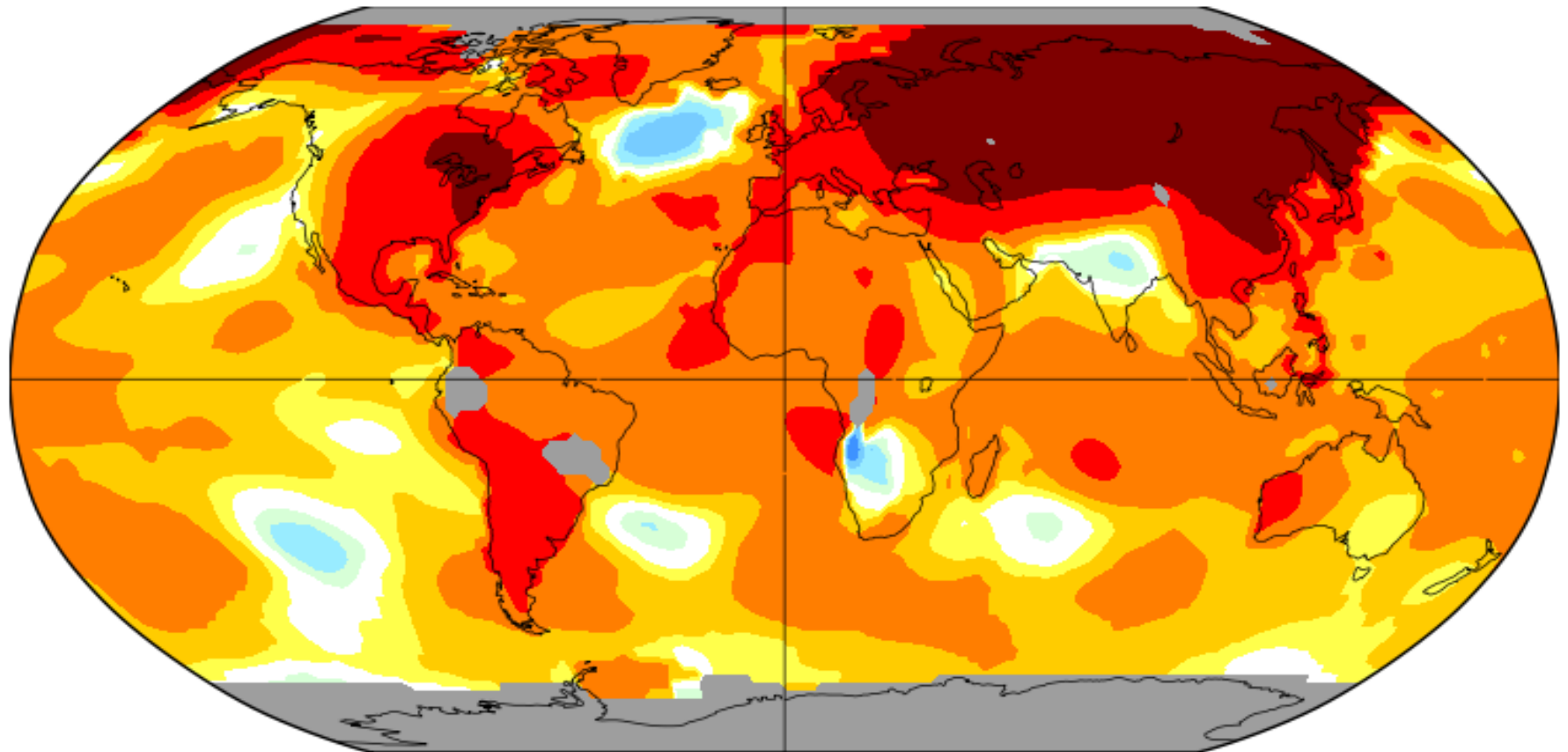
1.51



March 2020

L-OTI(°C) Anomaly vs 1880-1920

1.51



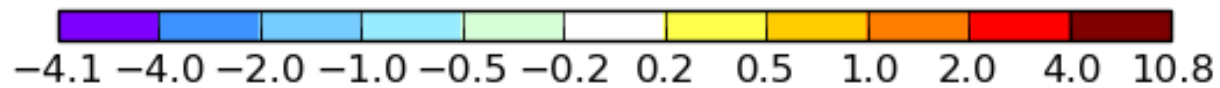
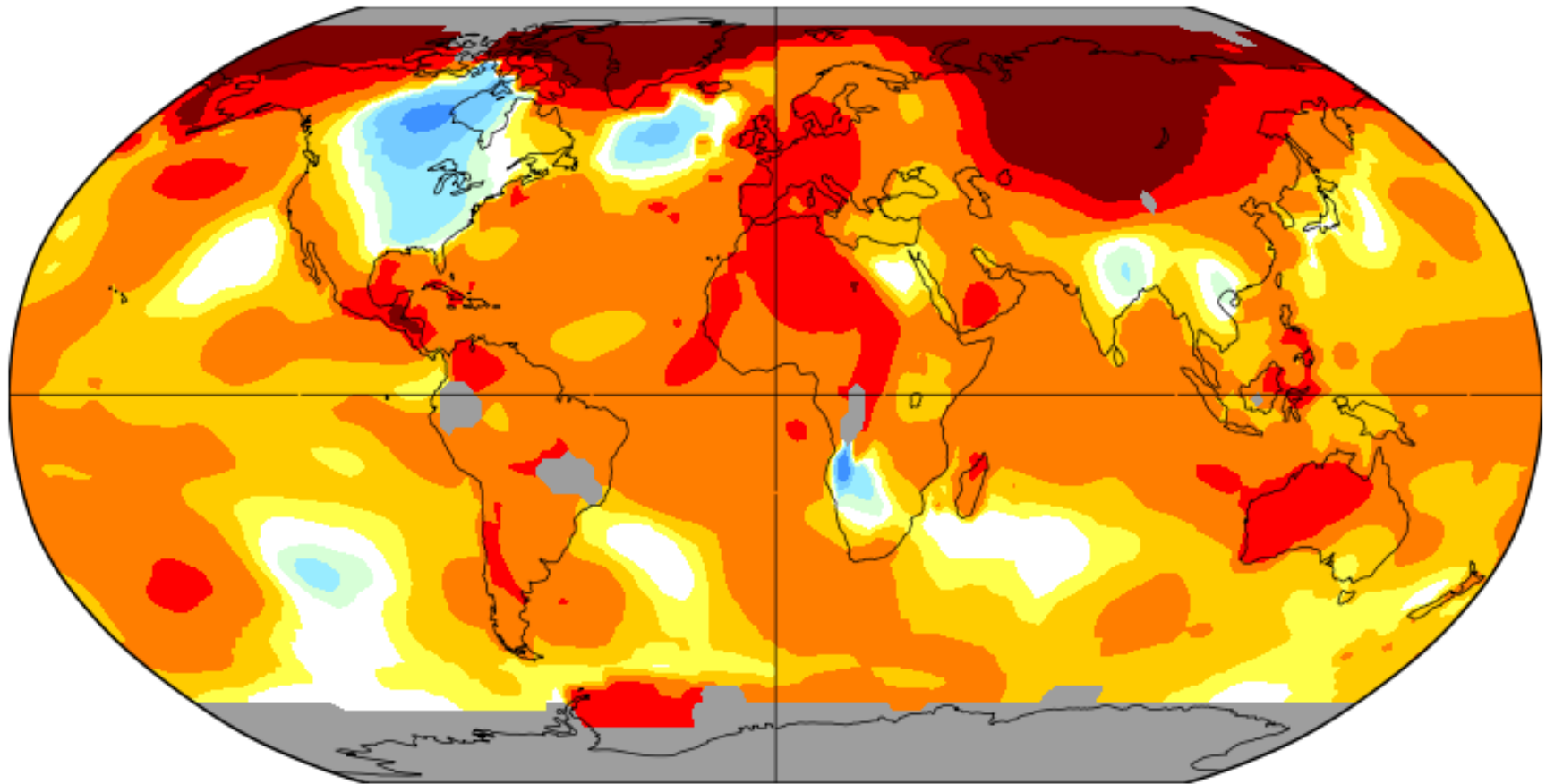
*Note:* Gray areas signify missing data.

*Note:* Ocean data are not used over land nor within 100km of a reporting land station.

April 2020

L-OTI(°C) Anomaly vs 1880-1920

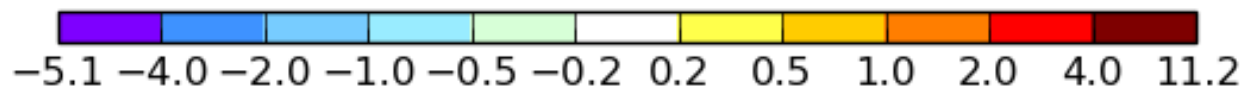
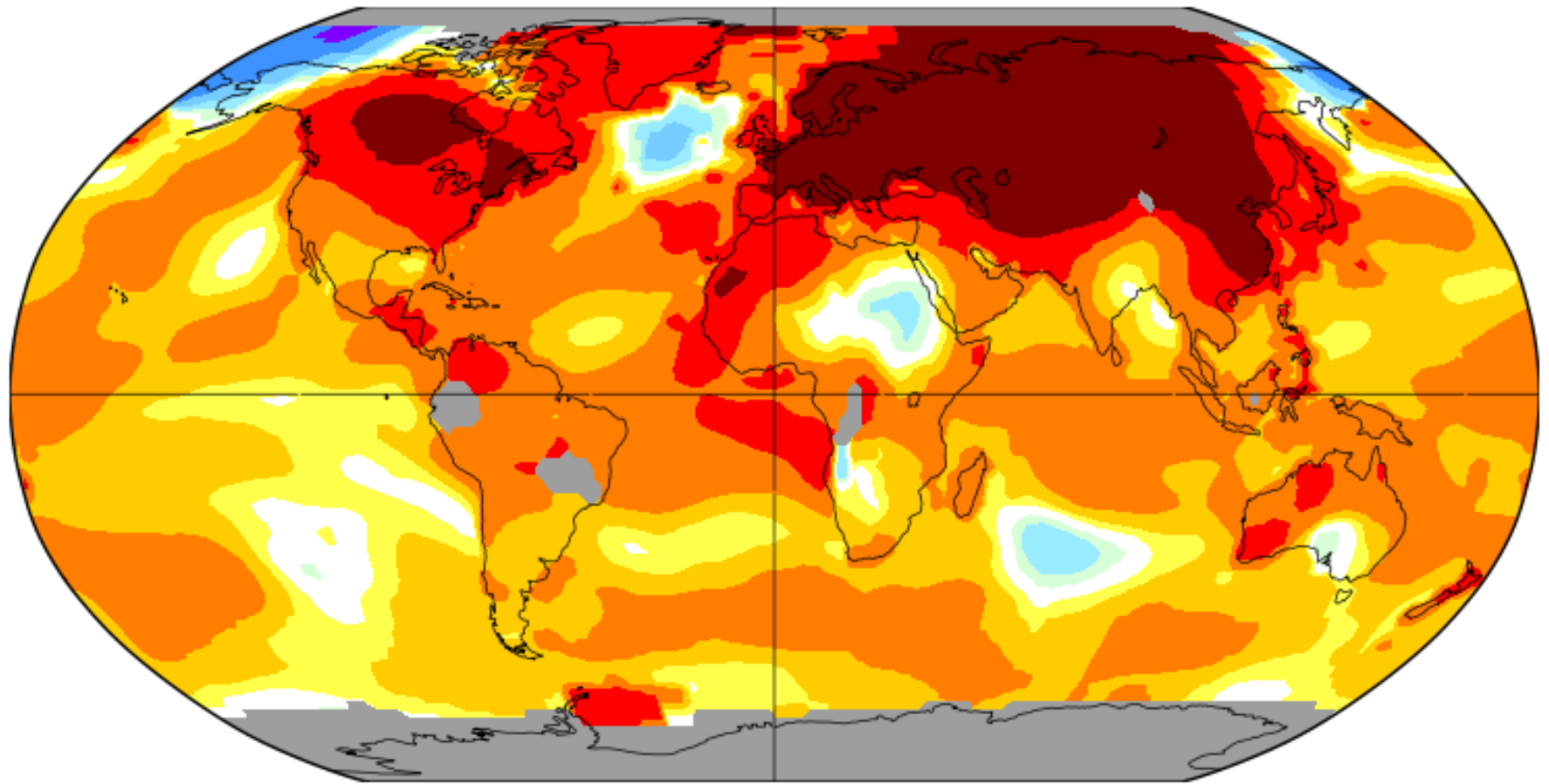
1.34



February 2020

L-OTI(°C) Anomaly vs 1881-1920

1.50



*Note:* Gray areas signify missing data.

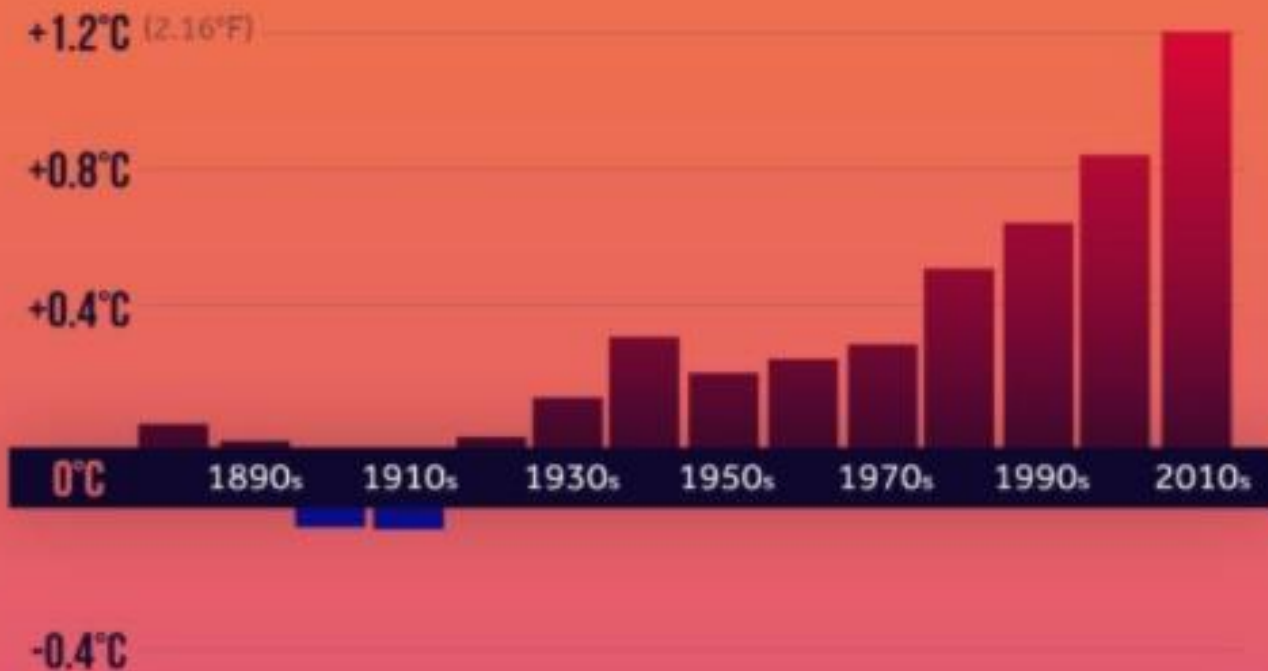
*Note:* Ocean data are not used over land nor within 100km of a reporting land station.



“Cada década desde a de 1970 foi mais quente que a década precedente”

## GLOBAL DECADES OF WARMING

Average Decadal Temperature Anomalies



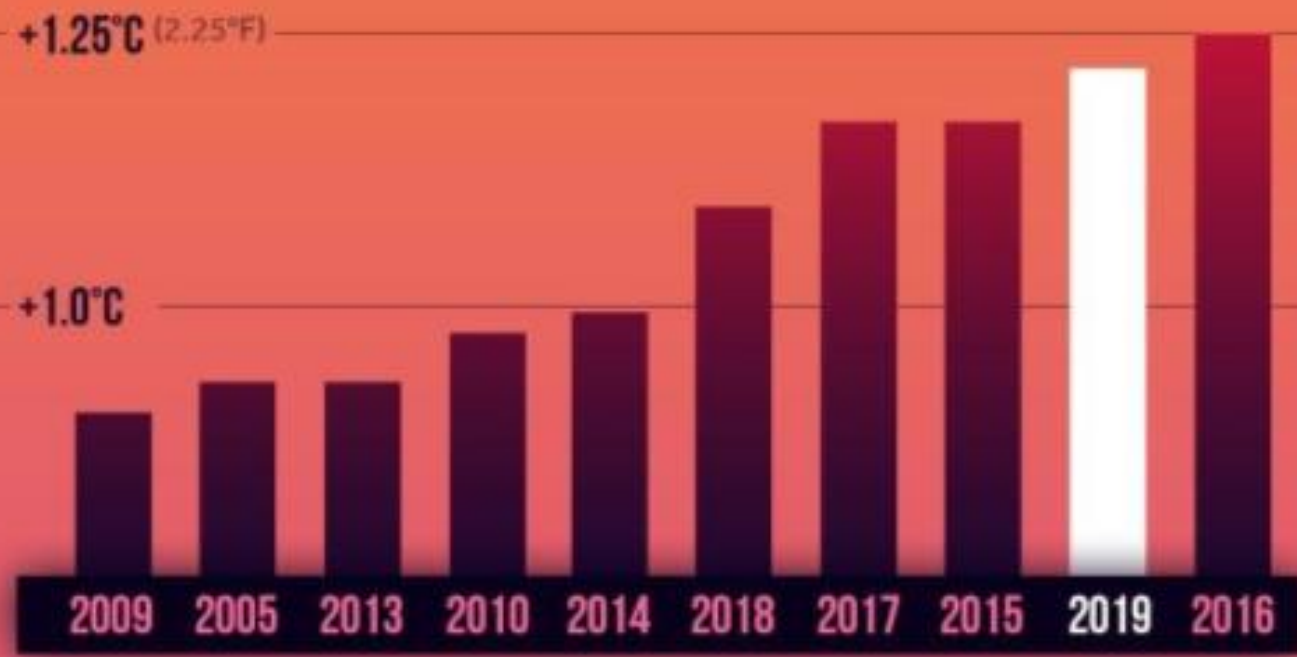
Source: NASA GISS & NOAA NCEI global temperature anomalies averaged and adjusted to early industrial baseline (1881-1910). Data as of 1/15/2020

CLIMATE  CENTRAL

Os dez anos mais quentes ocorreram desde 2005 e os cinco mais quentes, desde 2015

# 10 HOTTEST YEARS ON RECORD GLOBALLY

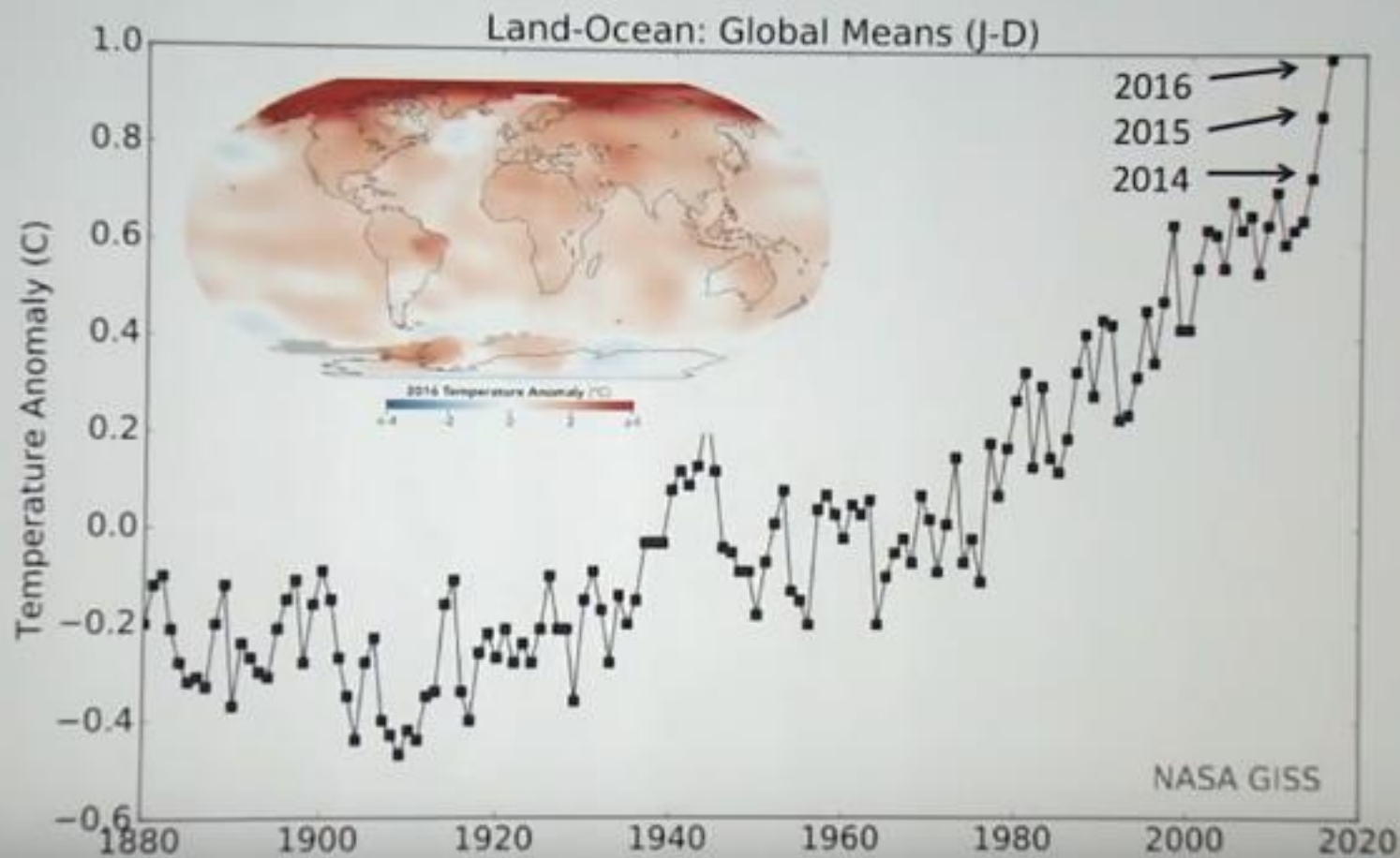
Last 5 = Hottest 5



Source: NASA GISS & NOAA NCEI global temperature anomalies (°C) averaged and adjusted to early industrial baseline (1861-1910). Data as of 1/15/2020.

Em 2014 começa a segunda onda de aceleração do aquecimento

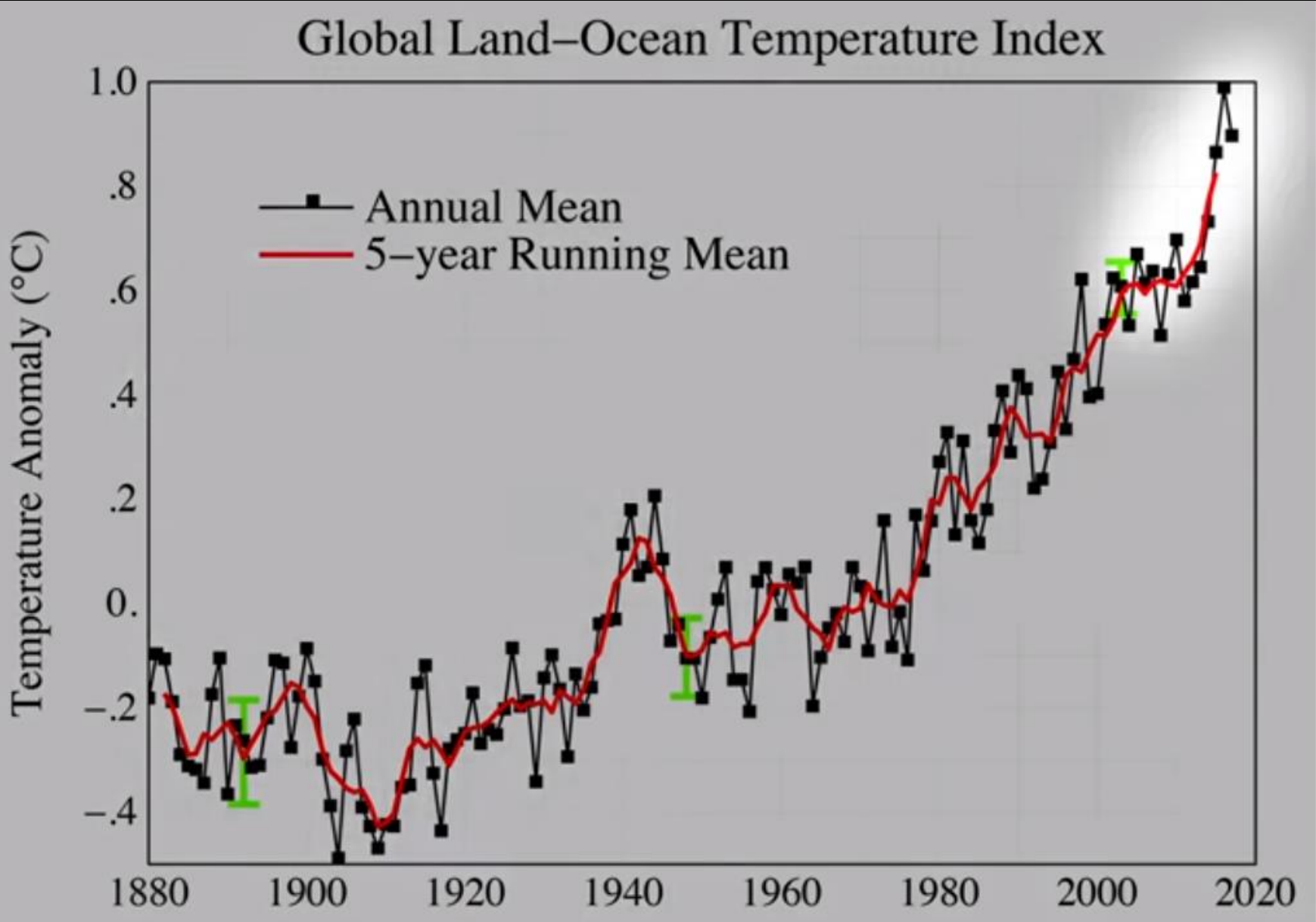
## The planet is warming



Cf. Alex Gardner, Jet Propulsion Laboratory, California Institute of Technology (Caltech)

<https://www.youtube.com/watch?v=5BfejRo37T8>

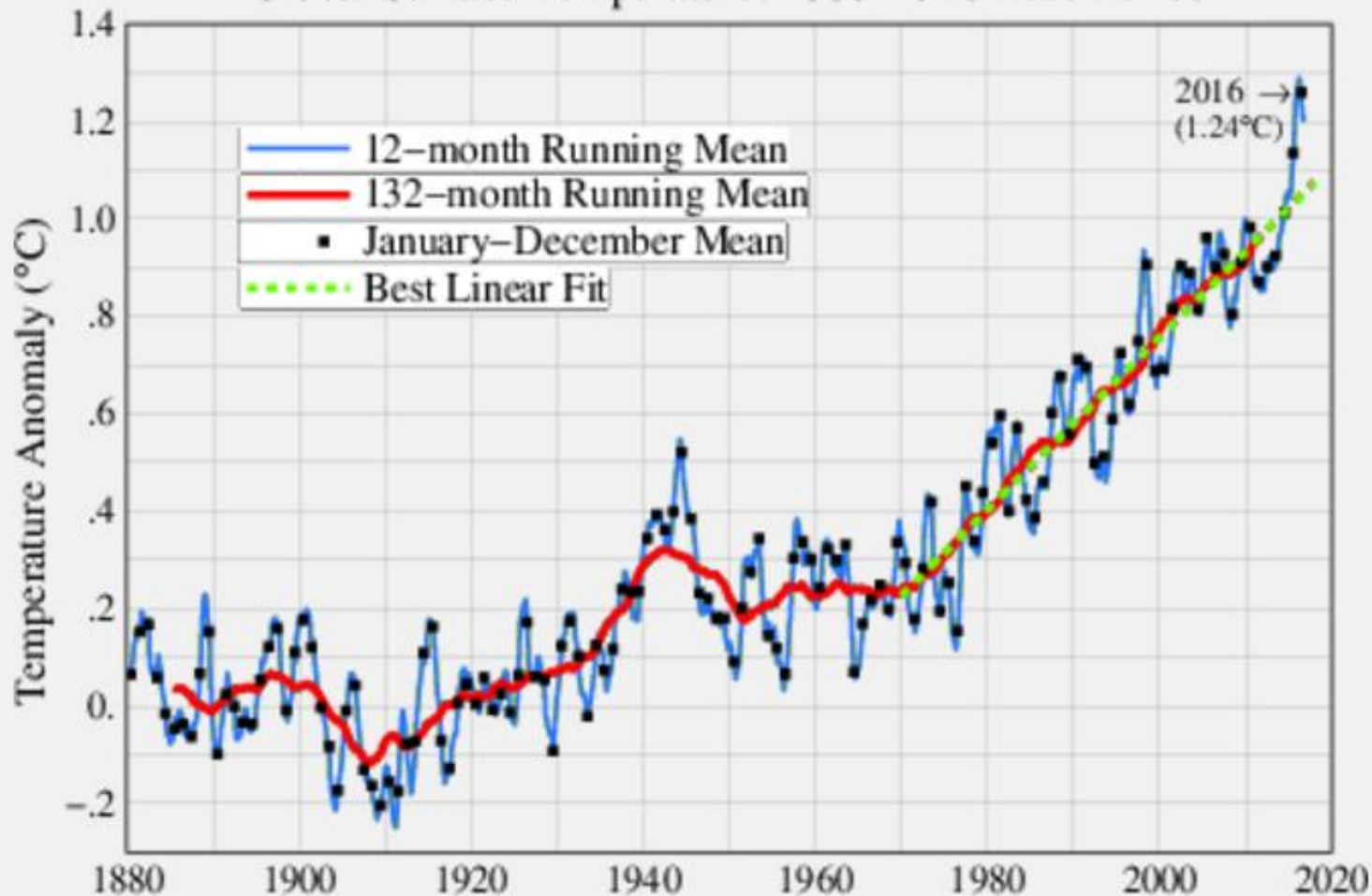
# 2014 começa a segunda onda de aceleração do aquecimento



2016: +1,24°C

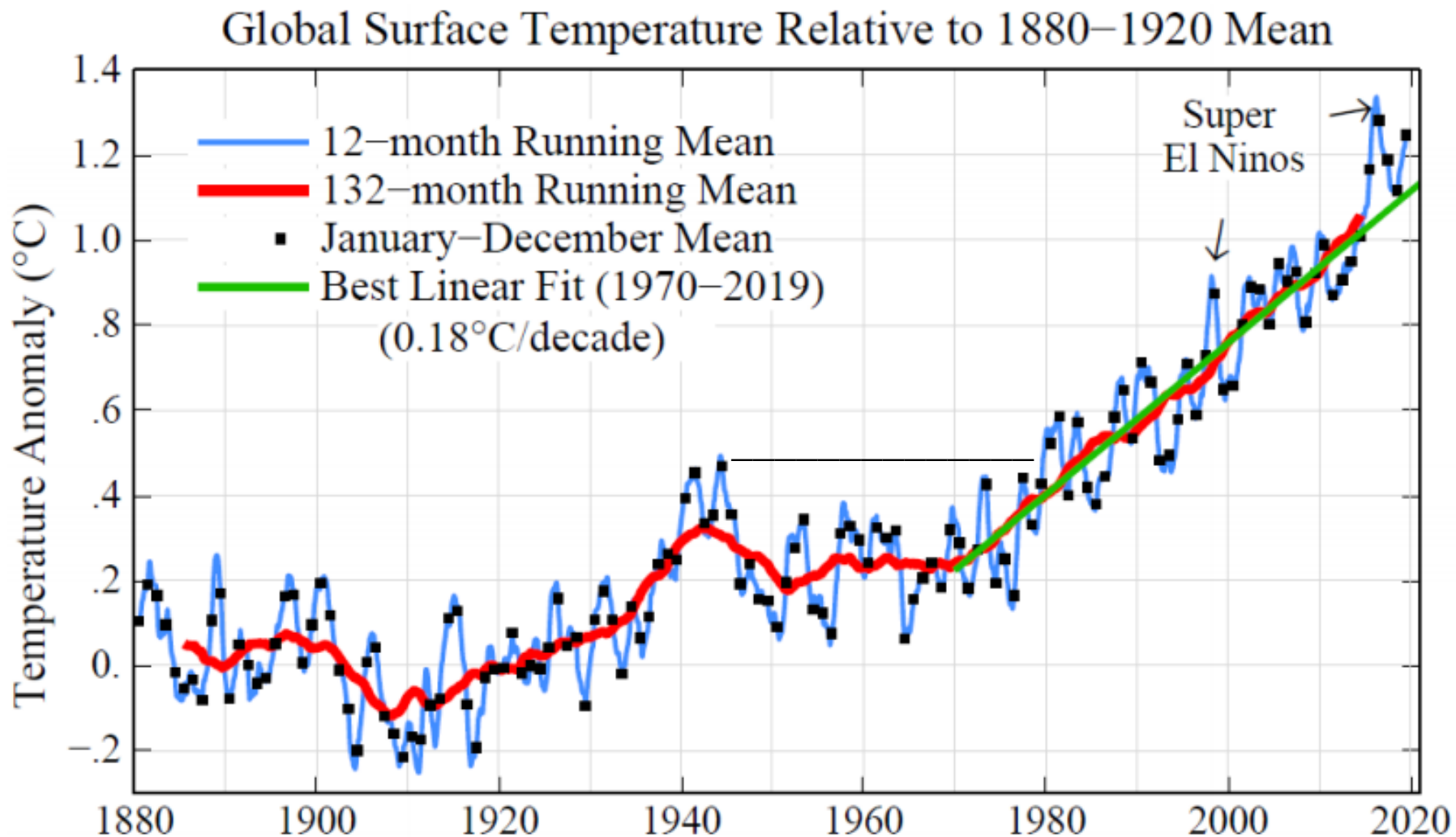
(acima do período 1880 – 1920)

Global Surface Temperature: 1880–1920 Base Period



Evolution de la température moyenne de la planète en référence à la période 1880/1920.

# NASA (15/1/2020) 2019 = 1,23°C



Janeiro – Julho de 2020: **1,36°C**

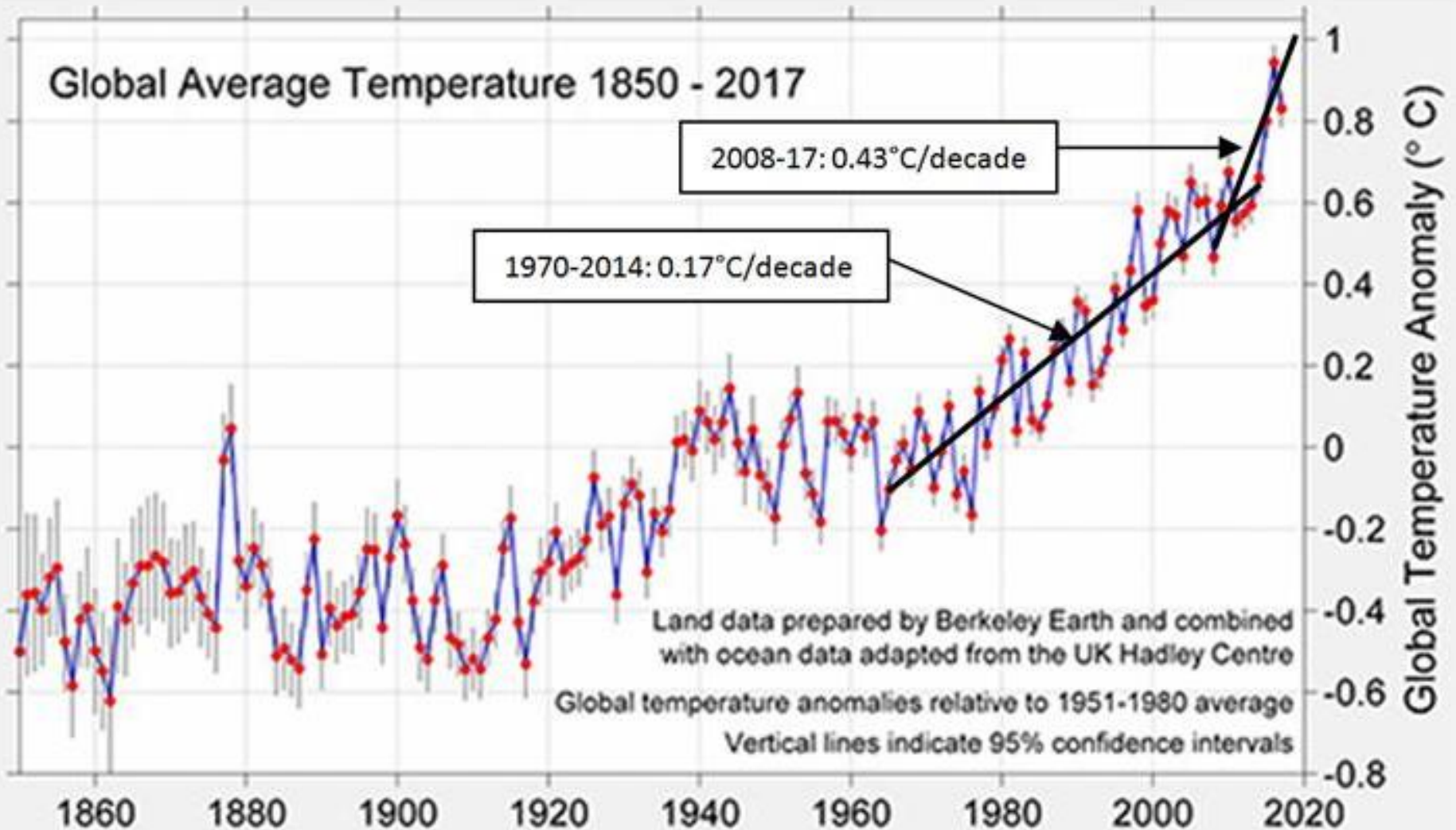
1,08°C (1951-1980) e **1,36°C** (1880-1920)

Estamos a apenas 0,14°C da marca fatídica de 1,5°C, a mais ambiciosa do Acordo de Paris para 2100!

“The first seven months in 2020 was the second warmest January-July at 1.08°C relative to the 1951-1980 base period (**1.36°C relative to 1880-1920**), but 2016 was just barely warmer at 1.09°C relative to 1951-1980”.

<https://mail.google.com/mail/u/0/?tab=rm&ogbl#search/climate/FMfcgxwJXVDZQLsfWCdTZTNfJvZdZpTh>

**Aceleração enorme:** o ritmo do aquecimento **multiplica-se por 2,5** na comparação entre os dois períodos



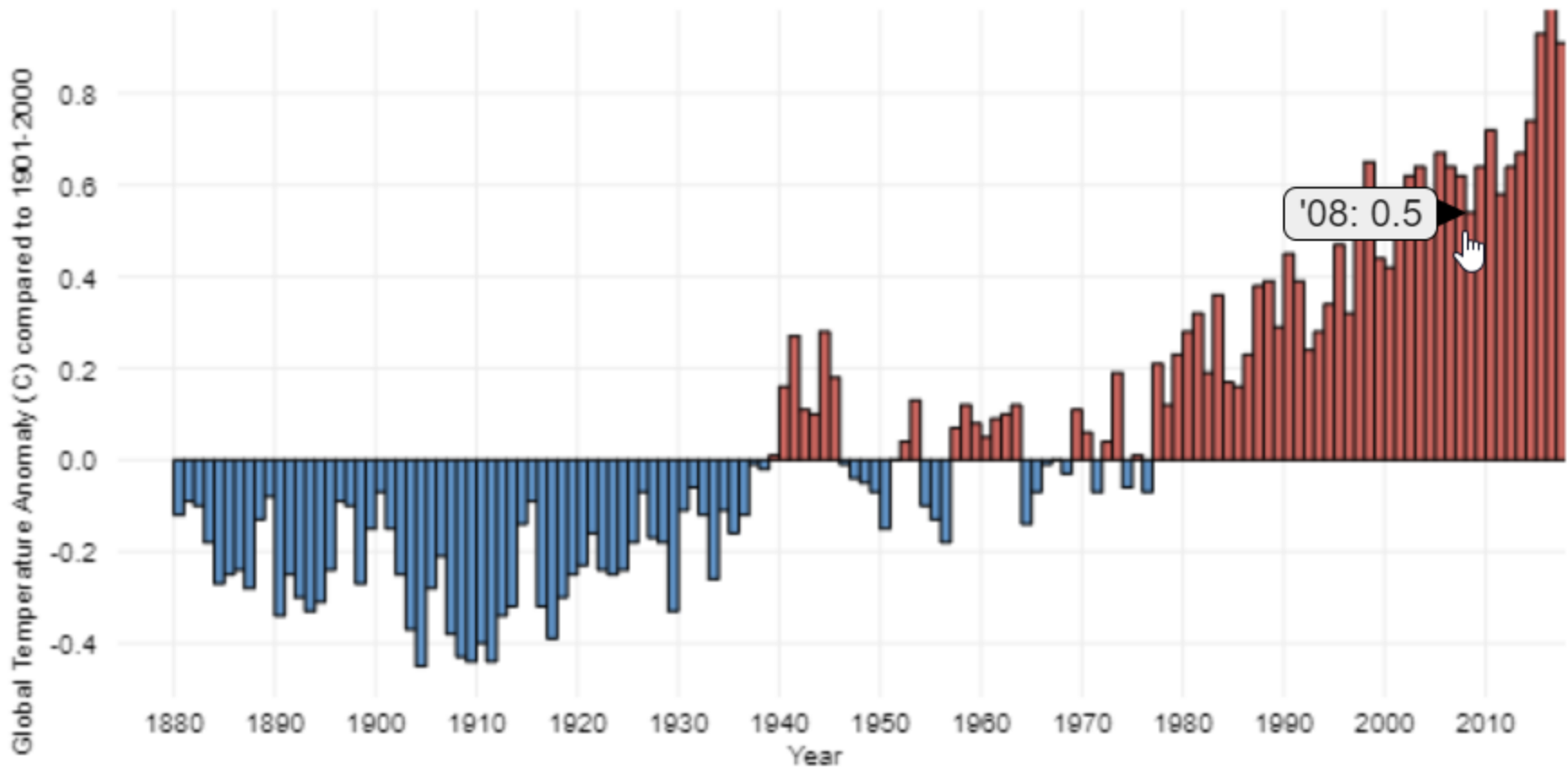
Fonte: Climate Change Data Center da Chiangmay University

<http://ccdatacenter.org/PageFact.aspx?FactPageID=8&Categories=YES>



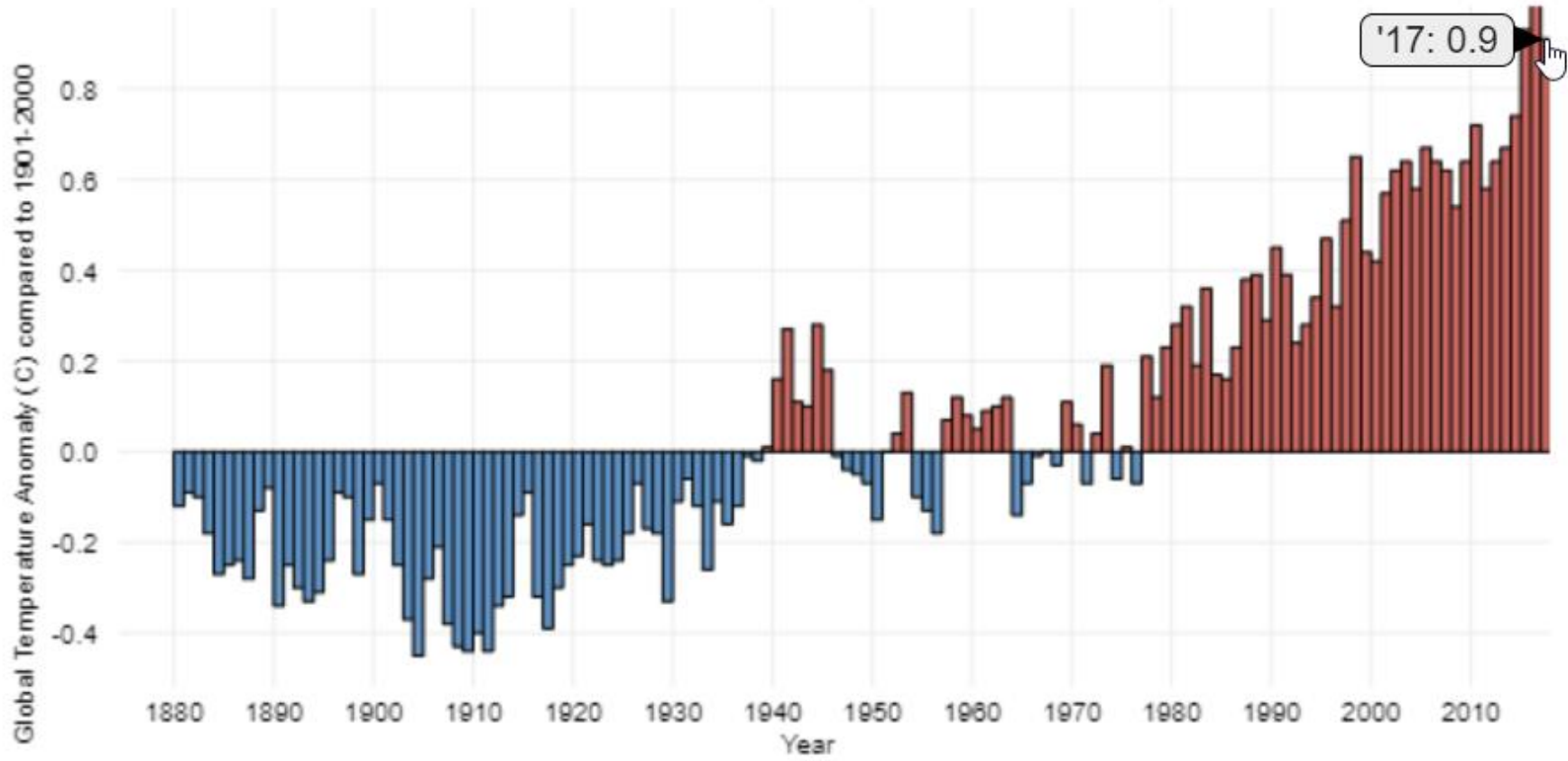
2008 = 0,5°C acima da média do século XX (NOAA)

History of global surface temperature since 1880



2017 = 0,9°C acima da média do século XX (NOAA)

History of global surface temperature since 1880



# 2019 foi o 2º ano mais quente no planeta (quase empatado com 2016)

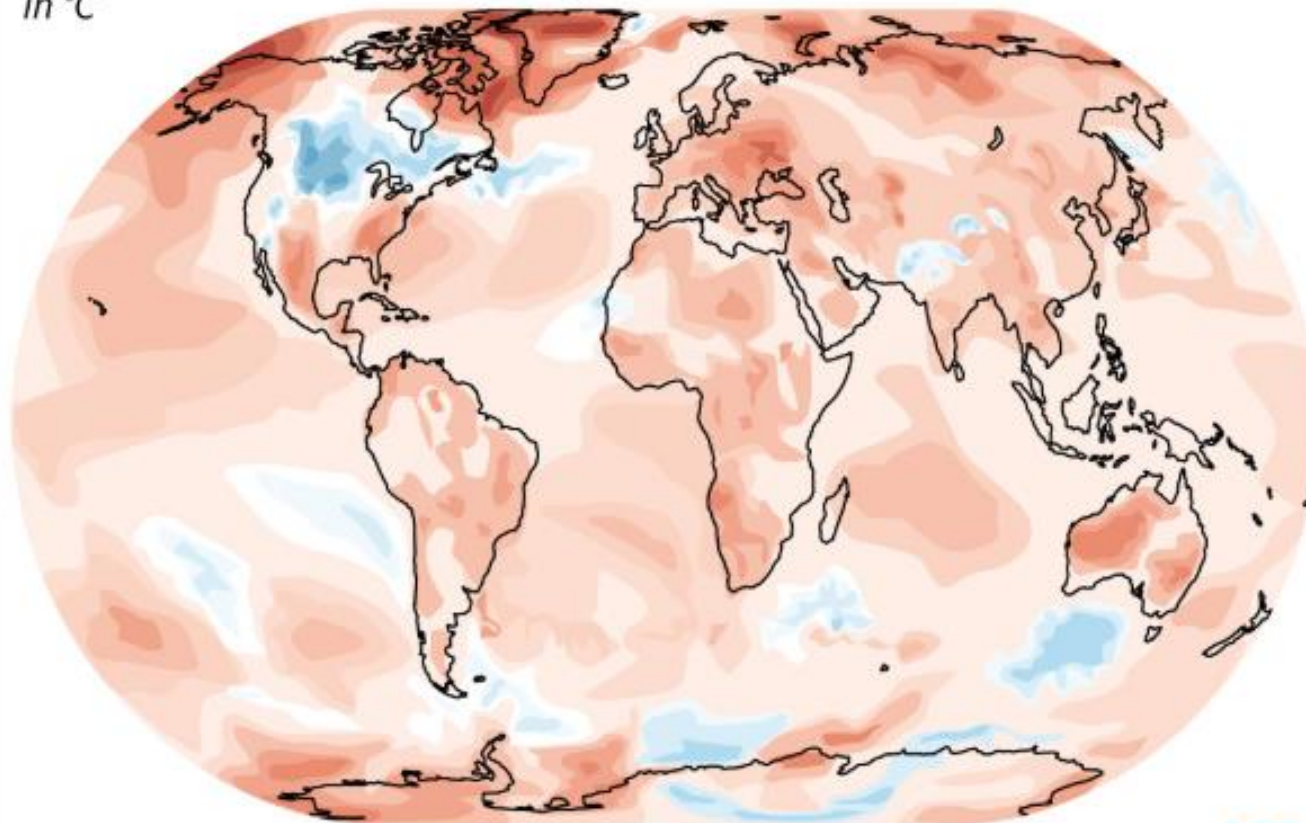
## 2019: second hottest year on record

Global temperature difference between 2019 and 1981-2010 average

difference in °C



A horizontal color scale bar ranging from -6 to +6 degrees Celsius. The scale is labeled 'difference in °C' on the left. The values are -6, -4, -2, 0, 2, 4, and +6. The colors transition from dark blue at -6, through light blue, white at 0, light orange, and dark orange at +6.



Source : ECMWF, Copernicus Climate Change Service

© AFP

# 2019 foi o ano mais quente na Europa

## 1,2°C acima do período 1981 – 2010

Recordes: Inglaterra = 38,7°C; Alemanha = 42,6°C

França = 46°C

15/01/2020

### CLIMATE NOW: 2019 WAS WARMEST YEAR ON RECORD IN EUROPE

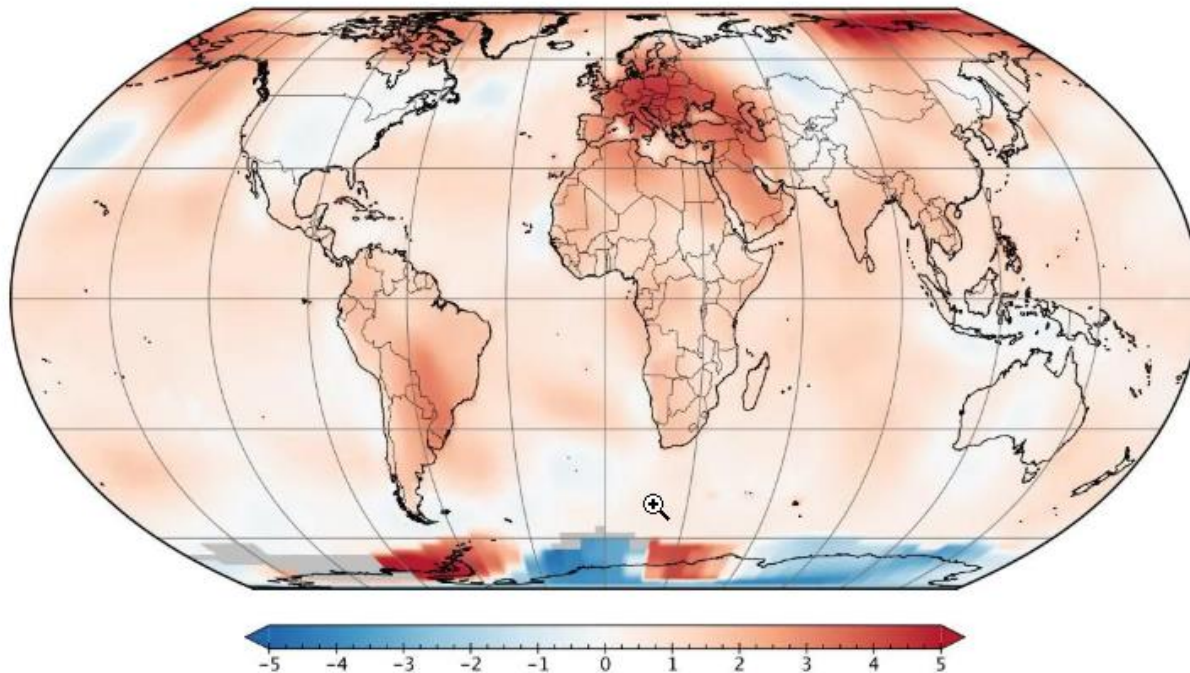
The latest information from the Copernicus Climate Change Service shows temperatures were over 1.2 degrees Centigrade above the 1981-2010 average in 2019. The summer heatwave saw national temperature records being broken across western Europe; we saw 38.7 degrees in the UK, 42.6 degrees in Germany, and 46 degrees in southern France, plus new temperature records also in Luxembourg, Belgium and the Netherlands.



# Junho de **2019** = Junho mais quente dos registros históricos (desde 1880)

Earth just had its hottest June on record, on track for warmest July

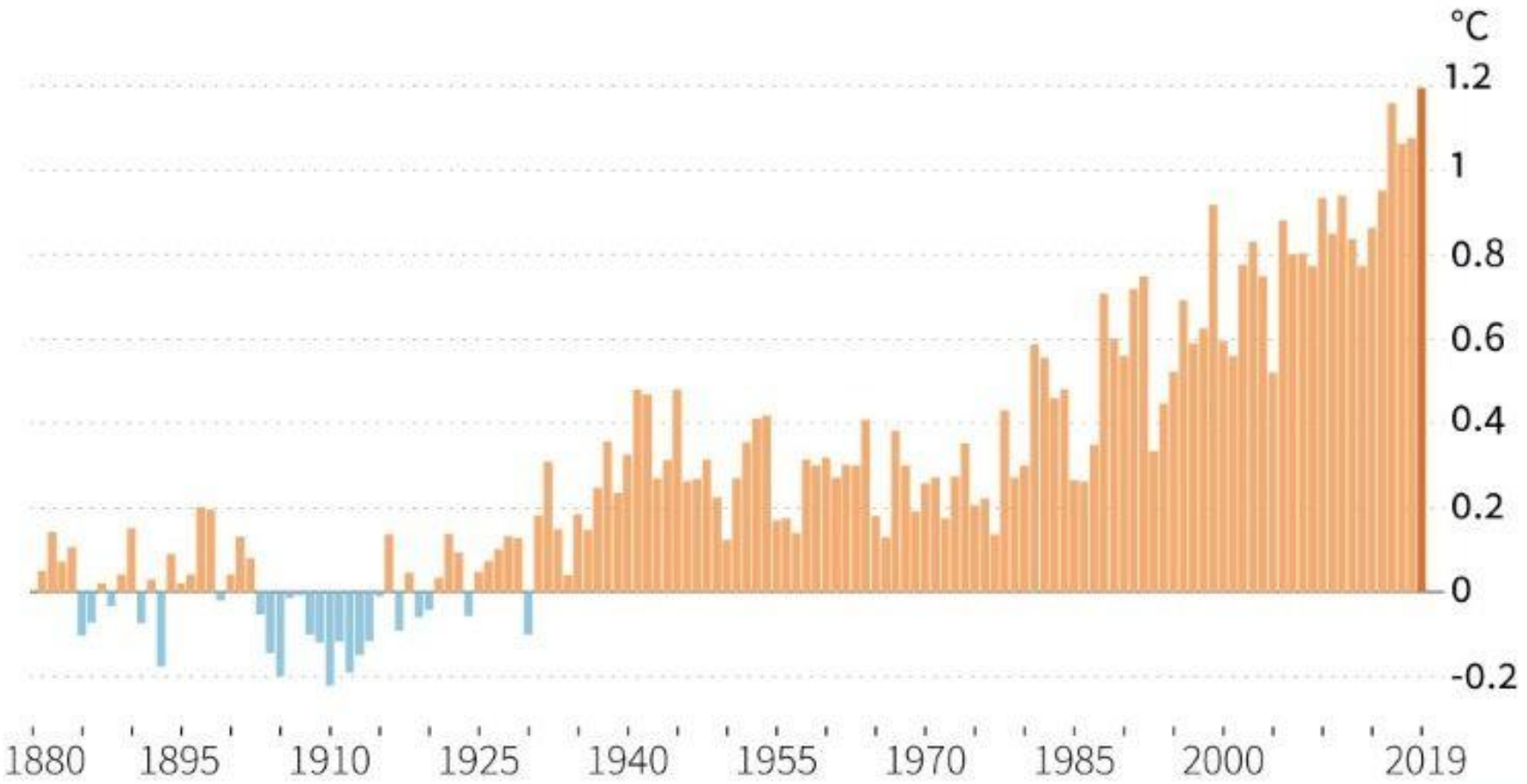
GISTEMP LOTI Anomaly (°C)  
June 2019



# Julho de 2019 = Julho mais quente dos registros

## July 2019: hottest month on record

Temperature in July compared to pre-industrial (1850-1900) average



Source: Copernicus Climate Change Service

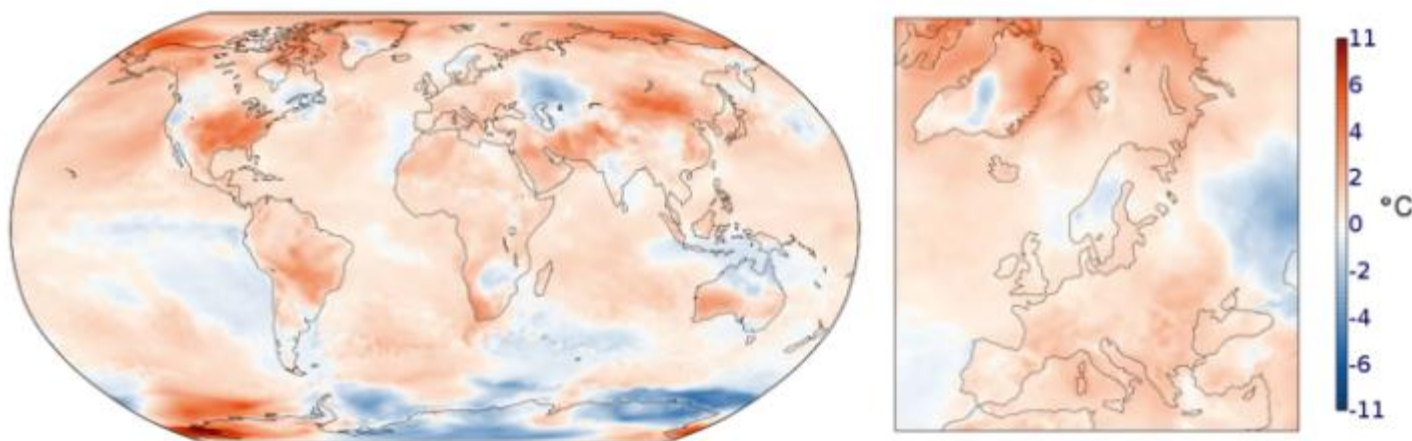


# Setembro de 2019 = Setembro mais quente dos registros

## Earth just experienced its hottest September, as 2019 heads for the record books

This makes four straight months of record or near-record global heat.

Surface air temperature anomaly for September 2019 relative to 1981-2010

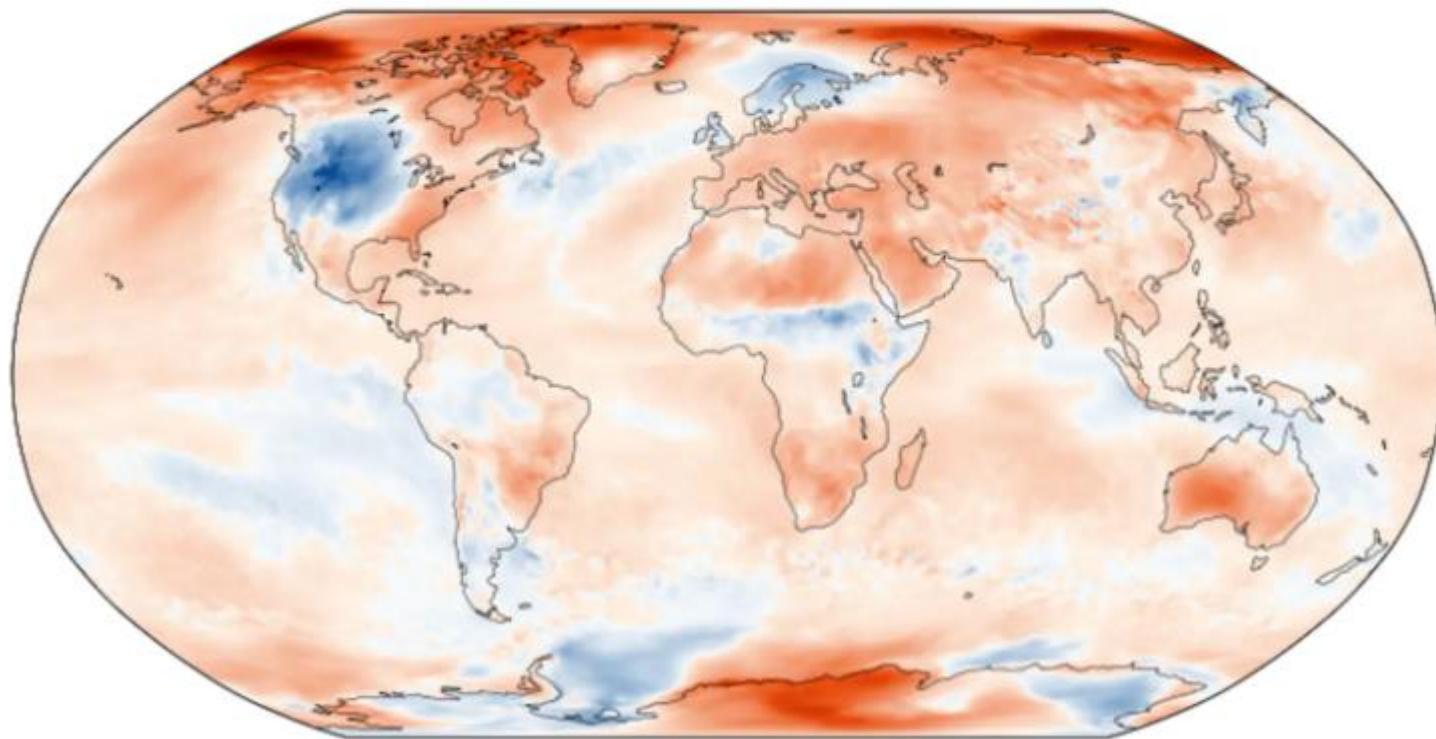


Global average surface temperature departures from average during September 2019. (Copernicus Climate Change Service)

Outubro de 2019 = Outubro mais quente dos registros

## Earth sizzles through October as another month ranks as the warmest on record

This is the fifth straight month with record or near-record heat.



Global average surface temperature departures from average during October, when compared to 1981-2010 levels. (Copernicus Climate Change Service)

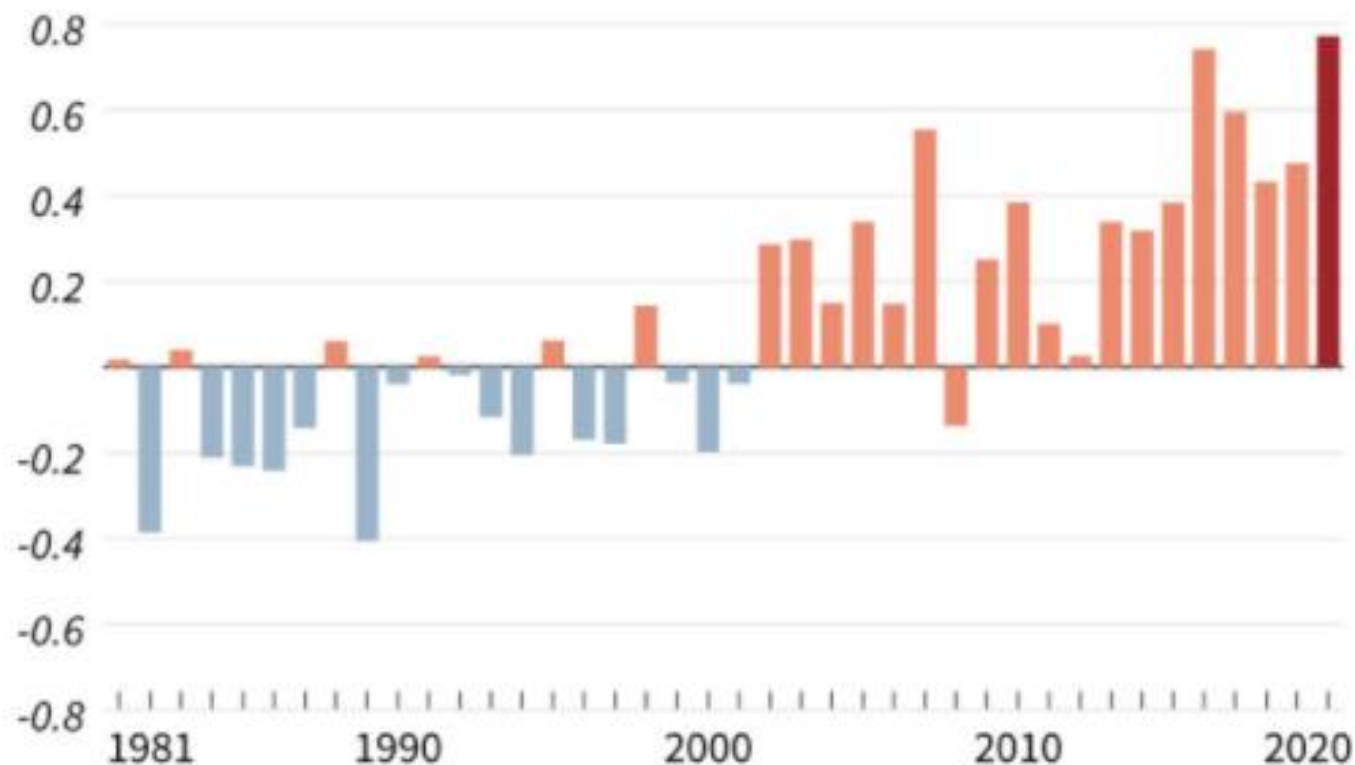


# FEEL THE HEAT: JANUARY 2020 WARMEST ON RECORD

A chart showing January global air temperature anomalies, compared to the 1981-2010 average.

## January 2020 warmest on record

Monthly global air temperature anomalies (°C), compared to the 1981-2010 average

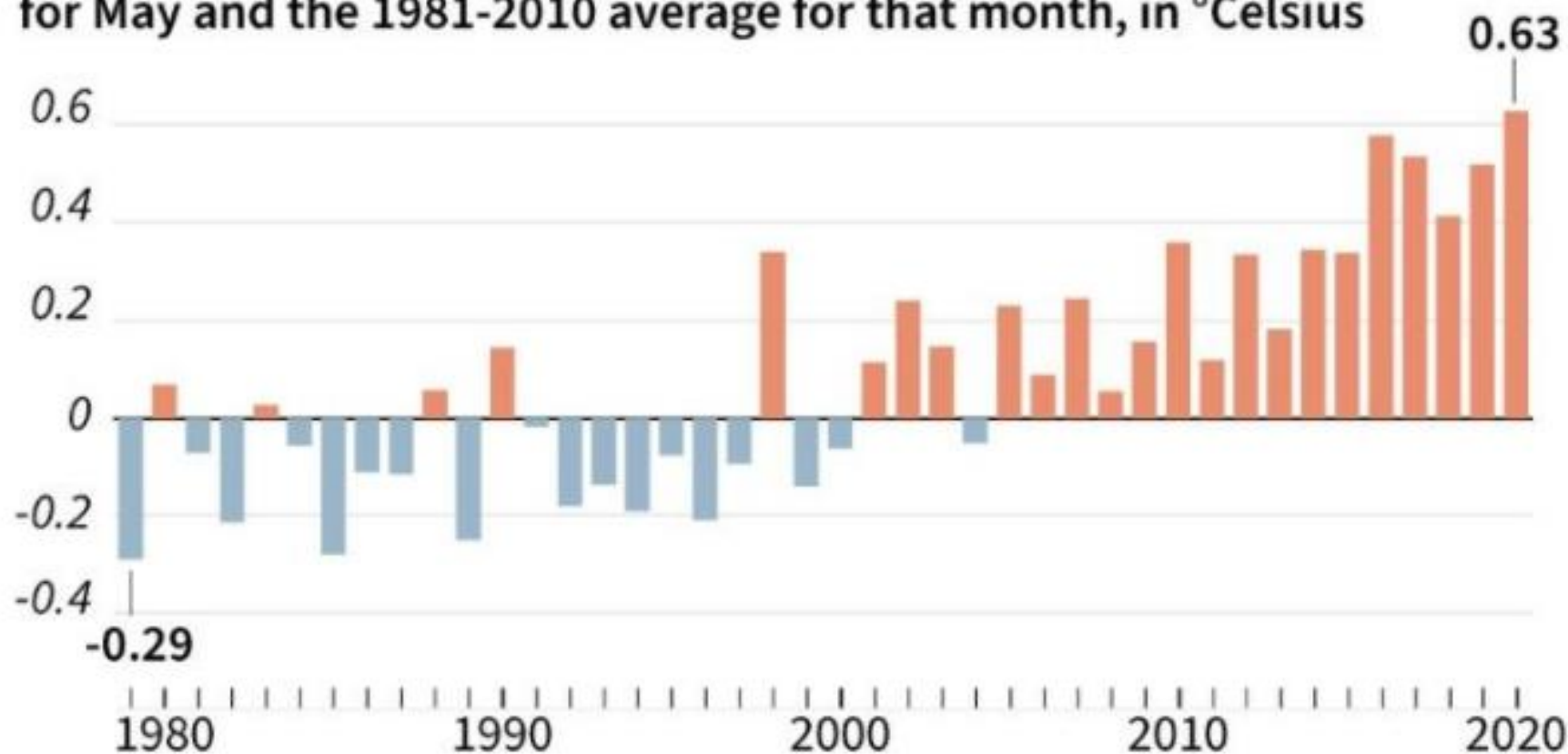


Source: Copernicus Climate Change Service

© AFP

# May 2020 was warmest on record

The difference between the global surface temperature (land and sea) for May and the 1981-2010 average for that month, in °Celsius



Source: Copernicus Climate Change Service

© AFP

Global surface temperature anomaly for May relative to 1981-2000 average, 1980-2020. May 2020 was the warmest May on record. Data: Copernicus Climate Change Service. Graphic: AFP

# September 2020 Was Warmest September On Record — World & Europe

October 8th, 2020 by [Guest Contributor](#)

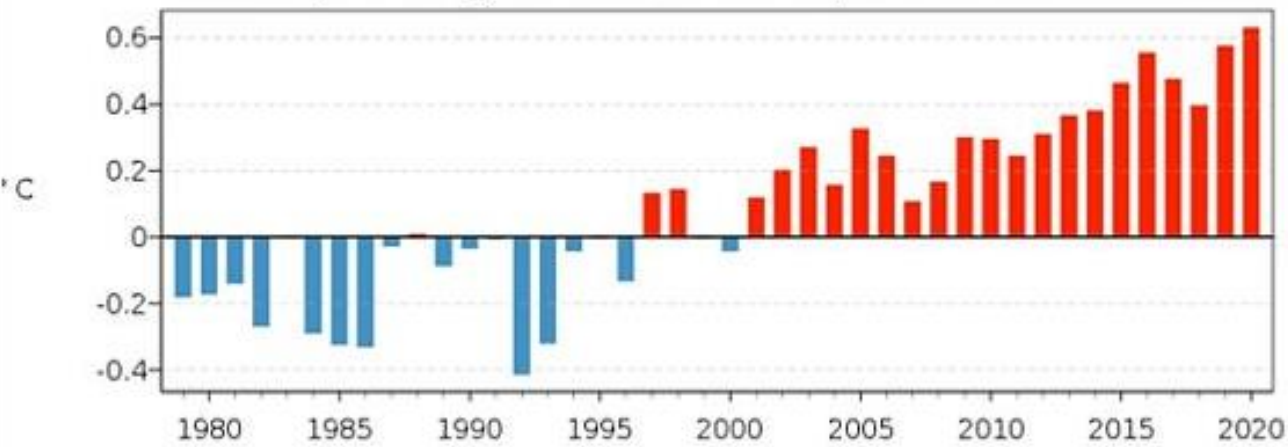
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*By the Copernicus Climate Change Service (C3S), [The Copernicus Programme](#).*

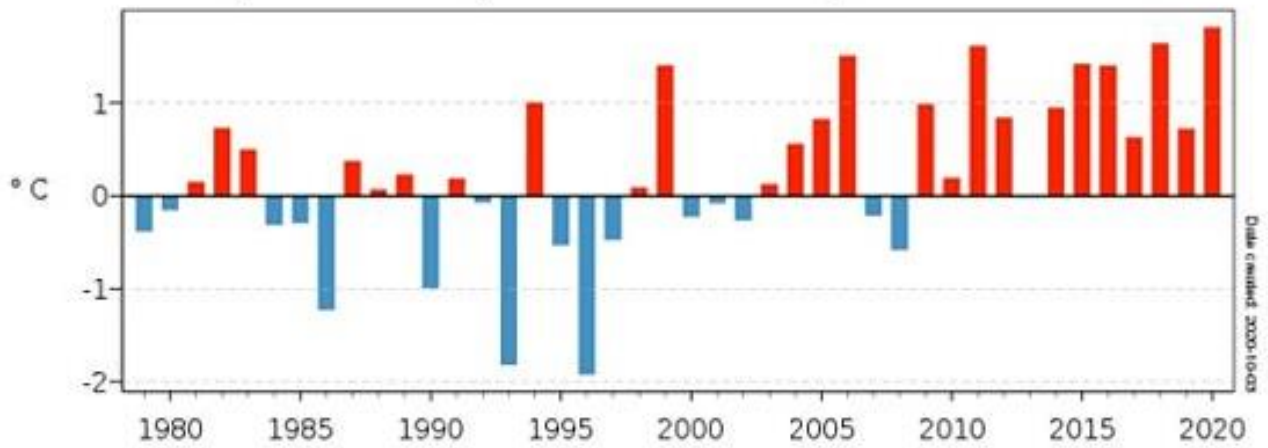
*Scientists from the ECMWF Copernicus Climate Change Service reveal that globally September 2020 was 0.05°C warmer than September 2019, previously the warmest on record, making it the world's warmest September so far. Meanwhile, temperatures in the Siberian Arctic continue to be much above average and Arctic sea ice is at its second lowest extent since satellite records began.*

# Setembro foi o mais quente mês dos registros históricos

September global surface air temperature anomalies



September European surface air temperature anomalies



(Data: ERA5. Reference period: 1981-2010. Credit: C3S/ECMWF)



# A corrida entre 2016 e 2020

## 2020 likely to be the warmest year on record globally

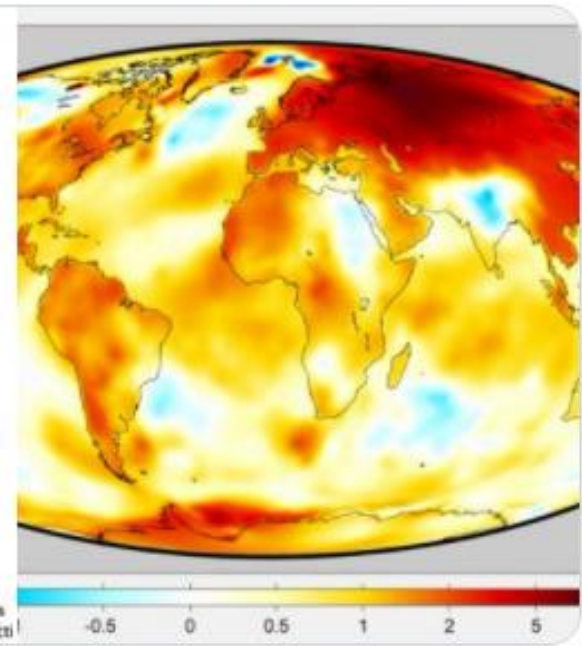
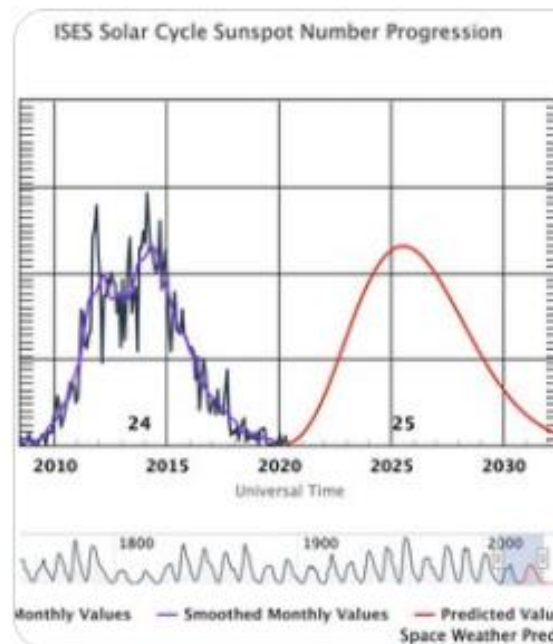
BY JEFF BERARDELLI

JUNE 15, 2020 / 9:55 AM / CBS



Jeff Berardelli @WeatherProf · 13 de jun

Solar minimum is not so grand I guess. Jan-May is 2nd warmest period on record and Berkeley Earth says the chance of 2020 being the warmest year on record is almost 90%.



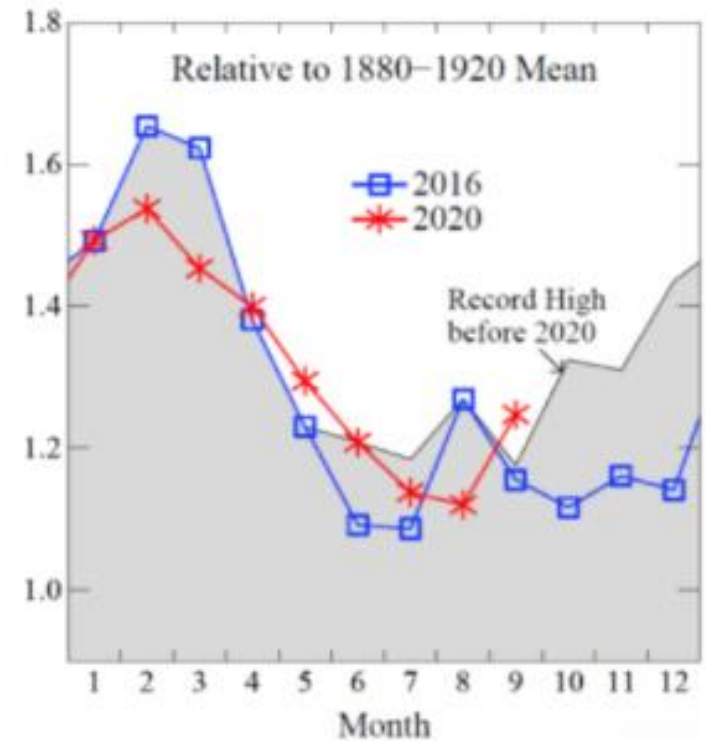
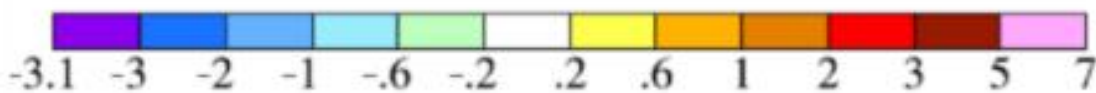
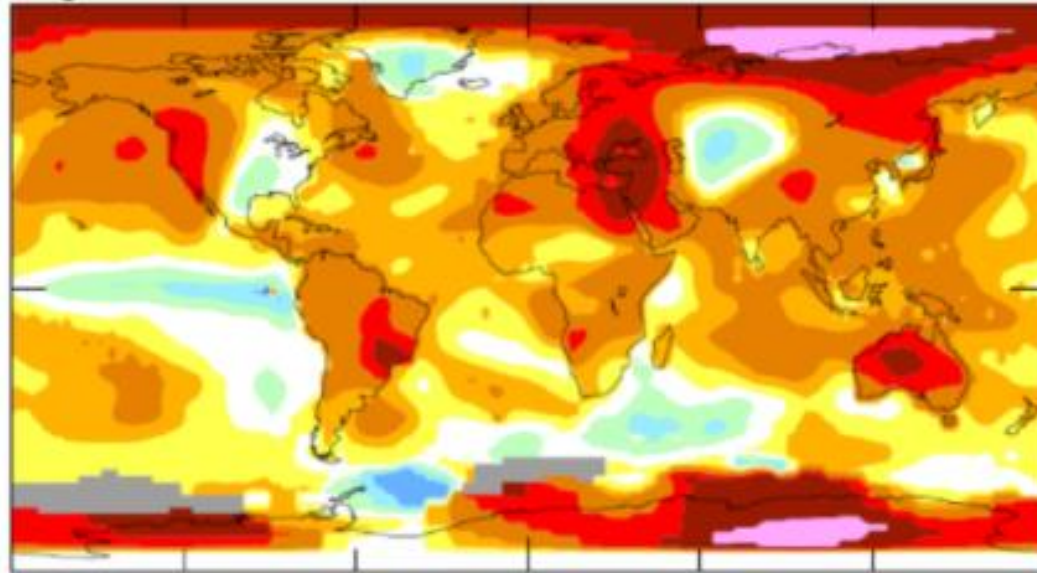
Últimos 7 anos  
(2014-2020):  
os mais quentes  
dos registros  
históricos

<https://www.cbsnews.com/news/warmest-year-on-record-2020-likely/#:~:text=The%20persistence%20of%20the%20warm,up%20as%20the%20warmest%20year.>

# A corrida entre 2016 e 2020

September 2020, warmest

1.00

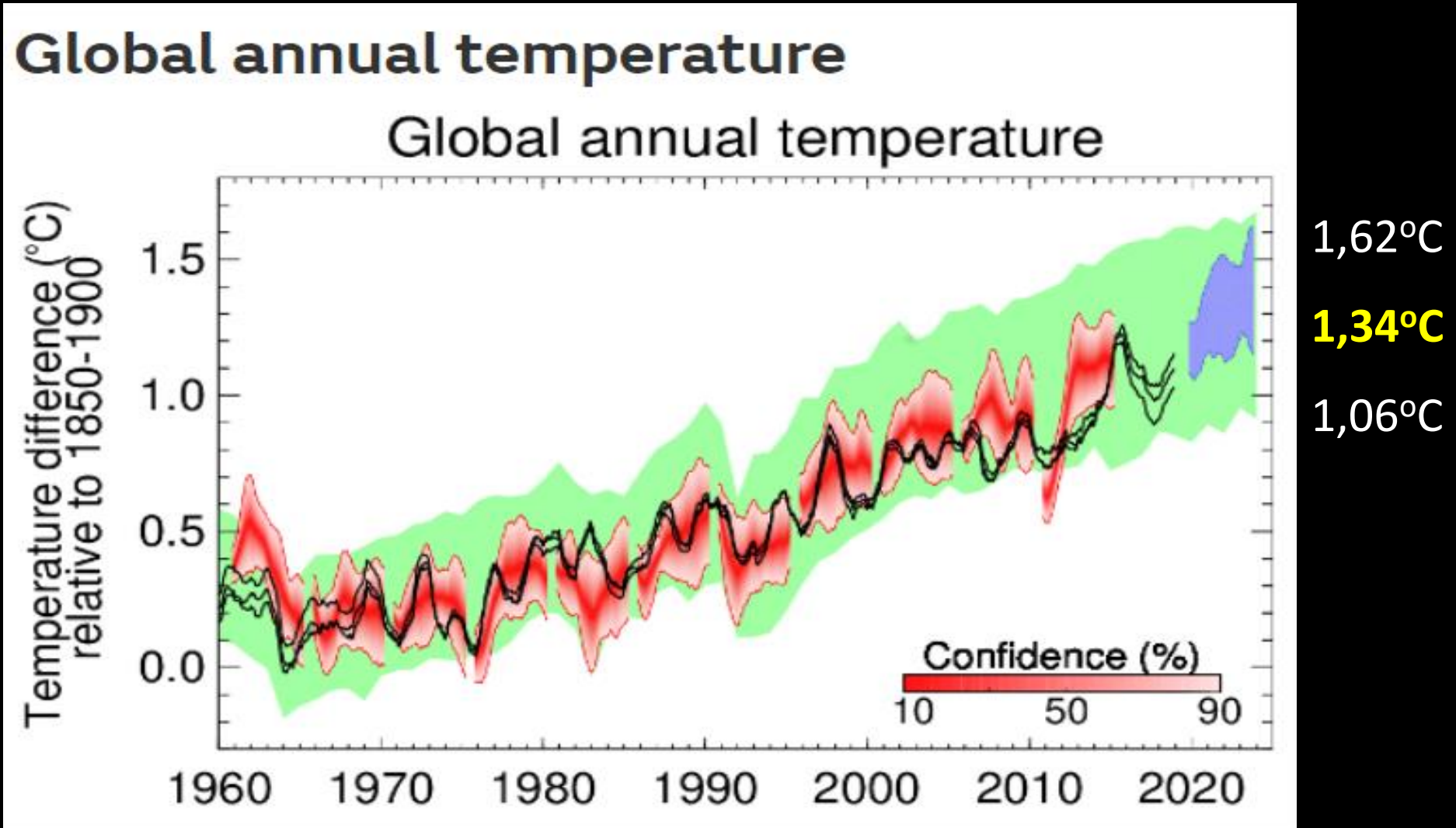


September 2020 was the warmest September since adequate global data began in 1880. Global temperature was  $+1.00^{\circ}\text{C}$  relative to the 1951-1980 base period and  $+1.25^{\circ}\text{C}$  relative to 1880-1920.

# Futuro imediato do aquecimento

Os próximos 5 a 10 anos levarão ***inevitavelmente*** a um aquecimento médio global igual ou superior a 1,5°C

2020 – 2024: 1,06°C - 1,62°C acima de 1850-1900 ou  
0,45°C a 1,01°C acima de 1981-2010



MET Office, “Decadal forecast” Janeiro 2020

<https://www.metoffice.gov.uk/research/climate/seasonal-to-decadal/long-range/decadal-fc/index>

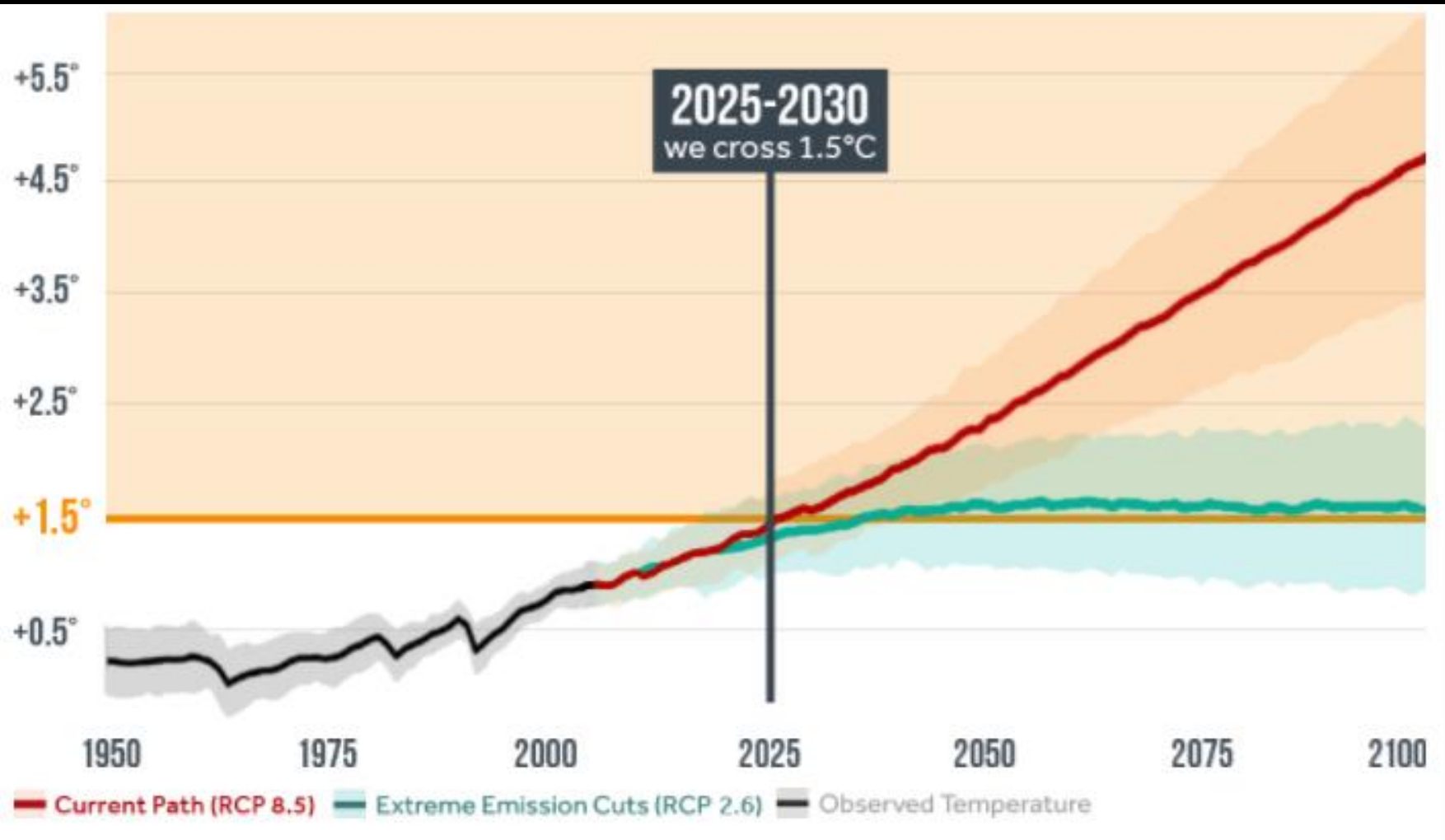


Há 20% de chances de um aquecimento médio global de 1,5°C até 2024 e as chances aumentam com o tempo



There is a ~**20%** chance that one of the **next 5 years** will be at least **1.5 °C warmer** than pre-industrial levels, but the chance is increasing with time.

# 1,5°C em 2025 - 2030 (Climate Central)



Climate Central Research Report, "Flirting with the 1.5°C Threshold". 20/IV/2016

<http://www.climatecentral.org/news/world-flirts-with-1.5C-threshold-20260>

Um aquecimento médio global  $> 1,5^{\circ}\text{C}$  é perigoso

Um aquecimento médio global  $> 2^{\circ}\text{C}$  é desastroso

Um aquecimento médio global  $> 3^{\circ}\text{C}$  é catastrófico,  
implicando a inviabilização das sociedades

Um aquecimento médio global  $> 4^{\circ}\text{C}$  é  
desconhecido, implicando ameaças existenciais

“Não temos evidência de que um aquecimento de 1,9°C é algo com que se possa lidar facilmente, e 2,1°C é um desastre”

Sir Brian Hoskins

Diretor do Grantham  
Institute for Climate Change,  
Imperial College, Londres:



Cf Andrew Simms, “A cat in hell’s chance – why we’re losing the battle to keep global warming below 2C”, *The Guardian*, 19/11/2017: “We have no evidence that a 1.9C rise is something we can easily cope with, and 2.1 is a disaster.”

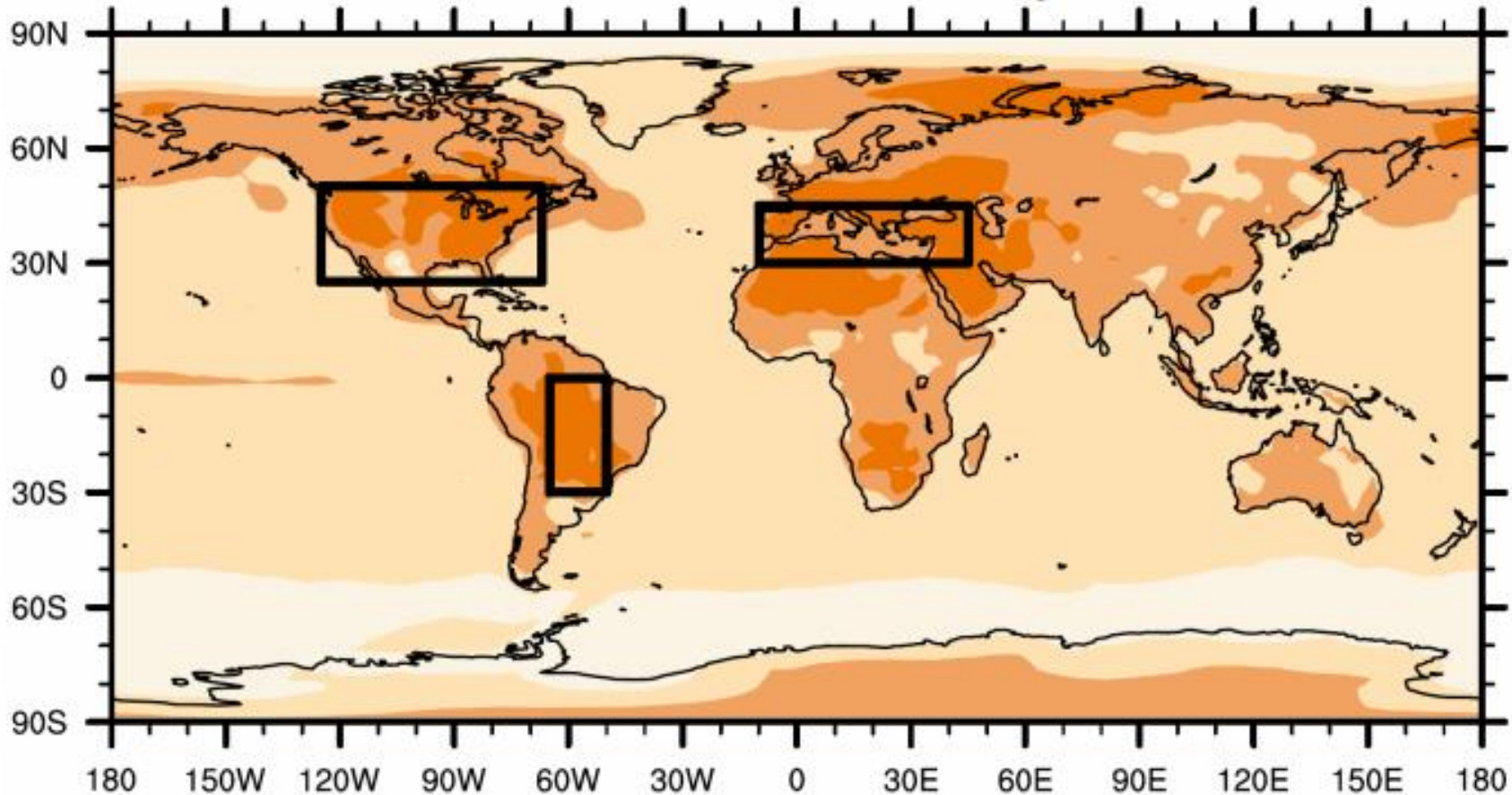
“O limite de 2°C das temperaturas médias em relação ao período pré-industrial pode ser cruzado em 2030 no Mediterrâneo, na **região central do Brasil** e nos EUA”



Sonia Seneviratne *et al.*, “Allowable CO<sub>2</sub> emissions based on regional and impact-related climate targets”. *Nature*, 529, 28/1/2016: «a regional 2°C threshold was passed in the simulations around year 2000 for TNn in the Arctic, while it is projected to be reached by ca. 2030 for TXx in the Mediterranean, Brazil and the contiguous U.S., and only by the mid-2040s for the global mean temperature, under the business-as-usual (RCP8.5) emissions scenario.”

# Aquecimento global vs regional

TXx local change when  $\Delta T_{\text{glob}} = 2^{\circ}\text{C}$



Intensity of hot extremes (TXx): let TX be the daily maximum temperature, then TXx is the annual maximum value of TX

Carlos A. Nobre  
Jose A. Marengo  
Wagner R. Soares  
*Editors*

# Climate Change Risks in Brazil

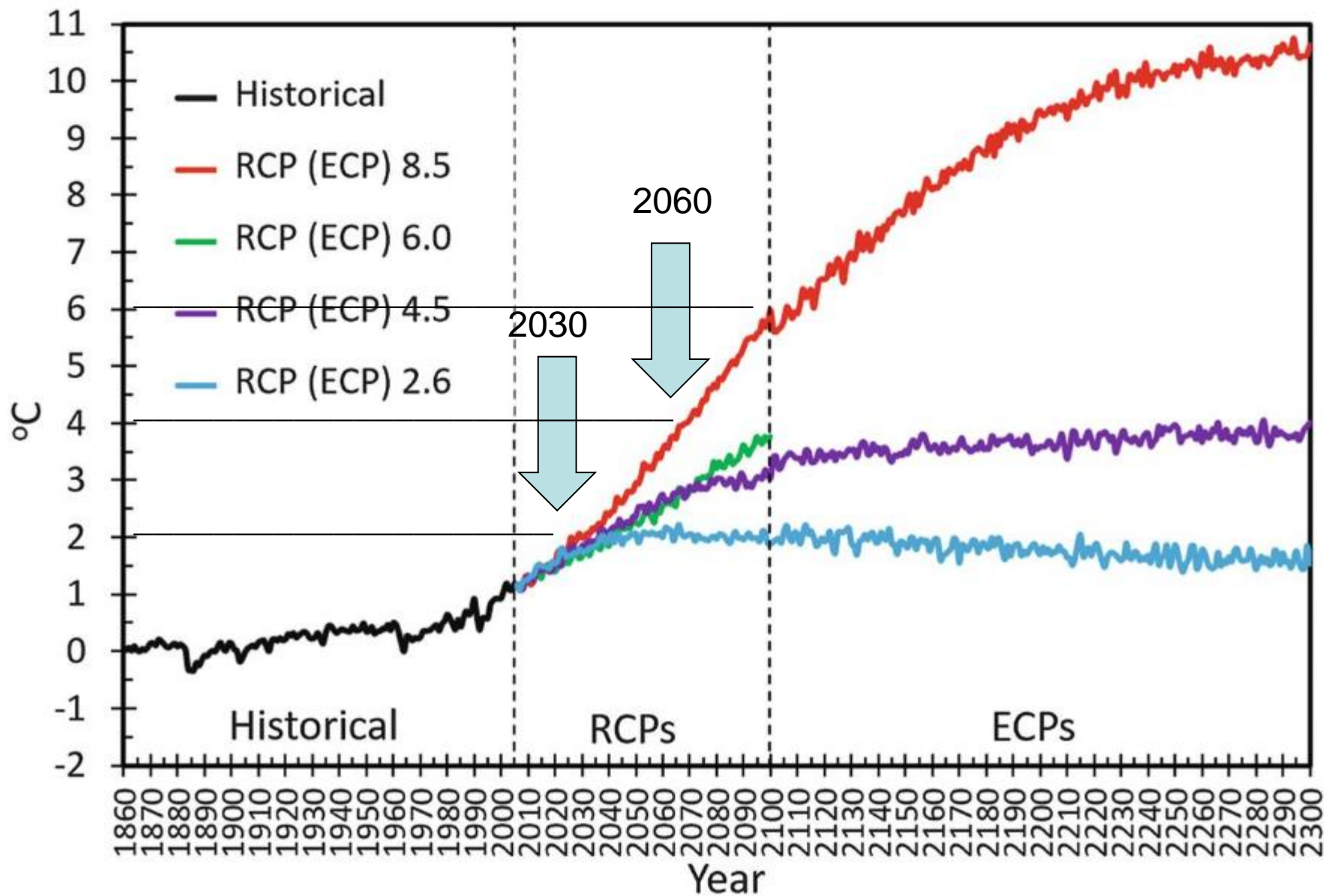
## Preface

**In a high greenhouse gas emissions scenario, the country has a high likelihood (over 70%) of suffering a greater than 4°C temperature rise before the end of the century. For high degrees of global warming exceeding**

Num cenário de altas emissões de gases de efeito estufa, o país tem uma alta probabilidade (acima de 70%) de sofrer um aumento de temperatura maior que 4°C antes do fim do século



# CLIMATE CHANGE RISKS IN BRAZIL





Para o capitalismo, a pandemia é apenas um acidente de percurso

Ela não terá impacto sobre o aquecimento futuro

Porque as emissões de gases de efeito estufa já estão voltando ao “normal”

Em abril, as emissões globais diárias haviam caído ~17% em relação aos níveis médios de 2019.

Daily global CO<sub>2</sub> emissions decreased by -17% (-11 to -25% for  $\pm 1\sigma$ ) by early April 2020 compared with the mean 2019 levels,

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Article | Published: 19 May 2020

# Temporary reduction in daily global CO<sub>2</sub> emissions during the COVID-19 forced confinement

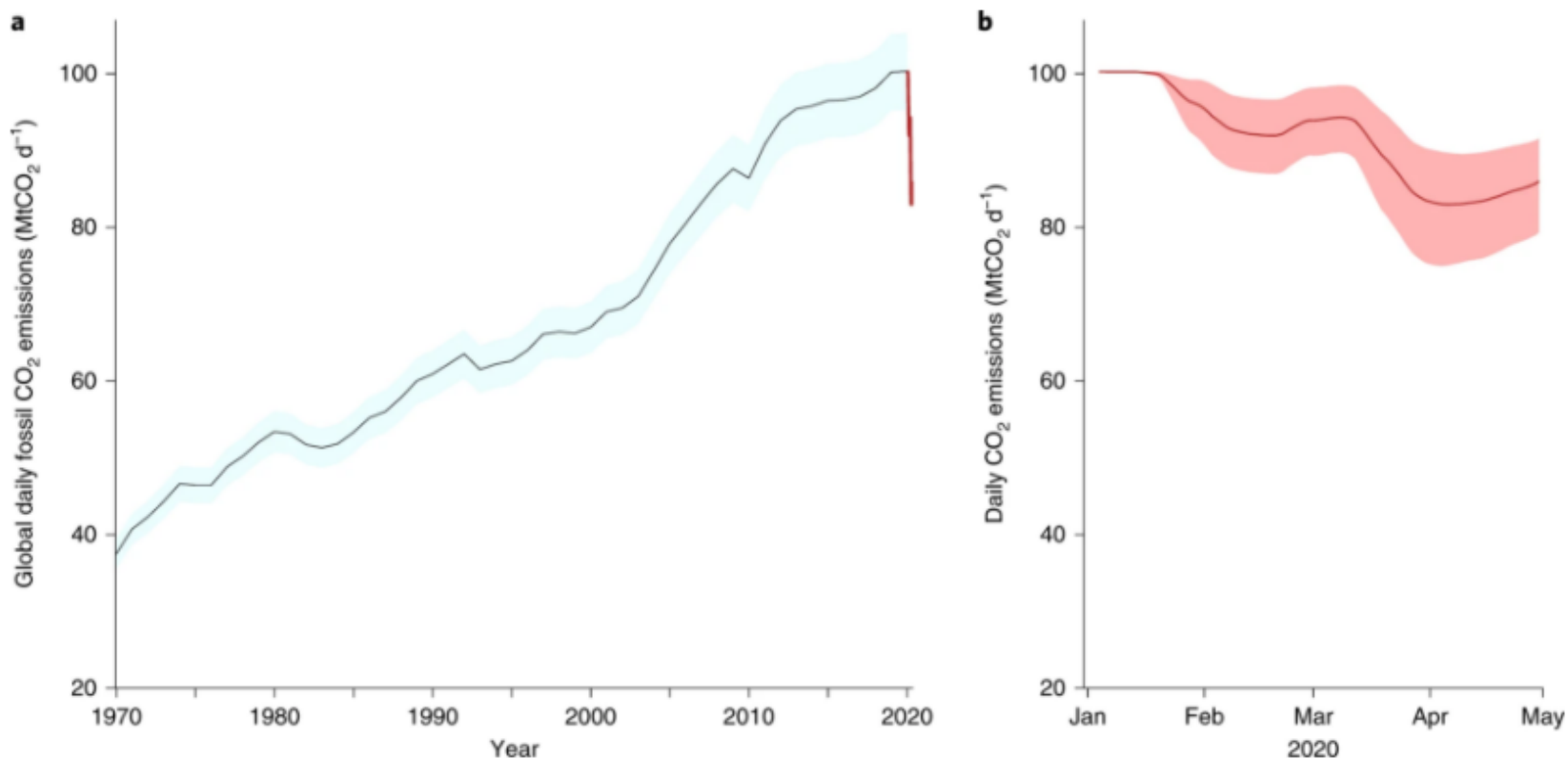
Corinne Le Quéré , Robert B. Jackson, Matthew W. Jones, Adam J. P. Smith, Sam Abernethy, Robbie M. Andrew, Anthony J. De-Gol, David R. Willis, Yuli Shan, Josep G. Canadell, Pierre Friedlingstein, Felix Creutzig & Glen P. Peters

# Temporary reduction in daily global CO<sub>2</sub> emissions during the COVID-19 forced confinement

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## Fig. 3: Global daily fossil CO<sub>2</sub> emissions (MtCO<sub>2</sub> d<sup>-1</sup>).

From: Temporary reduction in daily global CO<sub>2</sub> emissions during the COVID-19 forced confinement



**a**, Annual mean daily emissions in the period 1970–2019 (black line), updated from the Global Carbon Project<sup>1,3</sup> (Methods), with uncertainty of  $\pm 5\%$  ( $\pm 1\sigma$ ; grey shading). The red line shows the daily emissions up to end of April 2020 estimated here. **b**, Daily CO<sub>2</sub> emissions in 2020 (red line, as in **a**) based on the CI and corresponding change in activity for each CI level (Fig. 2) and the uncertainty (red shading; Table 2). Daily emissions in 2020 are smoothed with a 7-d box filter to account for the transition between confinement levels.

# 'Surprisingly rapid' rebound in carbon emissions post-lockdown

**Fiona Harvey** *Environment correspondent*

Thu 11 Jun 2020 18.30 BST

Em setembro, as emissões já voltaram aos níveis pré-pandemia

# **Emissions Are Already Heading Back to Pre-Pandemic Levels**

2016-2020 is set to be the warmest five-year period on record, WMO says

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By [Laura Millan Lombrana](#) and [Akshat Rathi](#)

9 de setembro de 2020 08:00 BRT

Na China, já em maio de 2020 as emissões de CO<sub>2</sub> haviam superado os níveis de maio de 2019

**CarbonBrief**  
CLEAR ON CLIMATE

EMISSIONS

29 June 2020 7:00

# Analysis: China's CO<sub>2</sub> emissions surged past pre-coronavirus levels in May

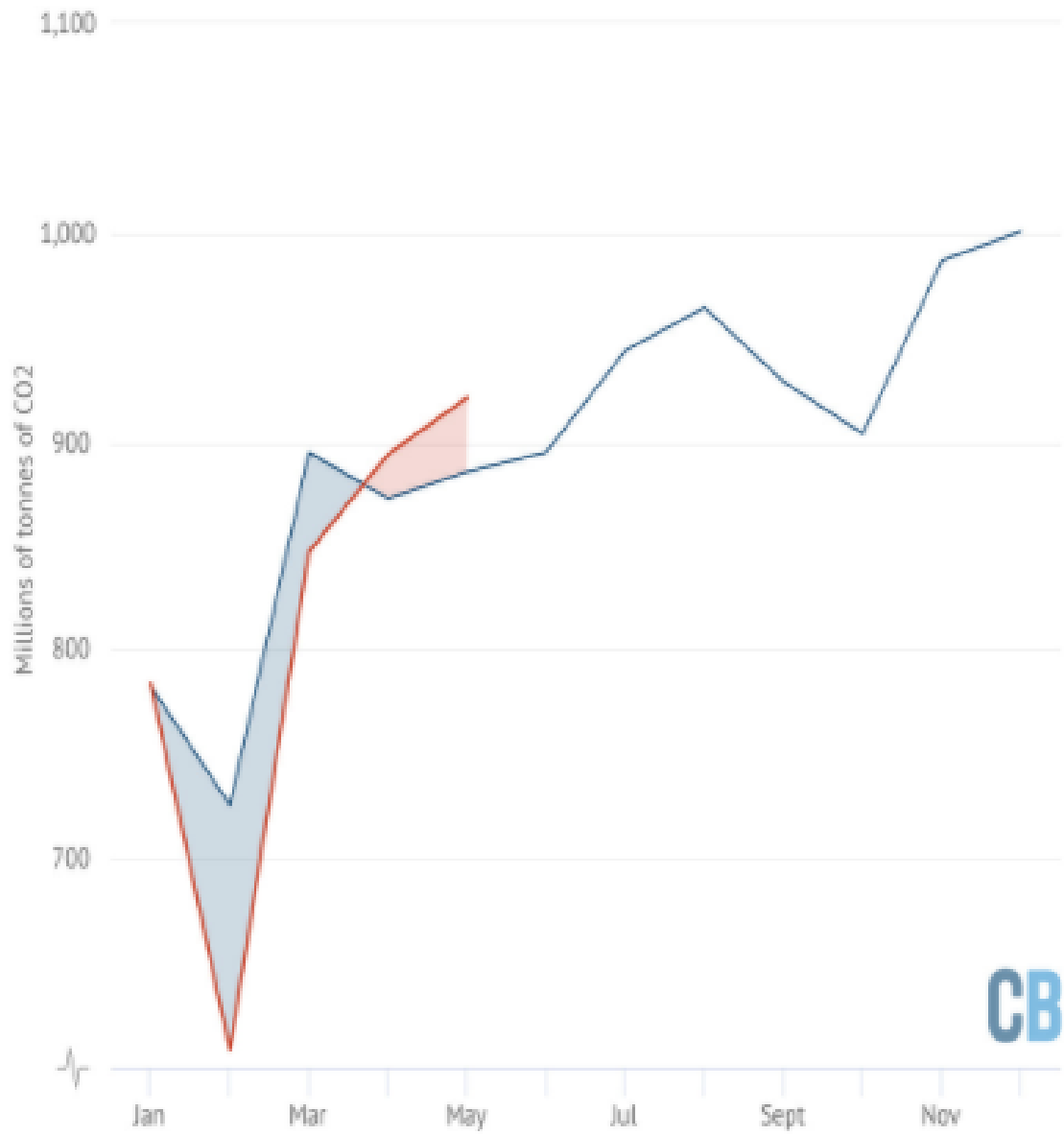
[https://www.carbonbrief.org/analysis-chinas-co2-emissions-surged-past-pre-coronavirus-levels-in-may?utm\\_campaign=RevueCBWeeklyBriefing&utm\\_medium=email&utm\\_source=Revue%20newsletter](https://www.carbonbrief.org/analysis-chinas-co2-emissions-surged-past-pre-coronavirus-levels-in-may?utm_campaign=RevueCBWeeklyBriefing&utm_medium=email&utm_source=Revue%20newsletter)

Aumento de 4% a 5% na comparação  
entre maio de 2019 e maio de 2020

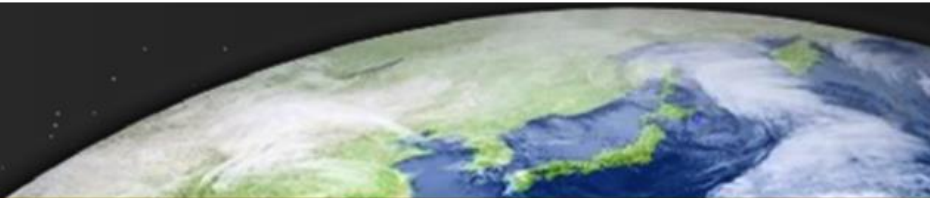
China's CO2 emissions have surged back from the coronavirus lockdown, rising by 4-5% year-on-year in May, analysis of new government data shows.

# China's CO2 emissions **surged** past pre-coronavirus levels in May

Monthly emissions from fossil fuels and cement in 2020 versus 2019

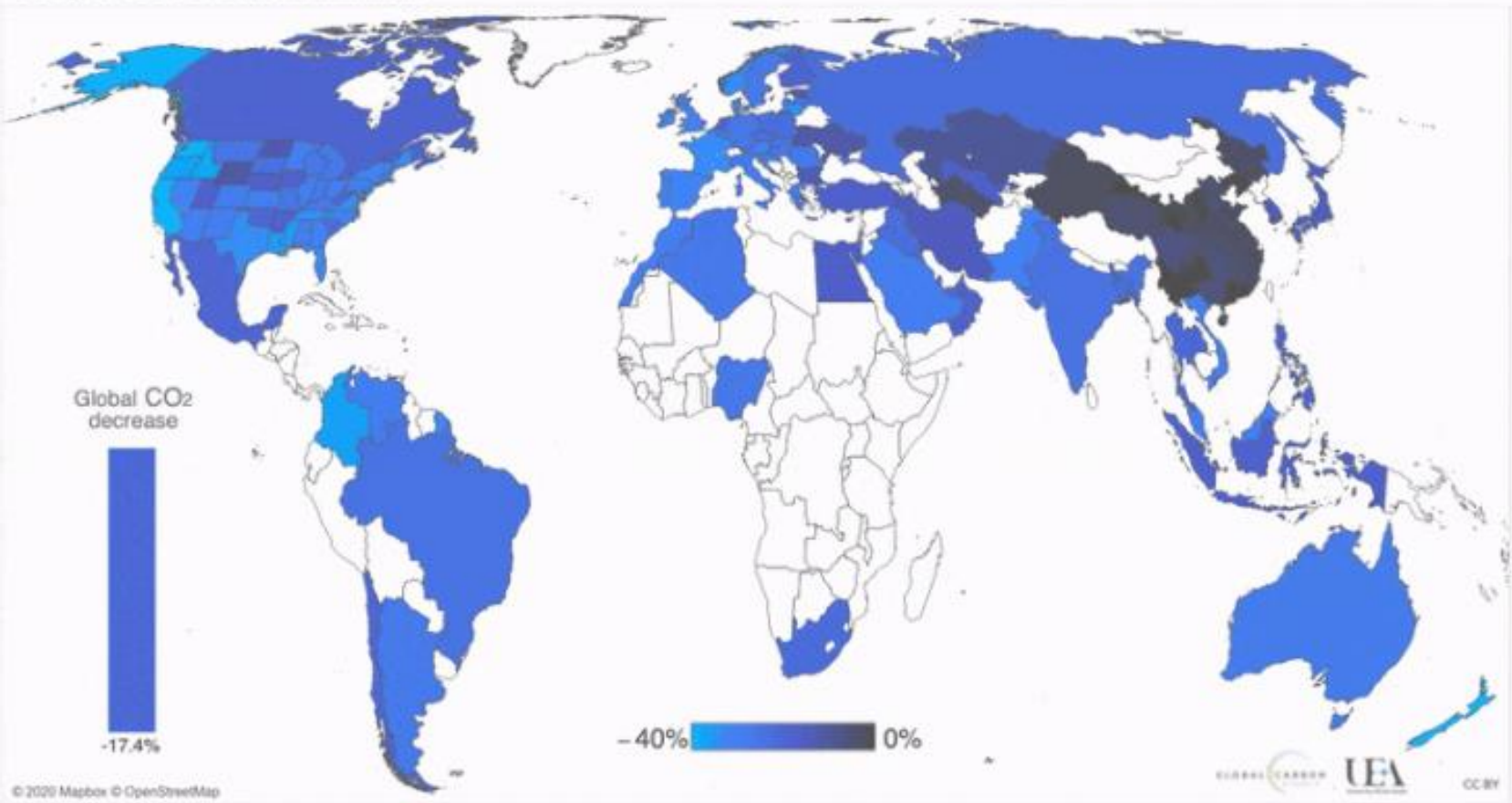




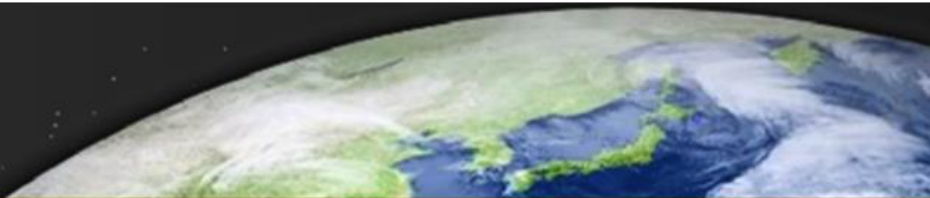


# Changes in CO<sub>2</sub> emissions during the COVID-19 forced confinement

7 April 2020

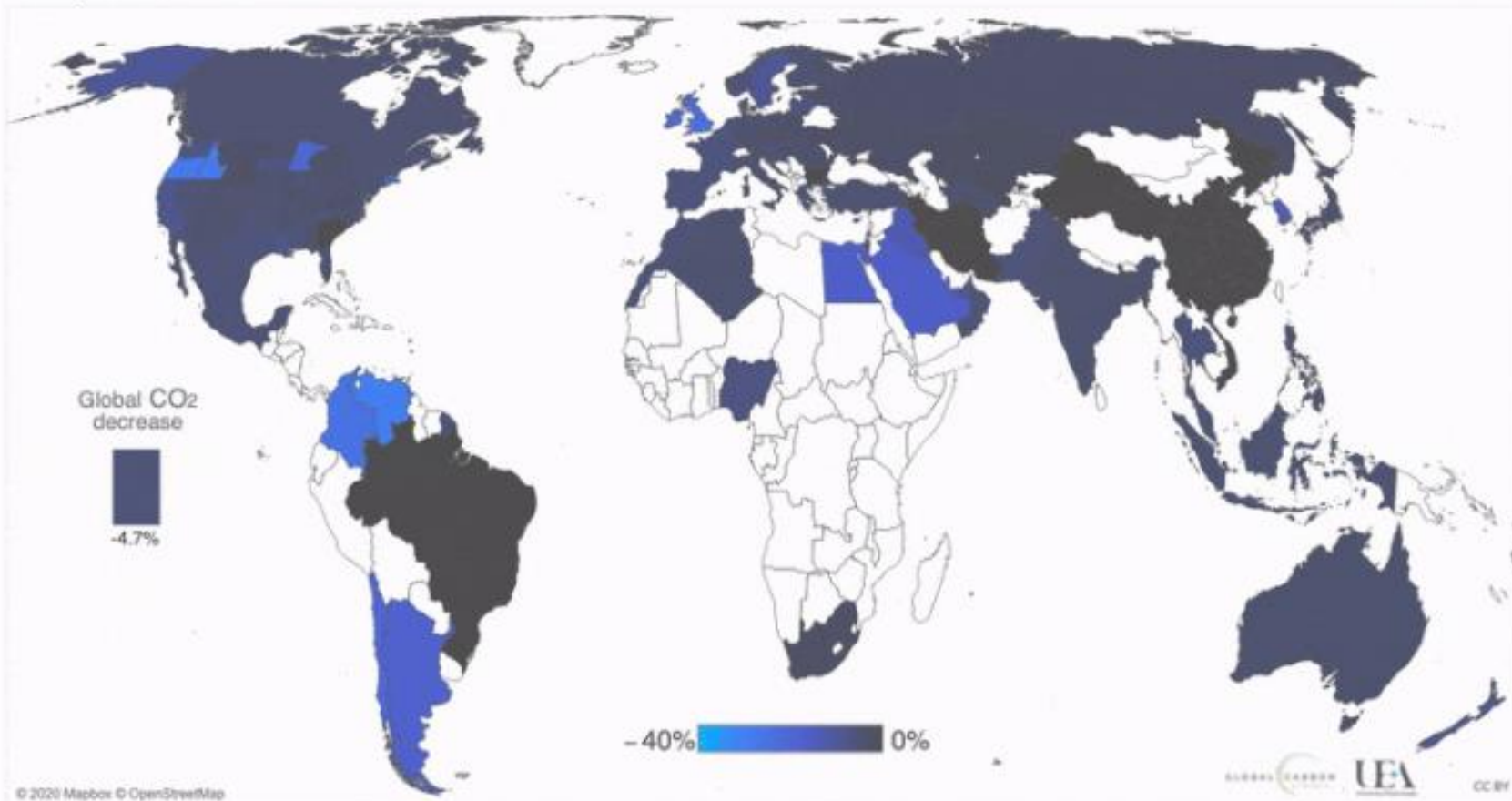


Map of percentage reduction of fossil fuel CO<sub>2</sub> emissions per region and country as function of time during the confinement period



# Changes in CO<sub>2</sub> emissions during the COVID-19 forced confinement

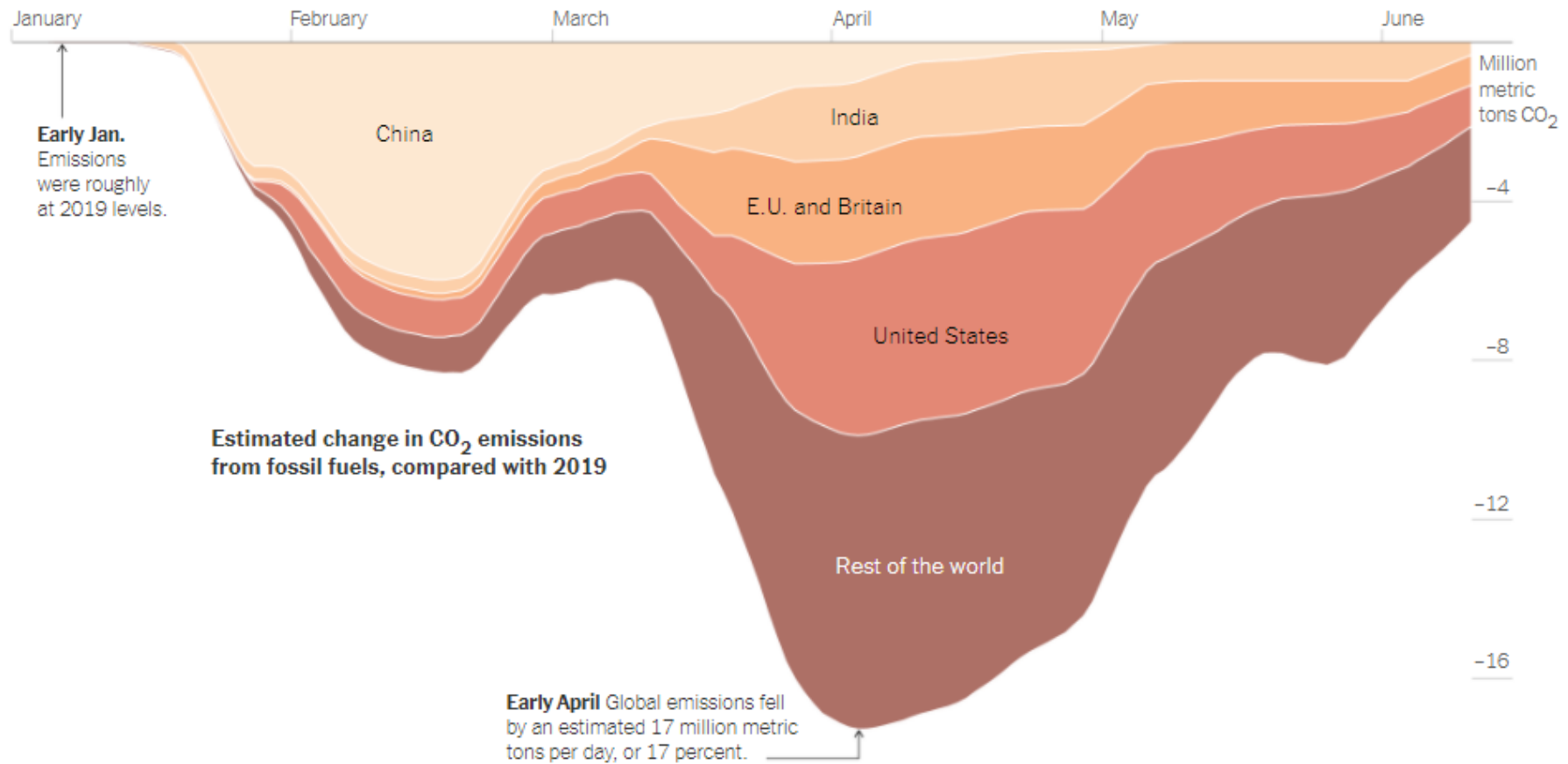
11 June 2020



Map of percentage reduction of fossil fuel CO<sub>2</sub> emissions per region and country as function of time during the confinement period

# Emissões globais Janeiro a Junho de 2020

De uma queda de 17% em abril para apenas -4,7% em Junho, sendo que já em maio a China e a Índia haviam superado os níveis de



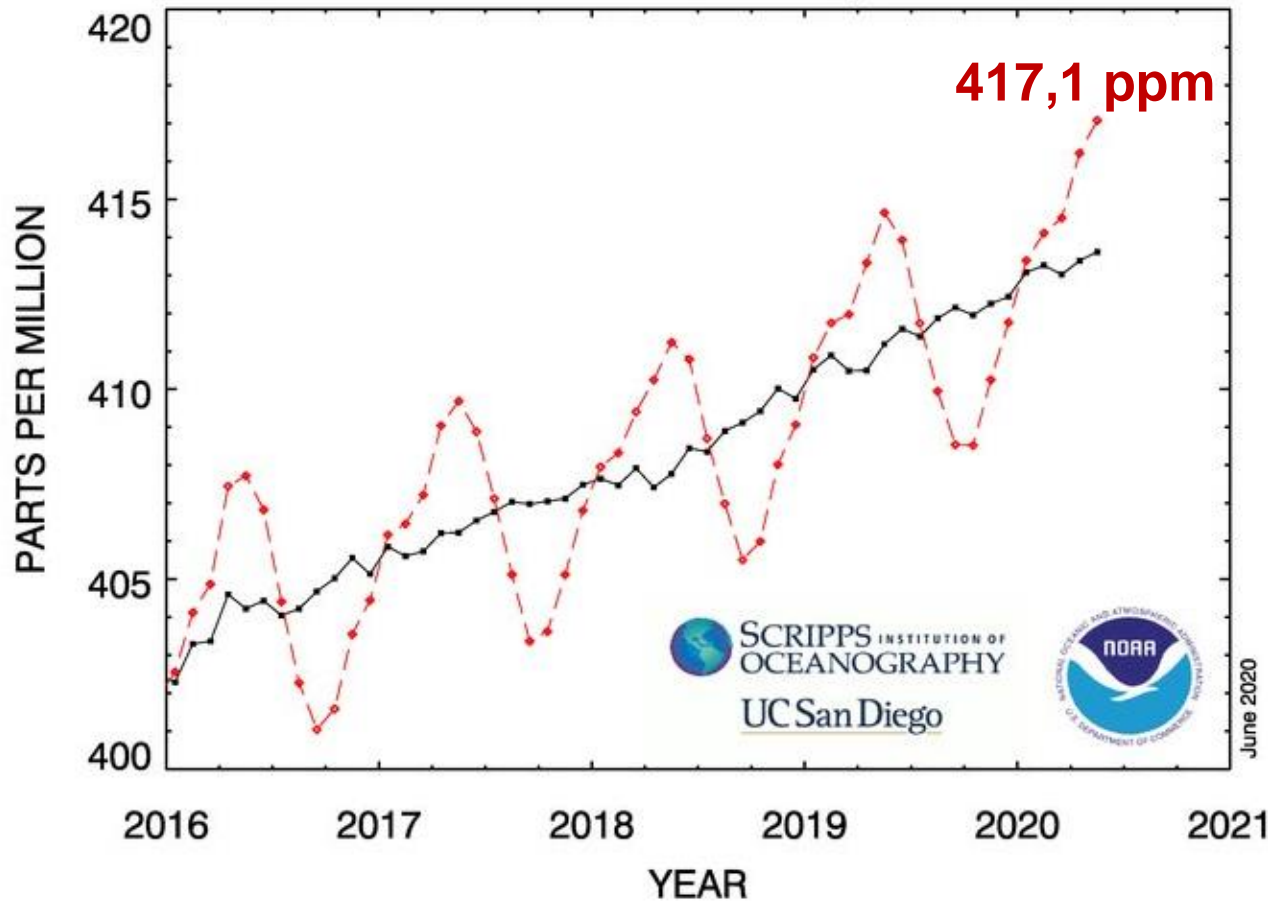
Sources: Nature Climate Change and Global Carbon Project

# May 2020 Had the Highest Monthly Atmospheric CO<sub>2</sub> Reading Ever Recorded

TOPICS: Carbon Dioxide Climate Change Global Warming NOAA

By NOAA JUNE 5, 2020

## RECENT MONTHLY MEAN CO<sub>2</sub> AT MAUNA LOA

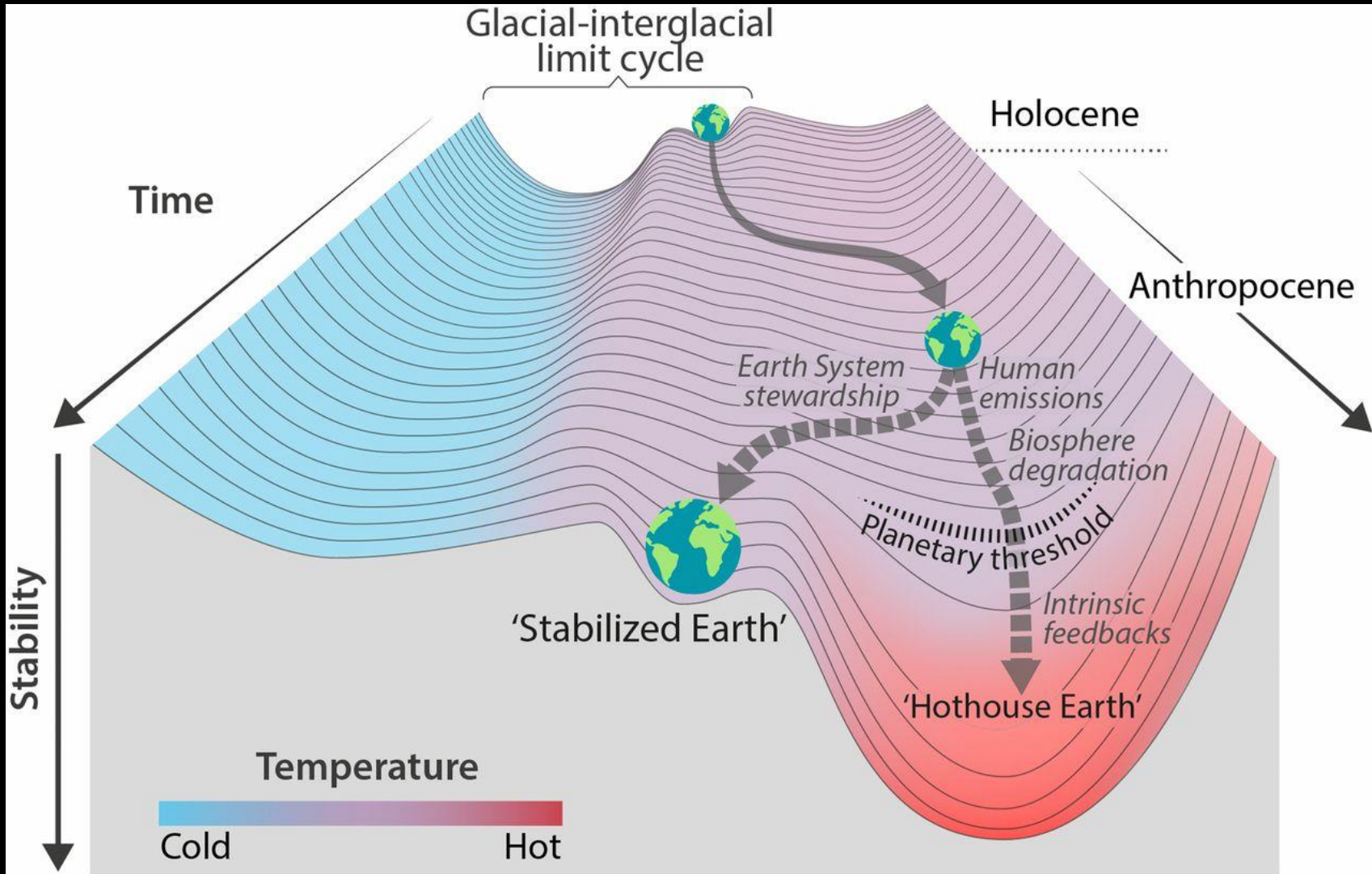


# O que fazer?

## 4 passos

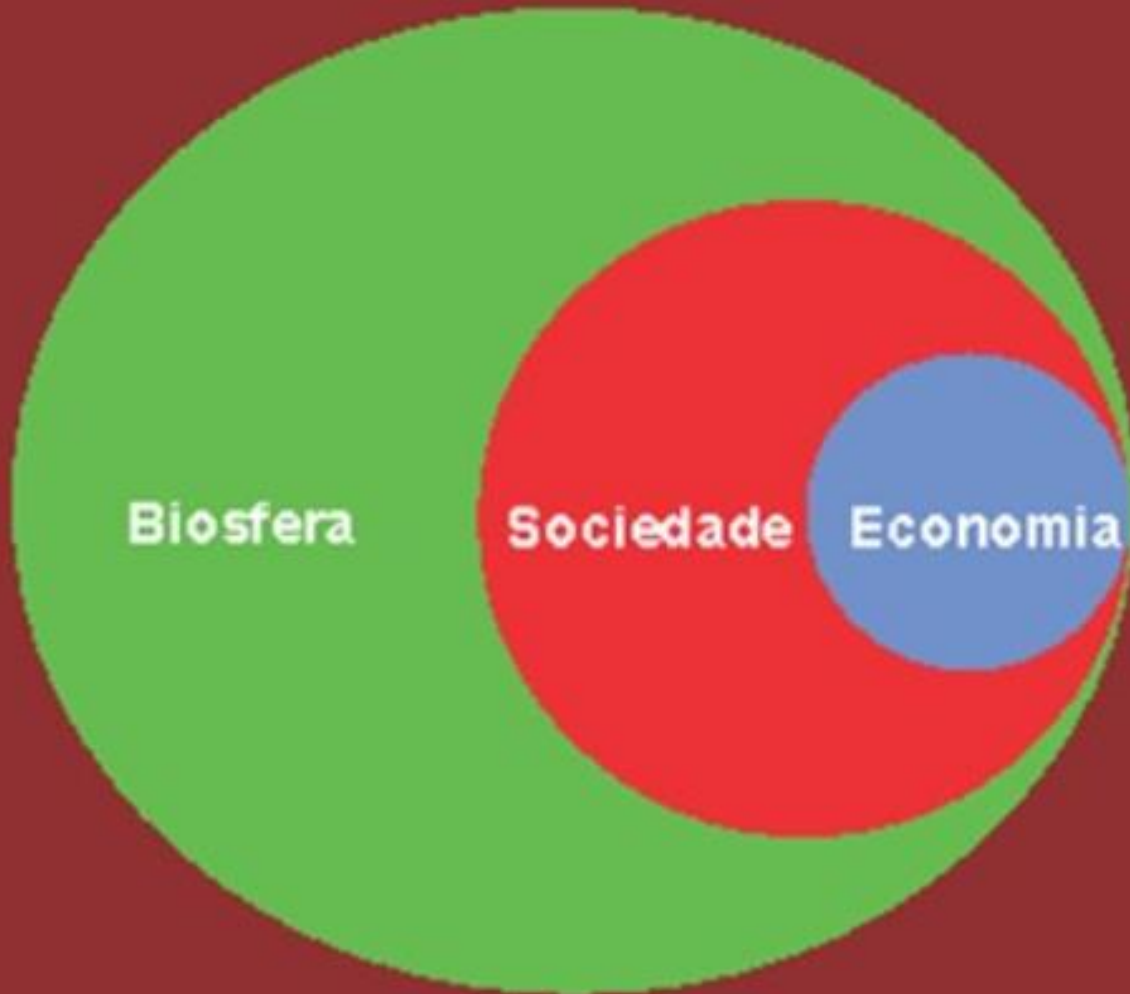
1. Reconhecer a realidade
2. Repensar as premissas
3. Acreditar que é possível mudar
4. Agir para mudar

# Passo 1 - **reconhecer** a gravidade extrema da situação atual: esta é a década da bifurcação



# Passo 2 – repensar nossas premissas

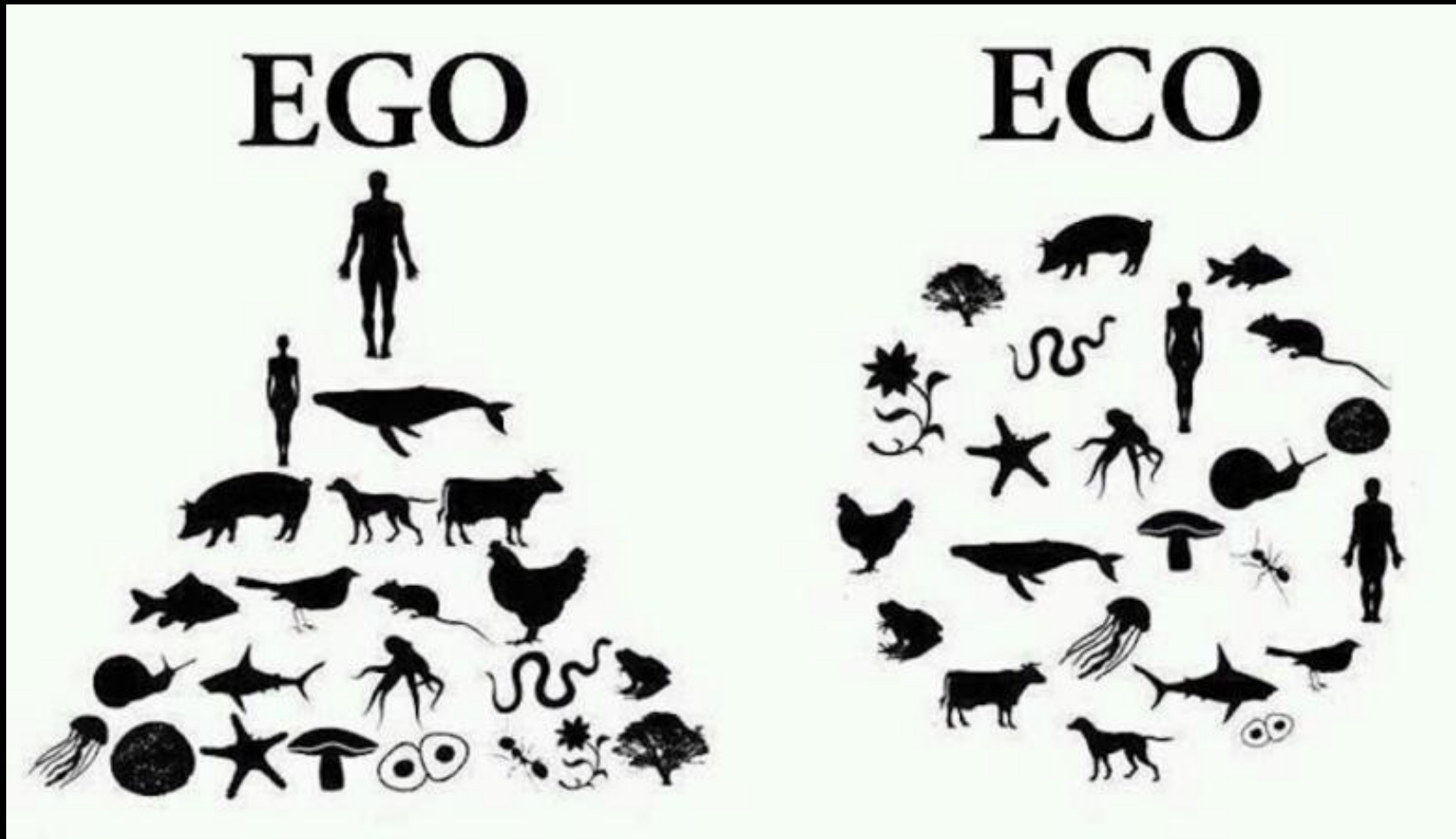
Repensando nossos esquemas mentais



“A economia é um subsistema da ecologia, e não o contrário”

Herman Daly


Abandonar o antropocentrismo, obstáculo maior – jurídico e mental – à compreensão de que a posição atual do homem na biosfera é, ao mesmo tempo, ecocida e suicida.





Passo 3 – Voltar a acreditar em nossa capacidade coletiva de mudar o mundo

Para que uma mudança aconteça, é preciso acreditar que ela é possível

A black and white portrait of Romain Rolland, a French philosopher, writer, and pacifist. He is shown from the chest up, wearing a dark suit jacket, a white shirt, and a dark tie. He has a serious expression and is looking slightly to the right of the camera. The background is dark and out of focus.

Il faut savoir allier le pessimisme de l'intelligence à l'optimisme de la volonté.

—Romain Rolland

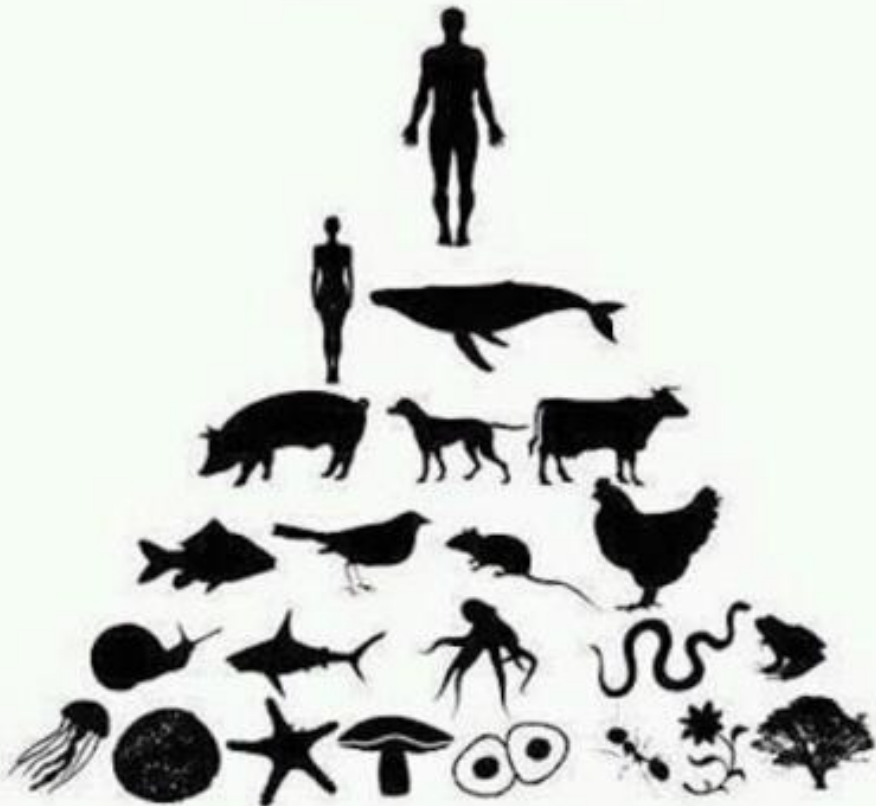
## Passo 4 - agir para mudar:

- diminuição da desigualdade
- Minimização dos impactos humanos sobre o clima, água, florestas, biodiversidade
- Diminuir drasticamente o consumo de carne
- Avaliar as alternativas políticas em função dessa emergência climática e ambiental

Obrigado!

[luiz.marques@gmail.com](mailto:luiz.marques@gmail.com)

# EGO



# ECO

