Emissioni degli incendi:
220 milioni di tonnellate CO_2

(metà delle emissioni dell'Italia in un anno)

Fonti: EU Copernicus Atmosphere Monitoring Service; Italy National Inventory Report 2019, ISPRA

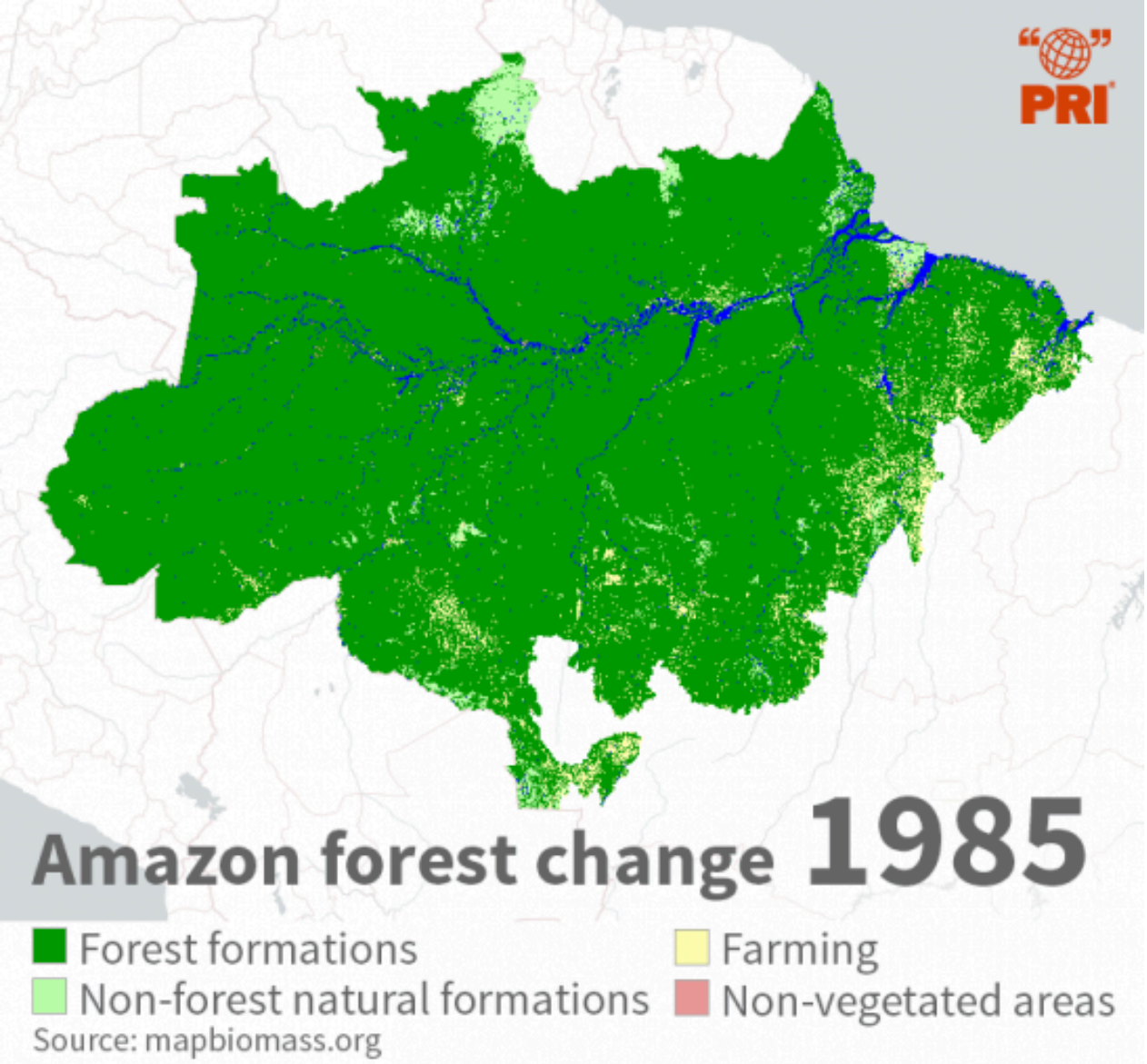
Deforestazione annua Amazzonia brasiliana (km^2)

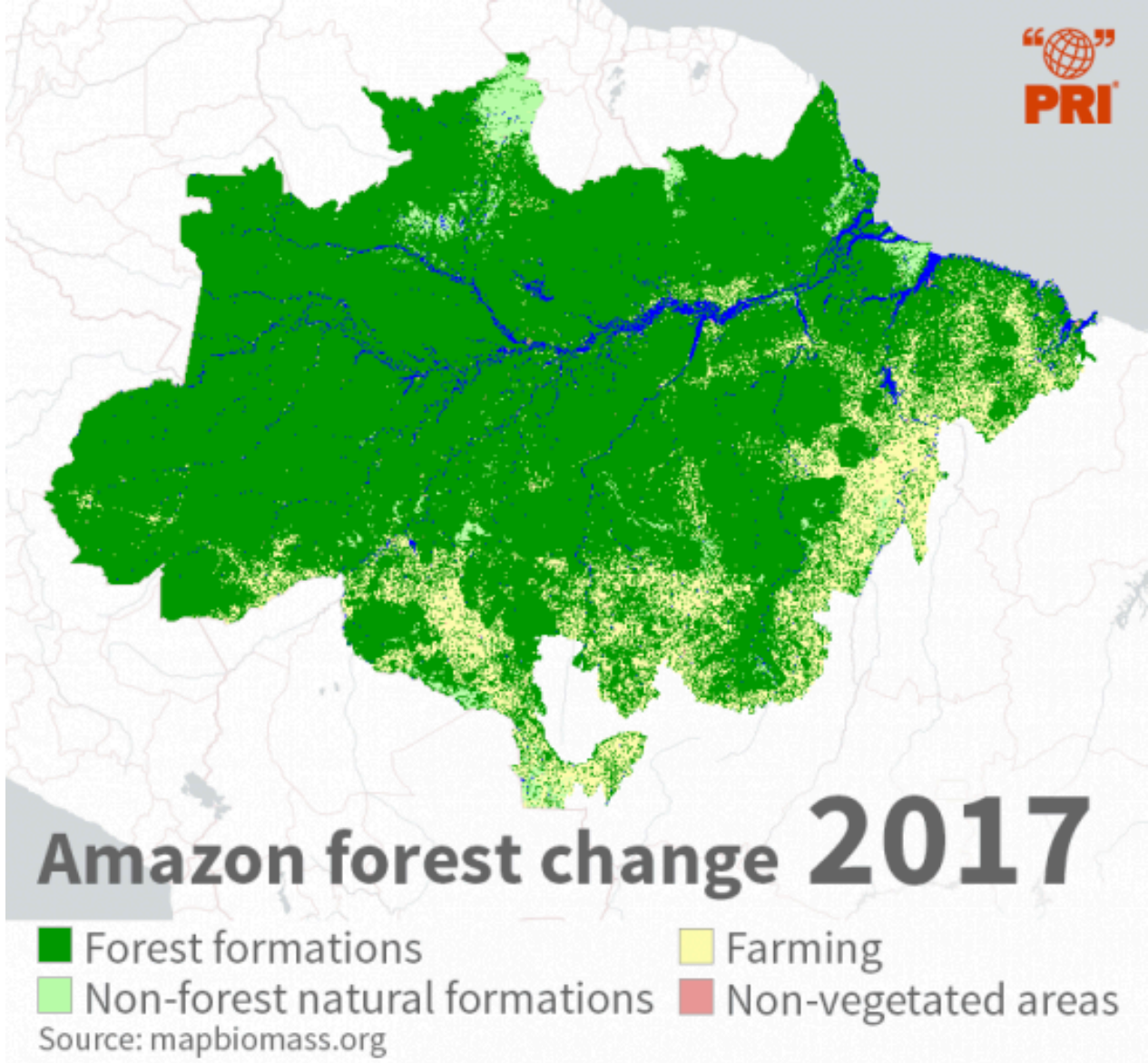
Fonte: INPE (dati da https://en.wikipedia.org/wiki/Deforestation_of_the_Amazon_rainforest)

Deforestazione in Amazzonia (1970-2019): 17% della superficie

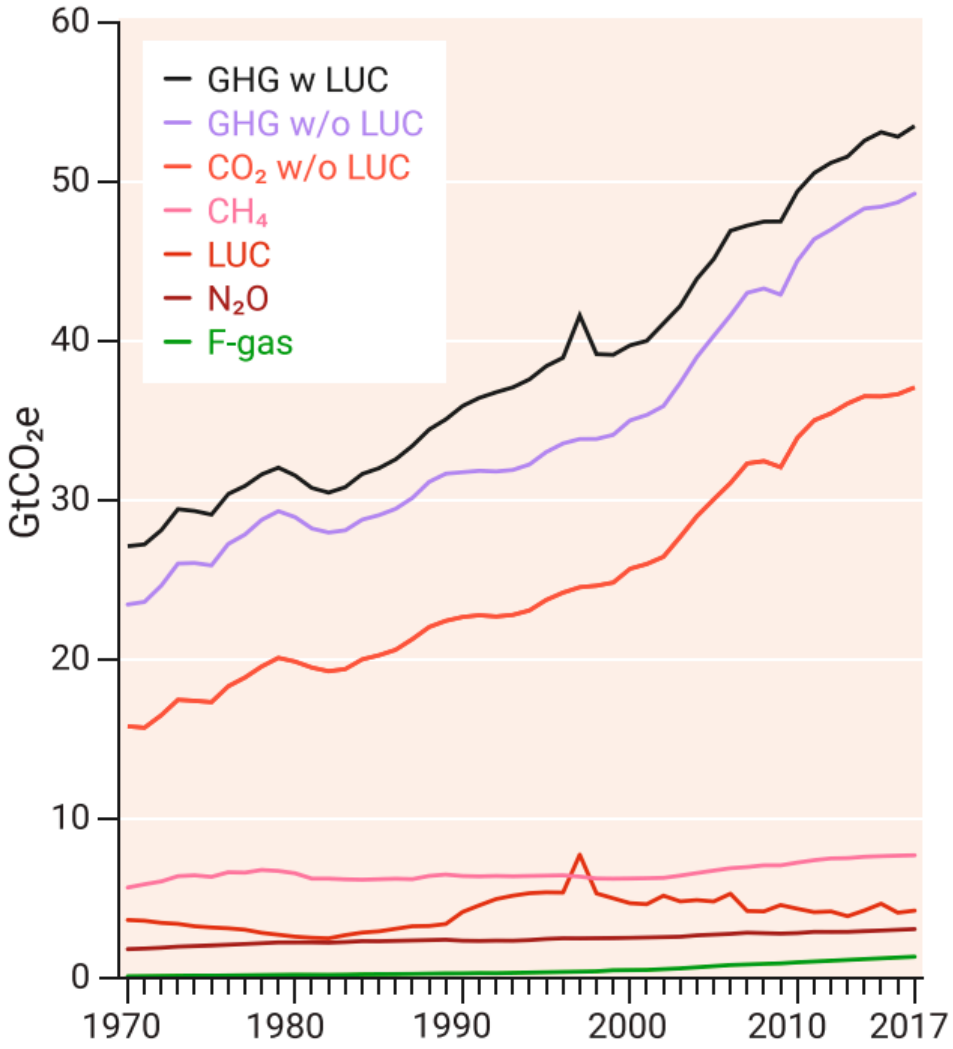
Punto di non ritorno per la perdita della foresta: 25-40%

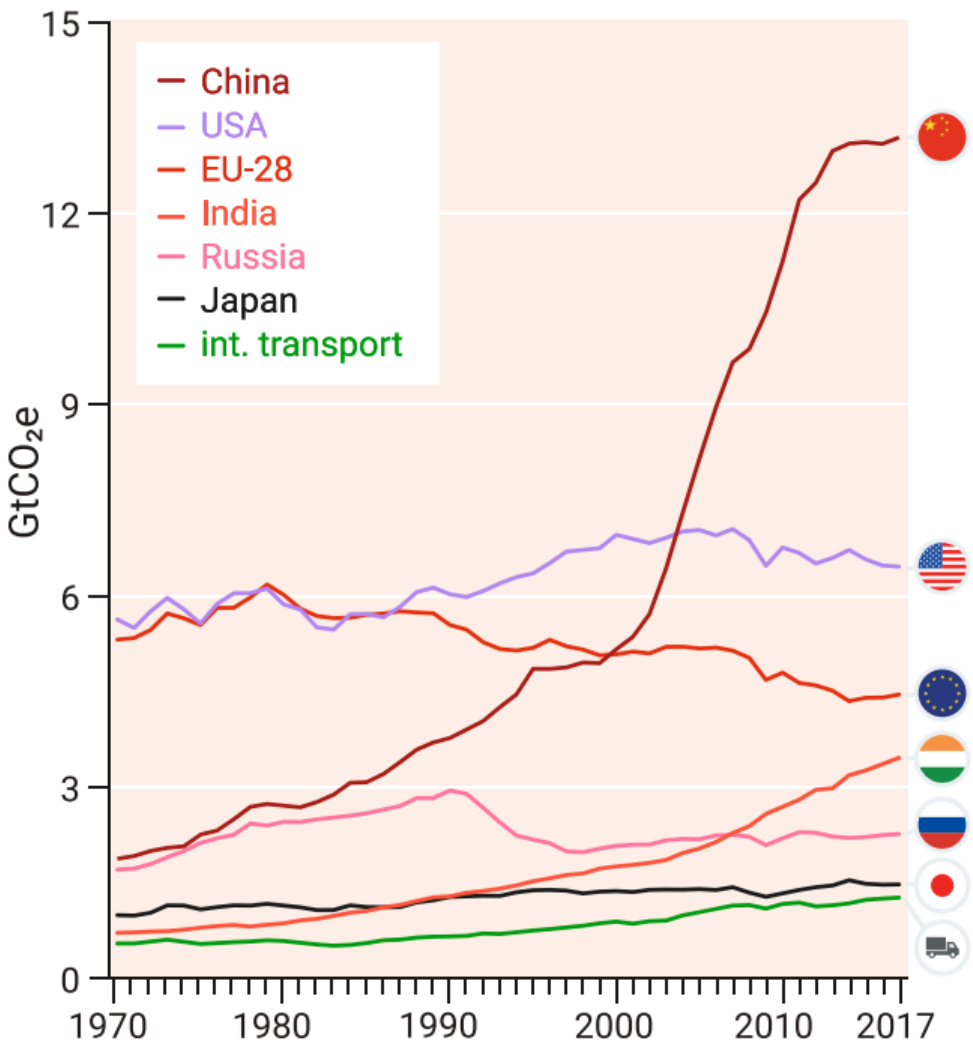
Lovejoy and Nobre 2018, Science Adv (https://advances.sciencemag.org/content/4/2/eaat2340)





Emissioni umane di gas serra (1850-2010)



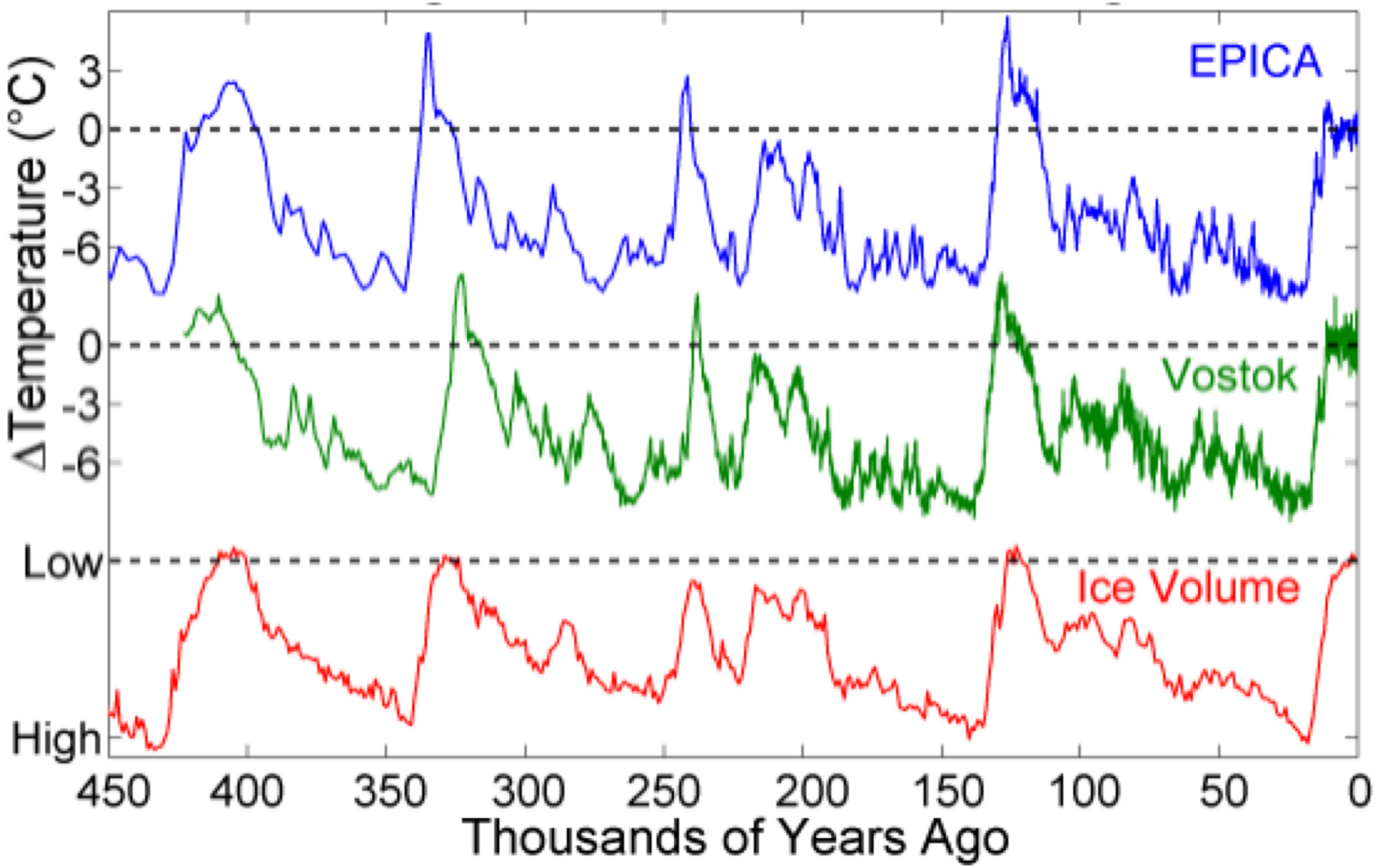


Fonte: UNEP Emission Gap Report 2018

https://www.unenvironment.org/resources/emissions-gap-report-2018

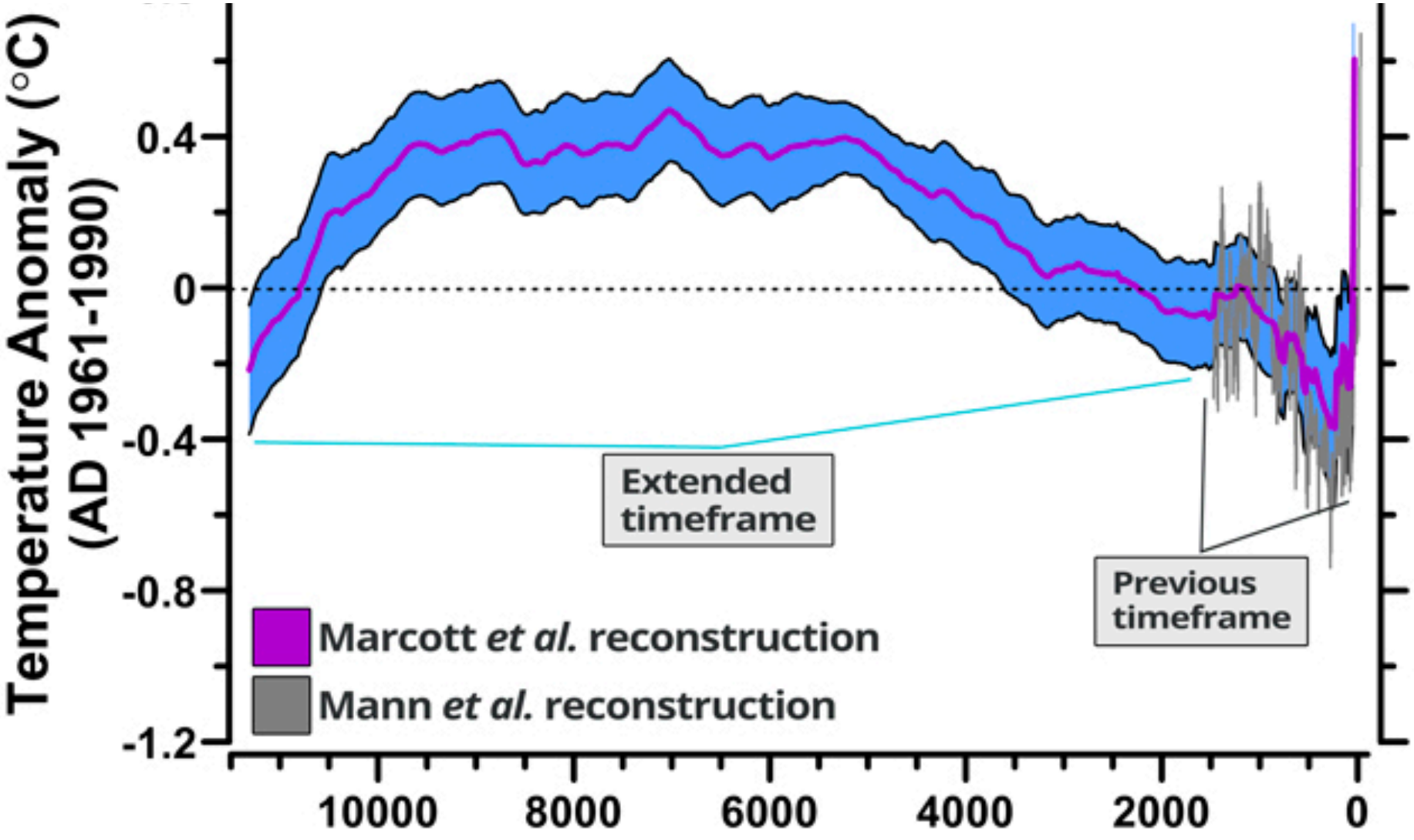
Temperatura globale negli ultimi 400 000 anni

https://commons.wikimedia.org/wiki/File:Ice_Age_Temperature.png



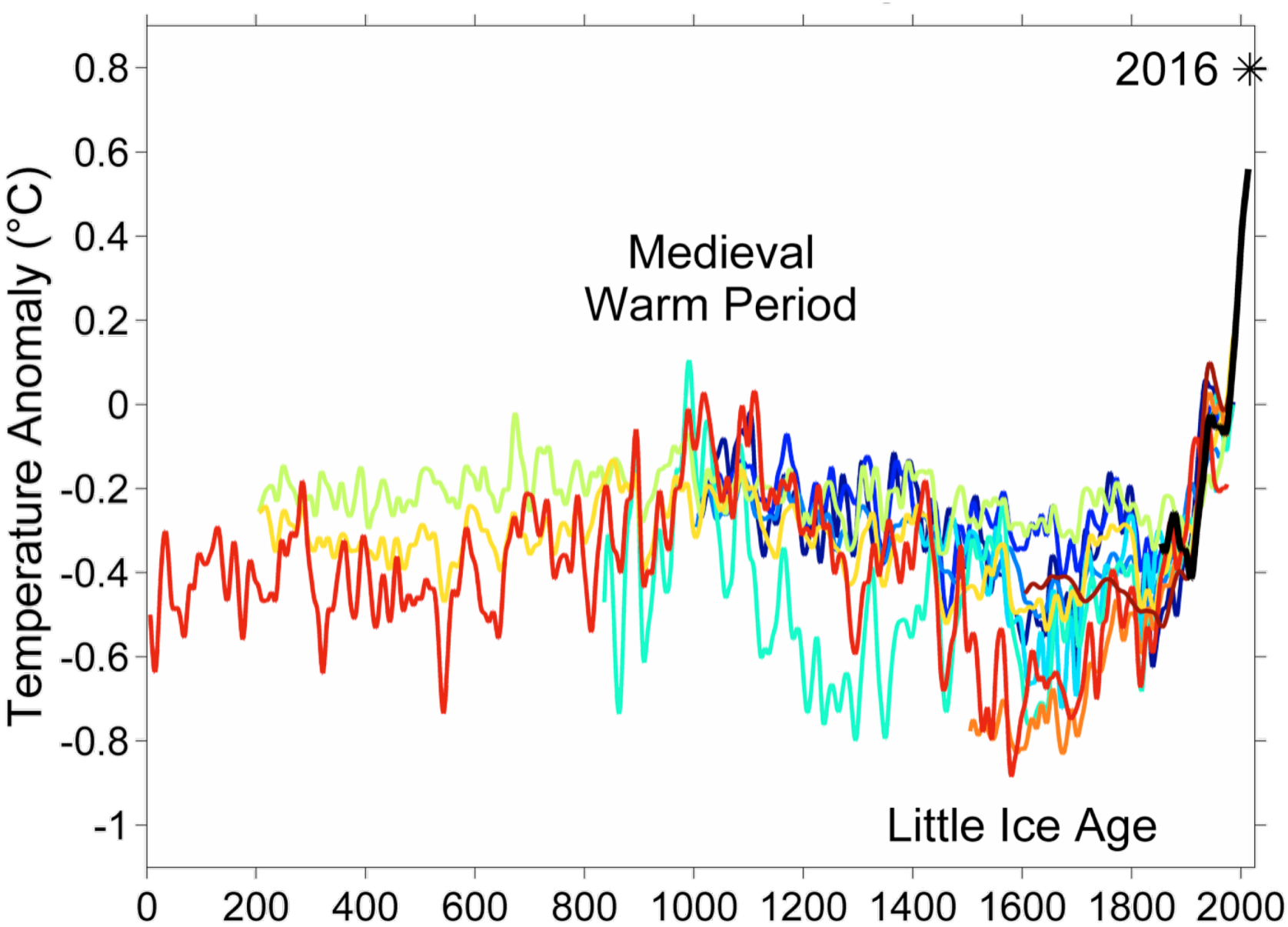
Temperatura globale negli ultimi 10000 anni

Marcott et al. 2013, Science (https://science.sciencemag.org/content/339/6124/1198.abstract)



Temperatura negli ultimi 1000 anni – emisfero nord, terre emerse

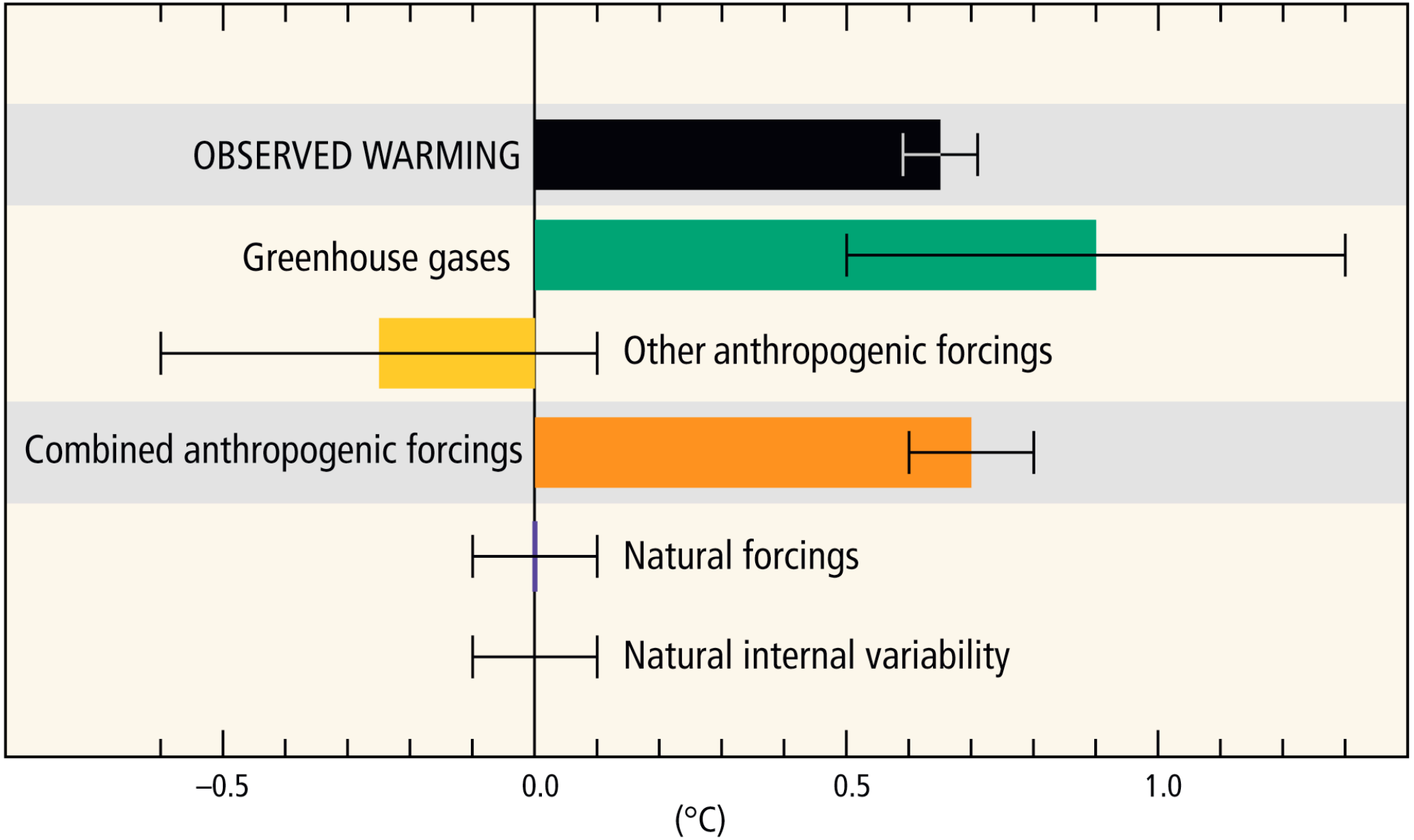
https://en.wikipedia.org/wiki/Temperature_record_of_the_past_1000_years



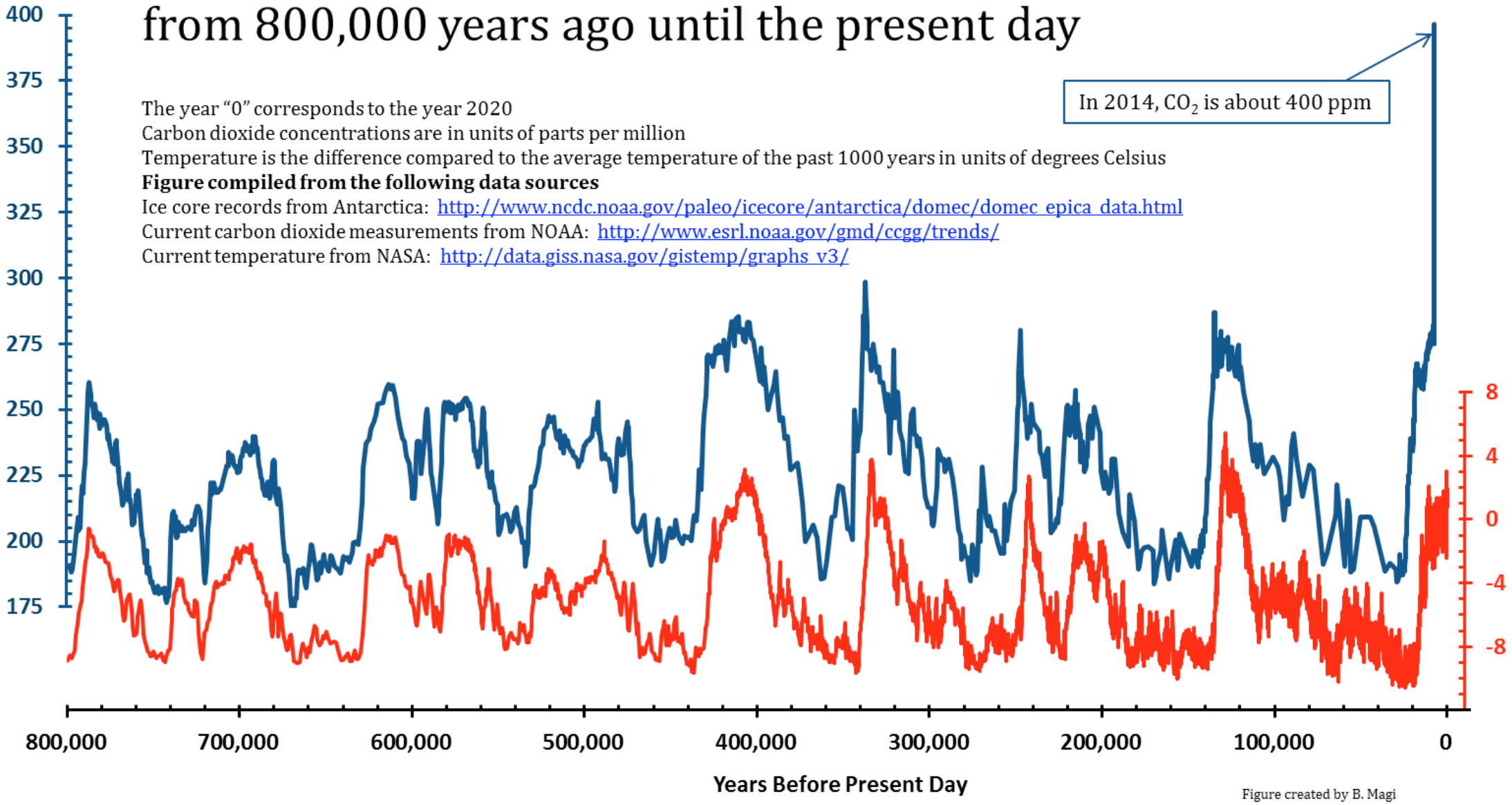
1.(dark blue 1000-1991): *The Holocene*.
2.(blue 1000-1980): *Geophysical Research Letters*.
3.(light blue 1000-1965): *Ambio*. Modified as published in *Science*.
4.(lightest blue 1402-1960): *J. Geophys. Res.*.
5.(light green 831-1992): *Science*.
6.(yellow 200-1980): *Geophysical Research Letters*. doi: 10.1029/2003GL017814.
7.(orange 200-1995): *Reviews of Geophysics*. doi: 10.1029/2003RG000143
8.(red-orange 1500-1980): *Geophys. Res Lett.*. doi: 10.1029/2004GL019781
9.(red 1-1979): *Nature*. doi: 10.1038/nature03265
10.(dark red 1600-1990): *Science*. doi: 10.1126/science.1107046
(black 1856-2004): Instrumental data was jointly compiled by the Climatic Research Unit and the UK Meteorological Office Hadley Centre. Global Annual Average data set TaveGL2v was used.

Contributo al riscaldamento climatico 1951-2010

IPCC Fifth Assessment Report, Fig. SPM.3, http://www.ipcc.ch/report/ar5/wg1/)



Carbon dioxide and the temperature of our planet from 800,000 years ago until the present day

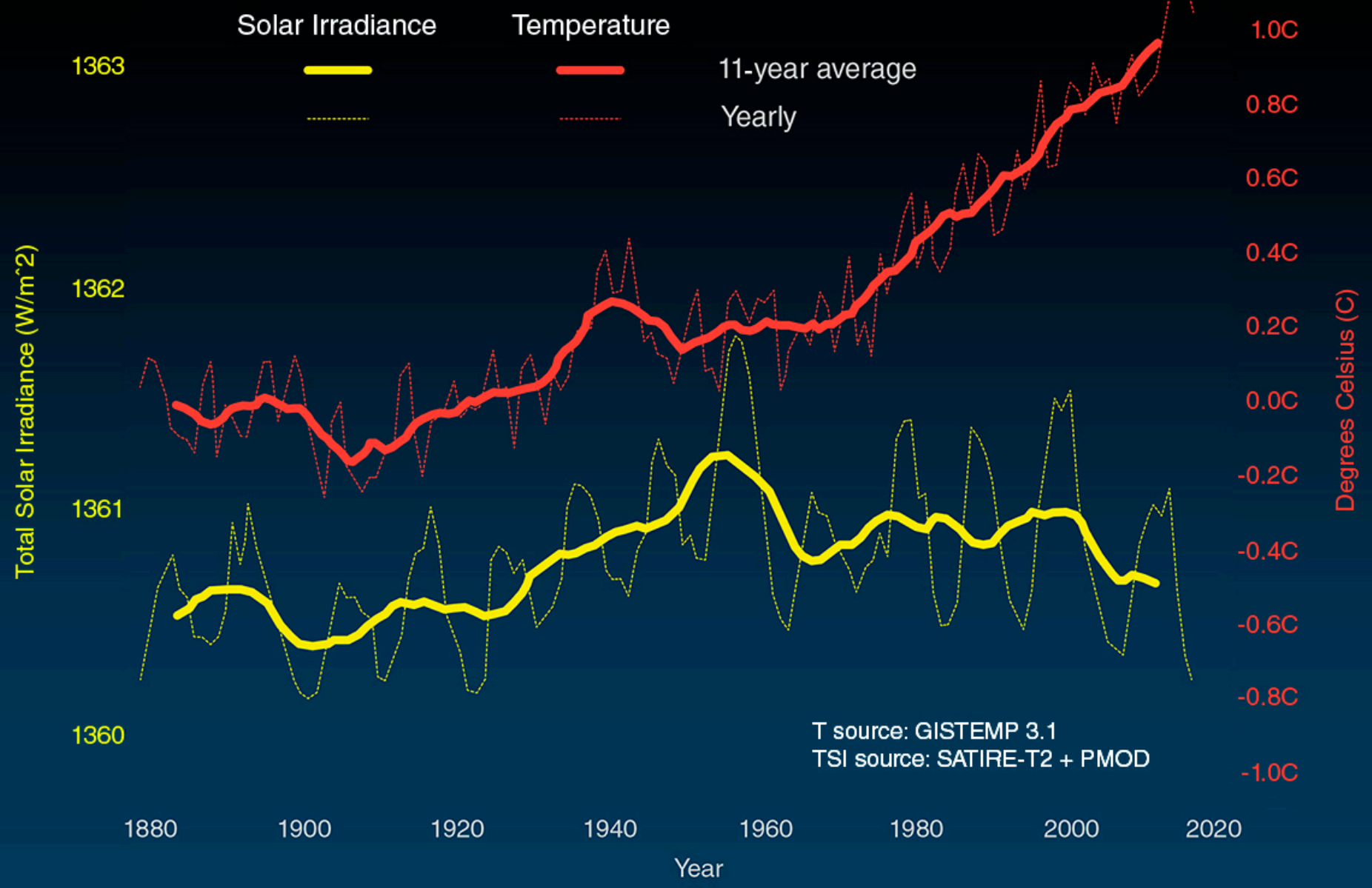


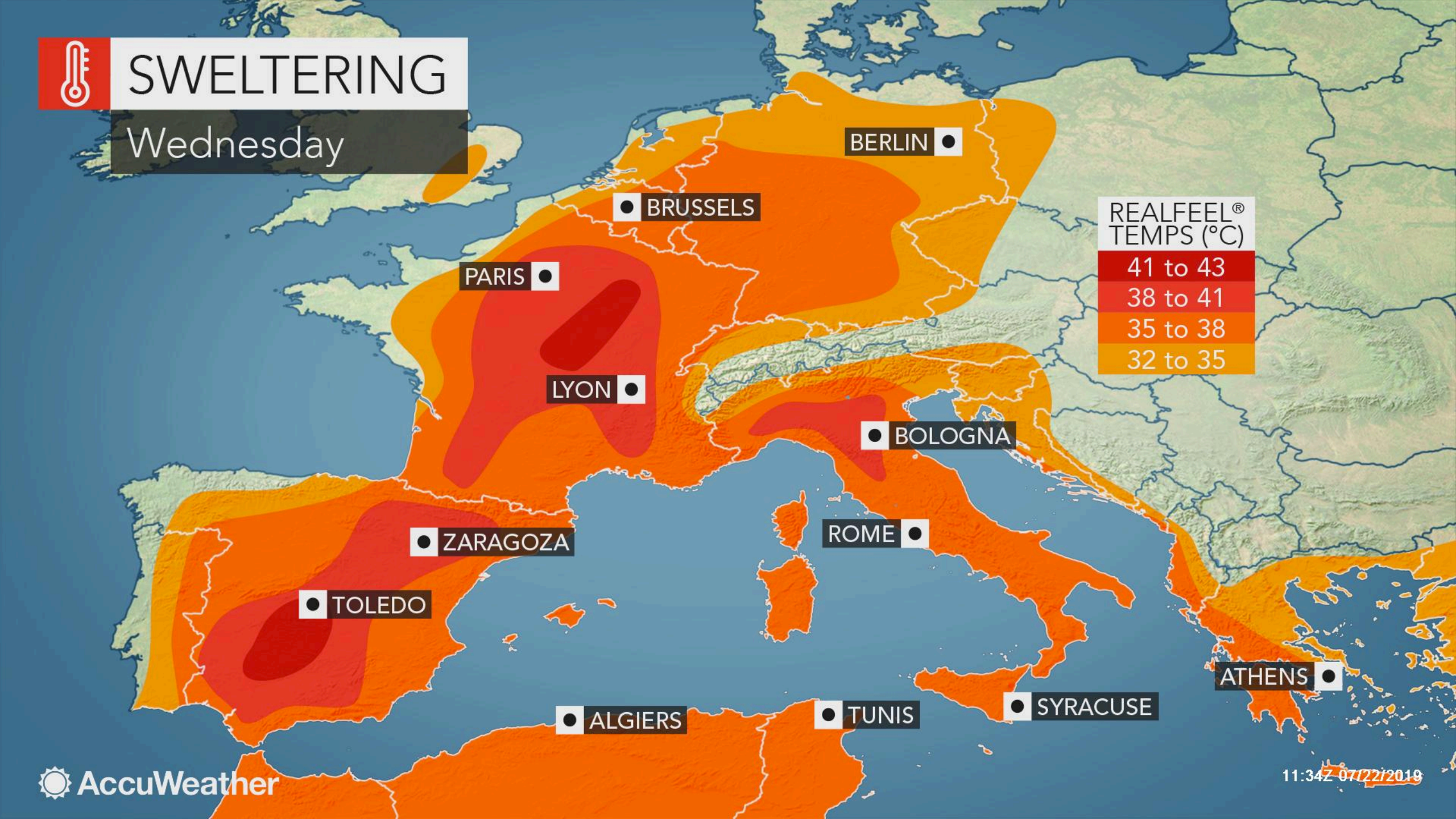
The year "0" corresponds to the year 2020
Carbon dioxide concentrations are in units of parts per million
Temperature is the difference compared to the average temperature of the past 1000 years in units of degrees Celsius
Figure compiled from the following data sources
Ice core records from Antarctica: http://www.ncdc.noaa.gov/paleo/icecore/antarctica/domec/domec_epica_data.html
Current carbon dioxide measurements from NOAA: http://www.esrl.noaa.gov/gmd/ccgg/trends/
Current temperature from NASA: http://data.giss.nasa.gov/gistemp/graphs_v3/

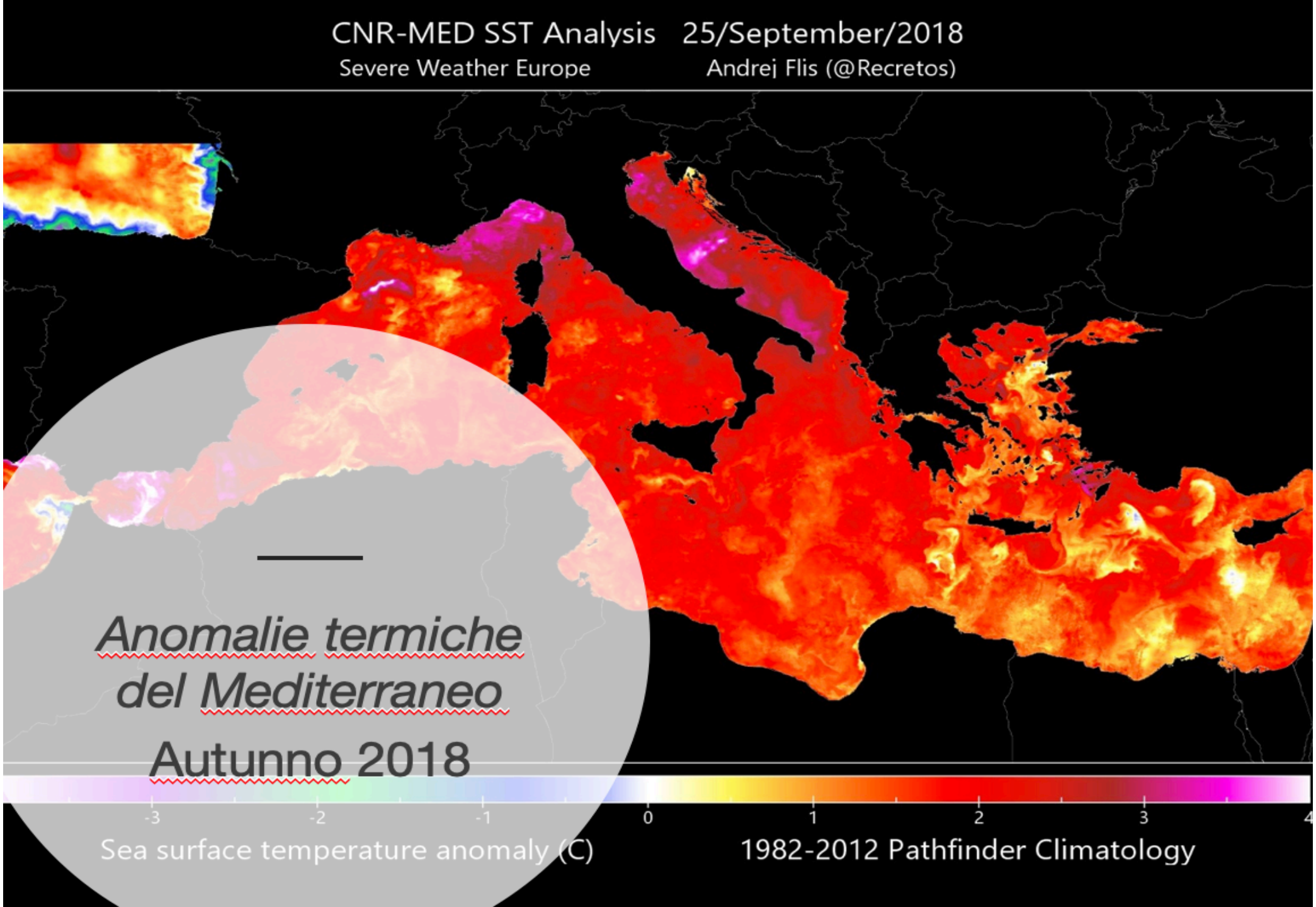
Figure created by B. Magi

Temperature vs Solar Activity

Fonte: NASA (https://climate.nasa.gov/climate_resources/189/graphic-temperature-vs-solar-activity/




SWELTERING
Wednesday
BERLIN
BRUSSELS
PARIS
LYON
BOLOGNA
ROME
ZARAGOZA
TOLEDO
ATHENS
SYRACUSE
TUNIS
ALGIERS
REALFEEL® TEMPS (°C)
41 to 43
38 to 41
35 to 38
32 to 35
AccuWeather
11:34Z 07/22/2019



Anomalie termiche del Mediterraneo

Autunno 2018

Il caso della tempesta Vaia
http://www.sisef.it/forest@/pdf/?id=efor2990-015

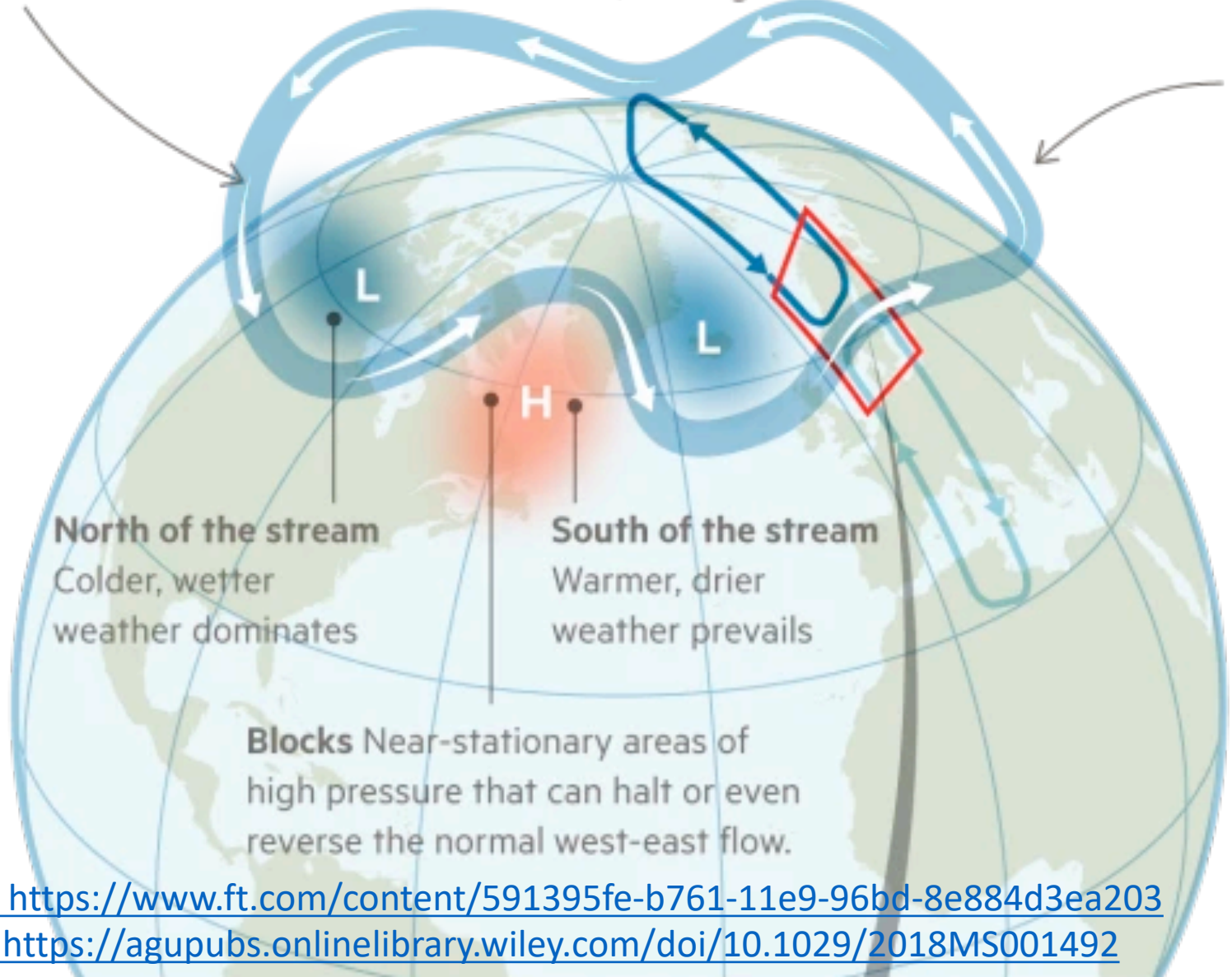

+ umidità atmosferica
+ piogge estreme
3B
meteo

«…a causa, molto probabilmente, di ingenti quantitativi d'acqua provenienti da una strada presente nell'area di nicchia.»

https://www.adnkronos.com/fatti/cronaca/2019/11/25/crollo-viadotto-cosa-successo_ogHfnzedWrMmEfvKlCf92H.html

What is the North Atlantic jet stream?

The polar front jet stream is a current of strong wind high in the atmosphere, one of four such bands that circle the earth, flowing from west to east



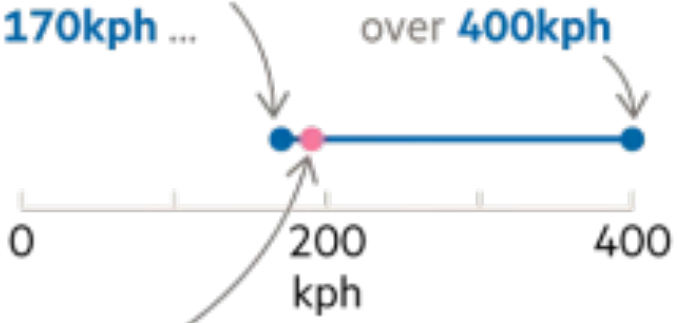
Location

8-12km altitude, around 60 degrees latitude, but can meander for large distances north and south. It is a few hundred kilometres wide, and several kilometres deep

Wind speeds

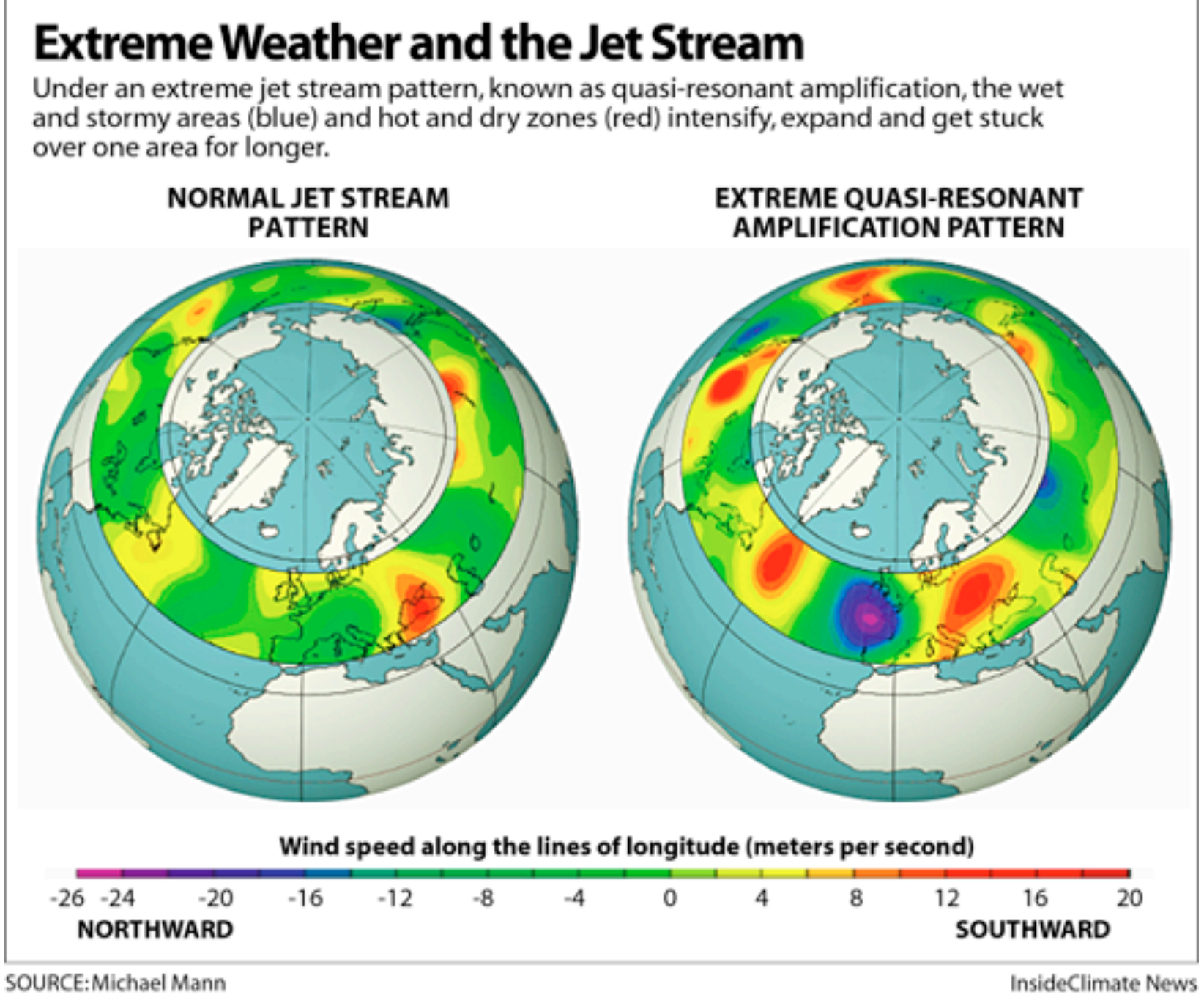
Typically around **170kph** ...

... but can reach over **400kph**



190kph Speed at which a cyclone is reclassified as a hurricane

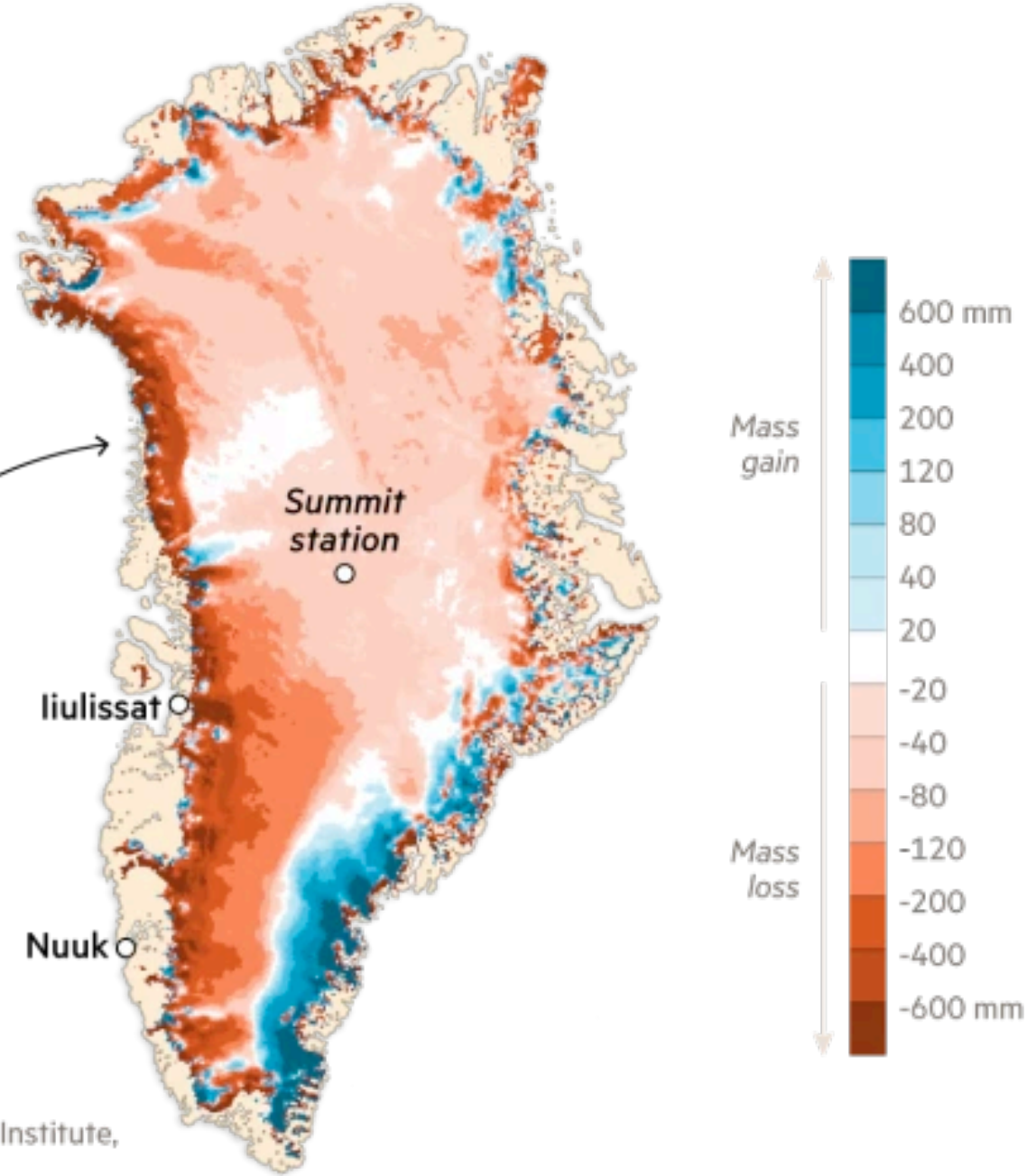
Figura: https://www.ft.com/content/591395fe-b761-11e9-96bd-8e884d3ea203
Paper: https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2018MS001492



Fonte: Mann et al. 2018, Science Adv (https://advances.sciencemag.org/content/4/10/eaat3272)

A changing ice mass

The map shows the anomaly between cumulative ice mass changes during the past year, compared with the period 1981–2010

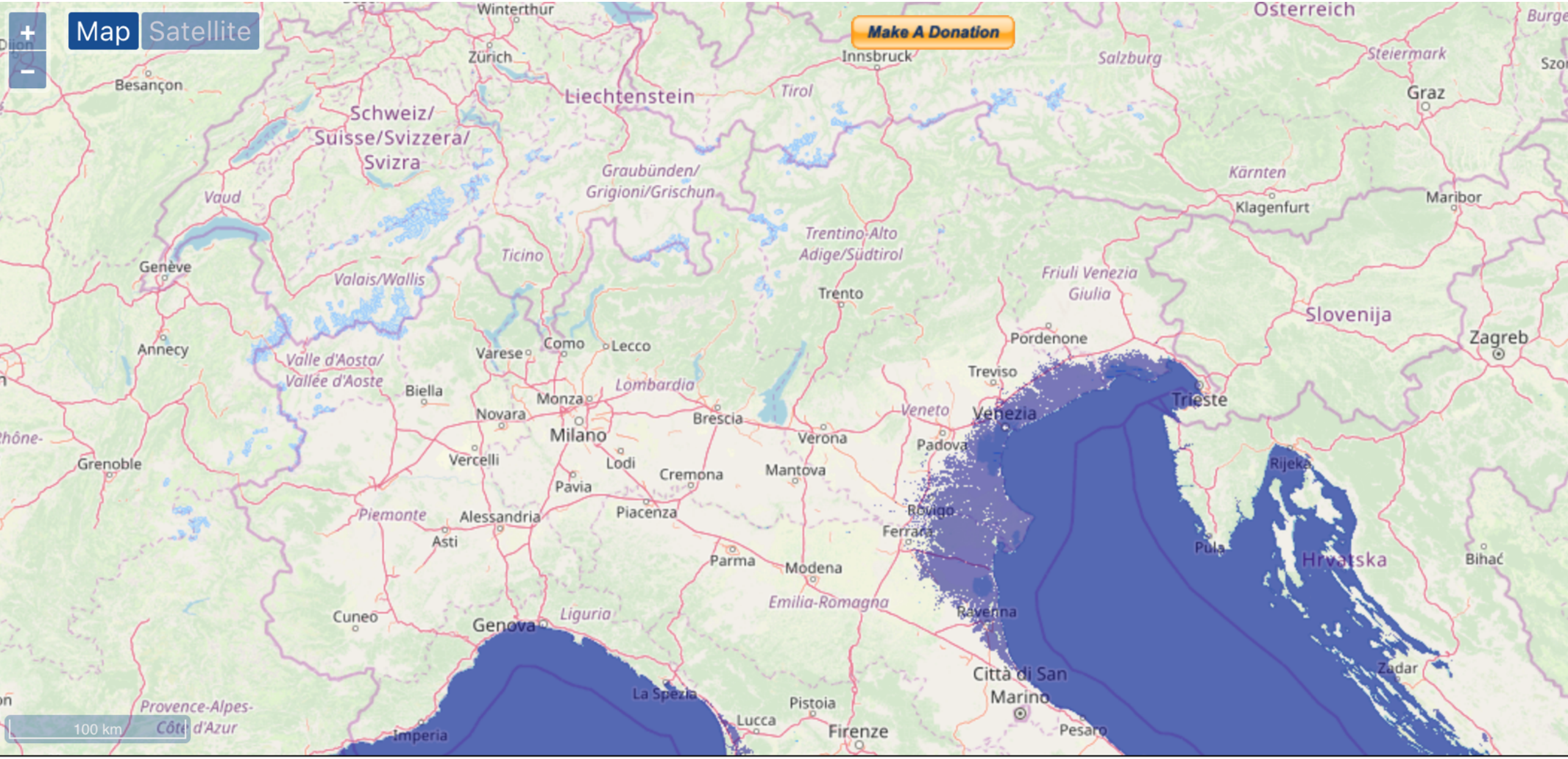


The ice sheet covers 81 per cent of Greenland, and is the second-largest ice sheet in the world, after Antarctica

Sources: Polar Portal; Danish Meteorological Institute, GEUS, DTU Space

https://www.ft.com/content/591395fe-b761-11e9-96bd-8e884d3ea203

Innalzamento del livello del mare di 1.5 m in Italia

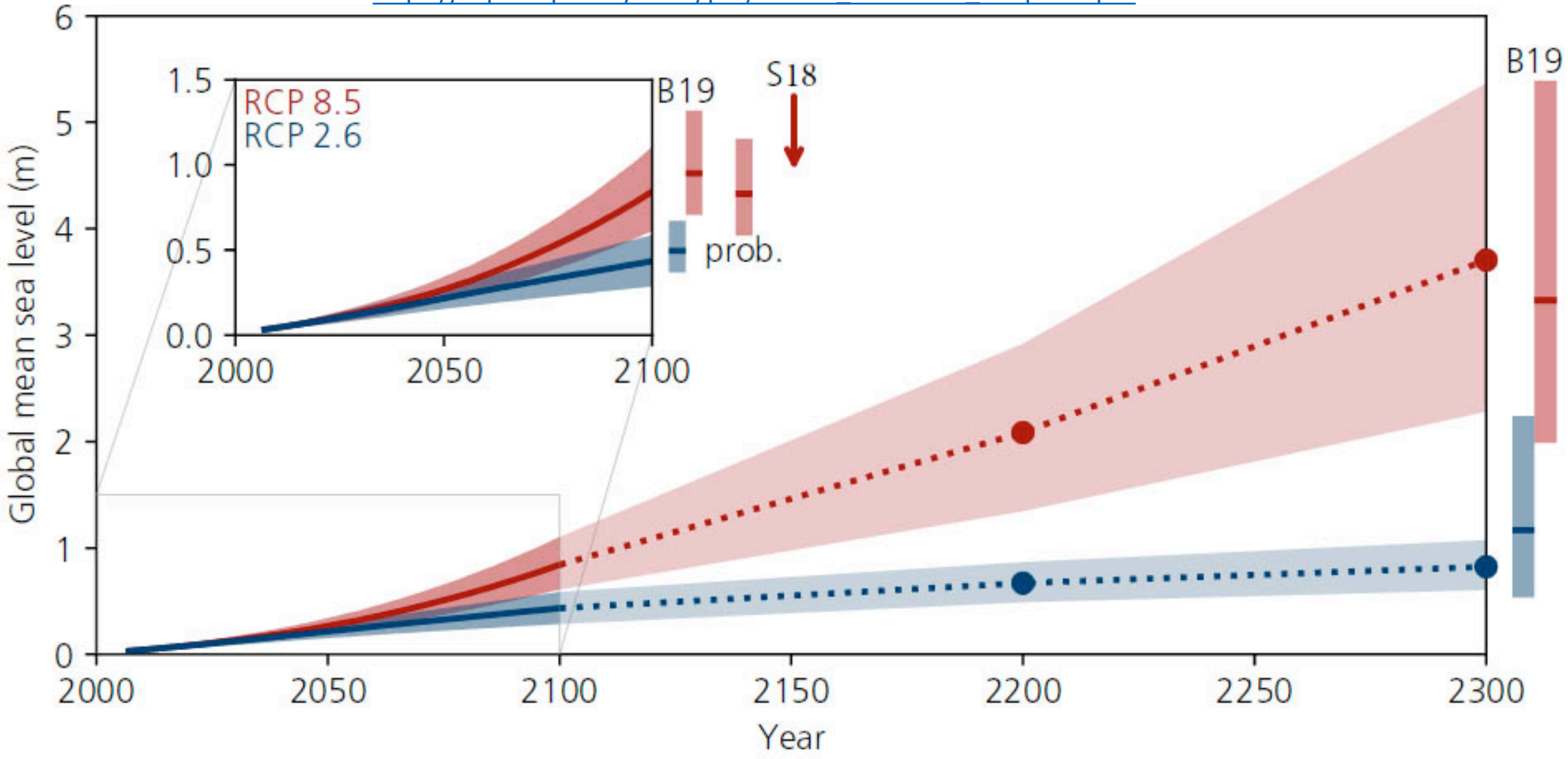


Link to this page:
http://flood.firetree.net/?ll=45.7038,11.9023&zoom=7&m=1

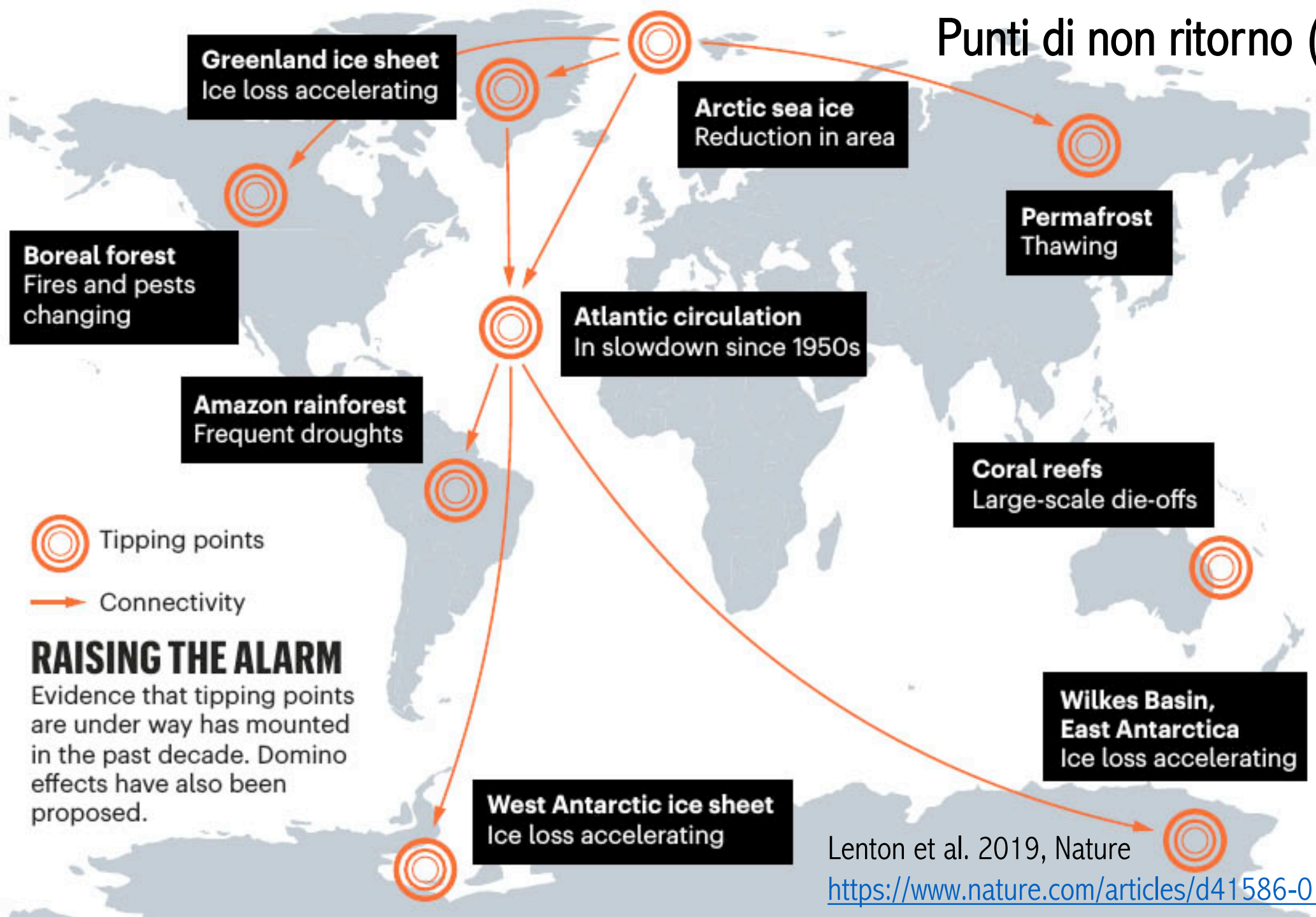
Previsioni dell'aumento del livello del mare

Fonte: IPCC Special Report on the Oceans and the Cryosphere 2019, Figure 4.2

https://report.ipcc.ch/srocc/pdf/SROCC_FinalDraft_Chapter4.pdf



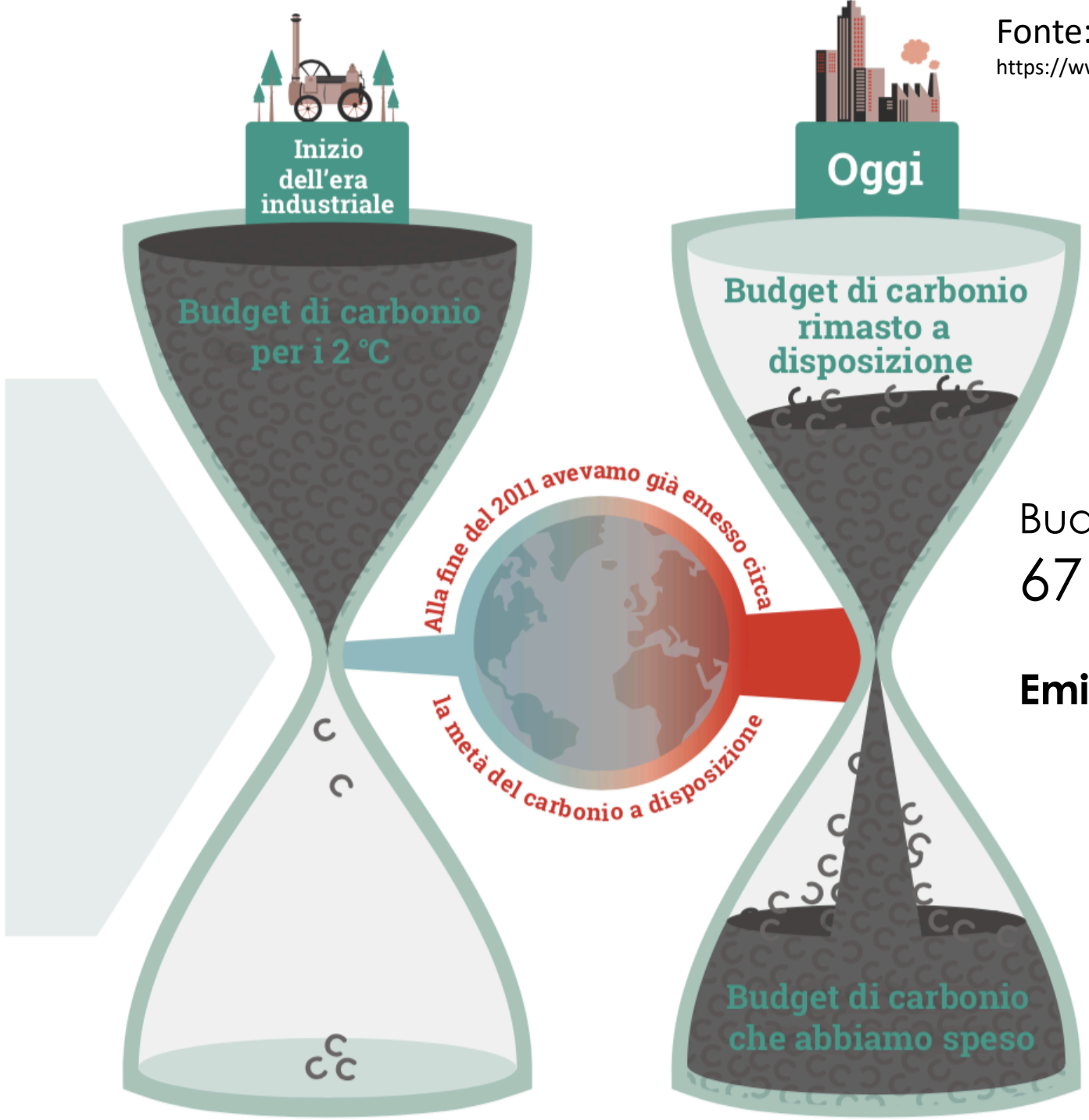
Punti di non ritorno (tipping points)



Lenton et al. 2019, Nature
https://www.nature.com/articles/d41586-019-03595-0

Fonte: Carbon Brief

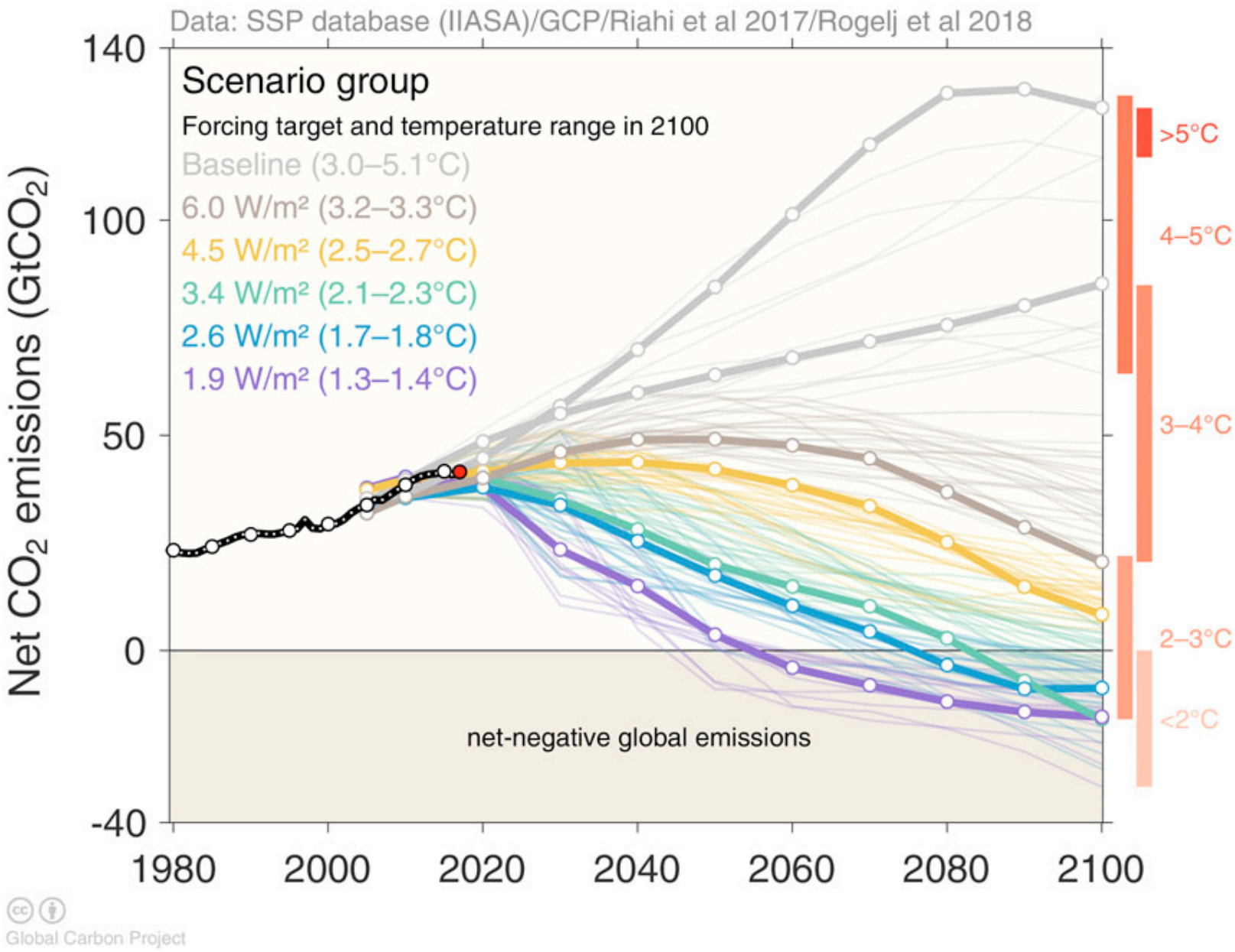
https://www.carbonbrief.org/analysis-how-much-carbon-budget-is-left-to-limit-global-warming-to-1-5c



Budget residuo per <1.5°C (67% di probabilità):

67 - 779 Gt CO_2 (luglio 2019)

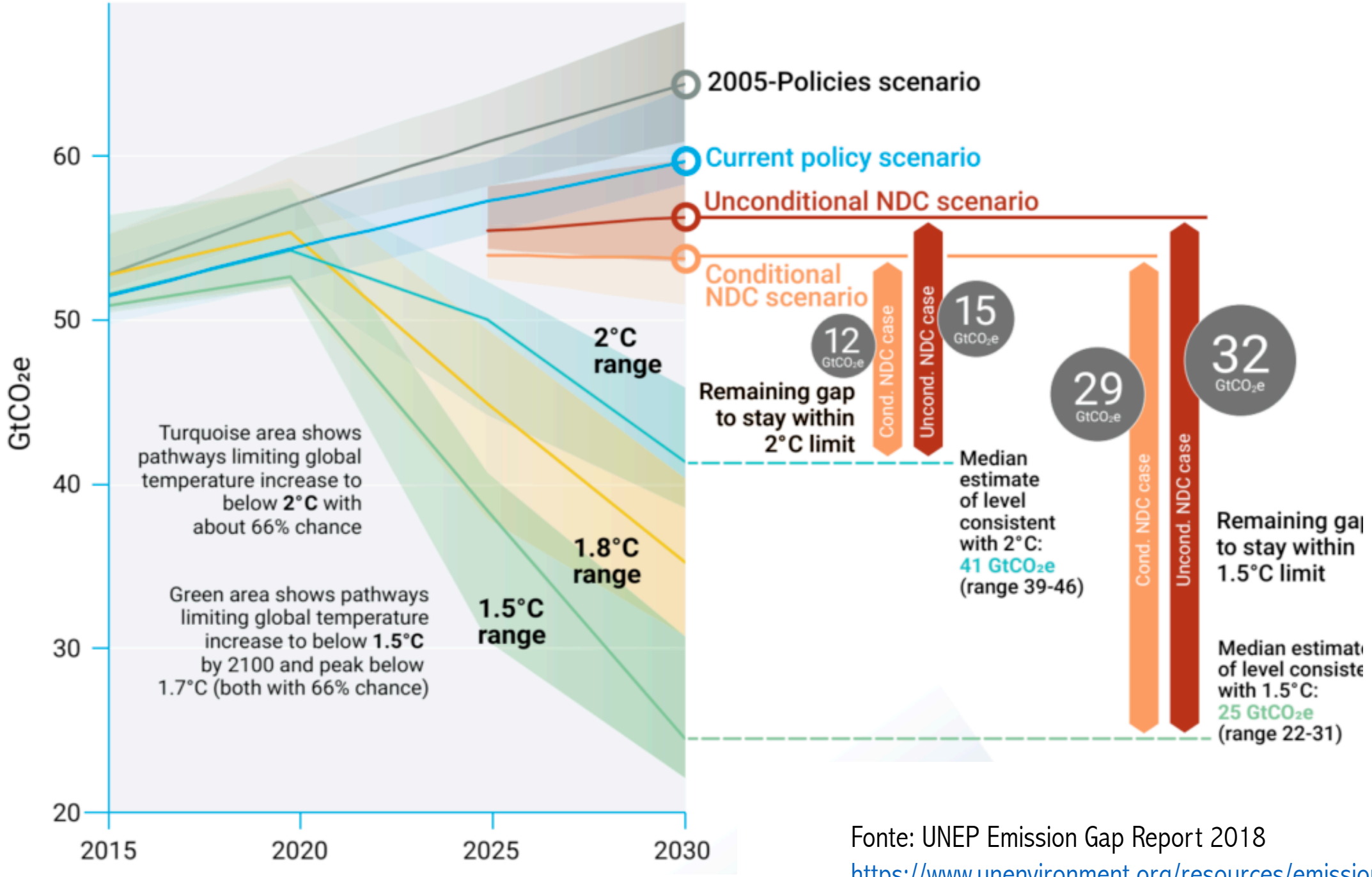
Emissioni anno 2018: 50 Mt CO_2 equivalente



Global CO2 emissions (gigatonnes, GtCO2) for all IAM runs in the SSP database.

SSP no-climate-policy baseline scenarios are shown grey, while various mitigation targets are shown in colour. Bold lines indicate the subset of scenarios chosen as a focus for running CMIP6 climate model simulations.

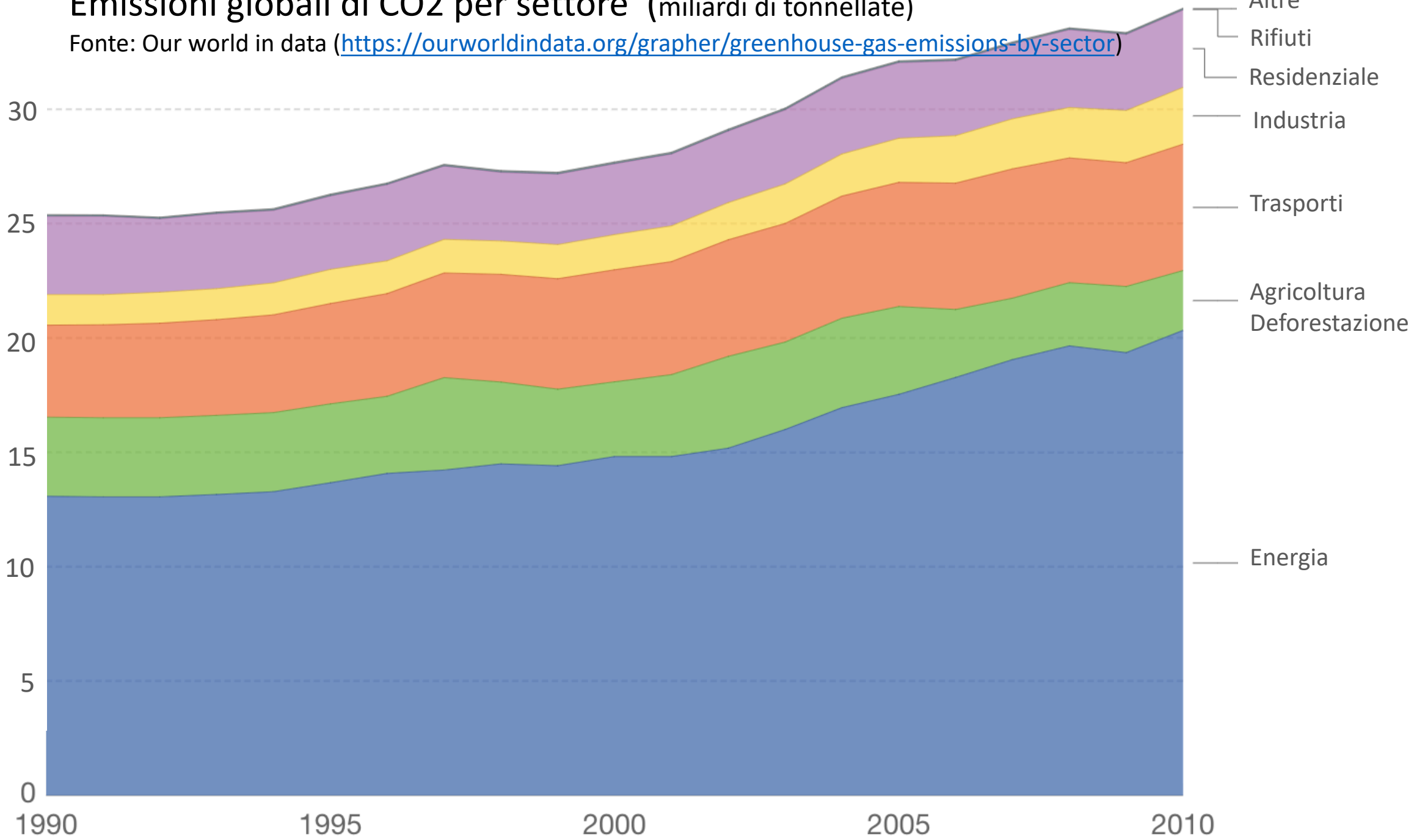
Chart produced for Carbon Brief by Glen Peters and Robbie Andrews from the Global Carbon Project.



Fonte: UNEP Emission Gap Report 2018
https://www.unenvironment.org/resources/emissions-gap-report-2018

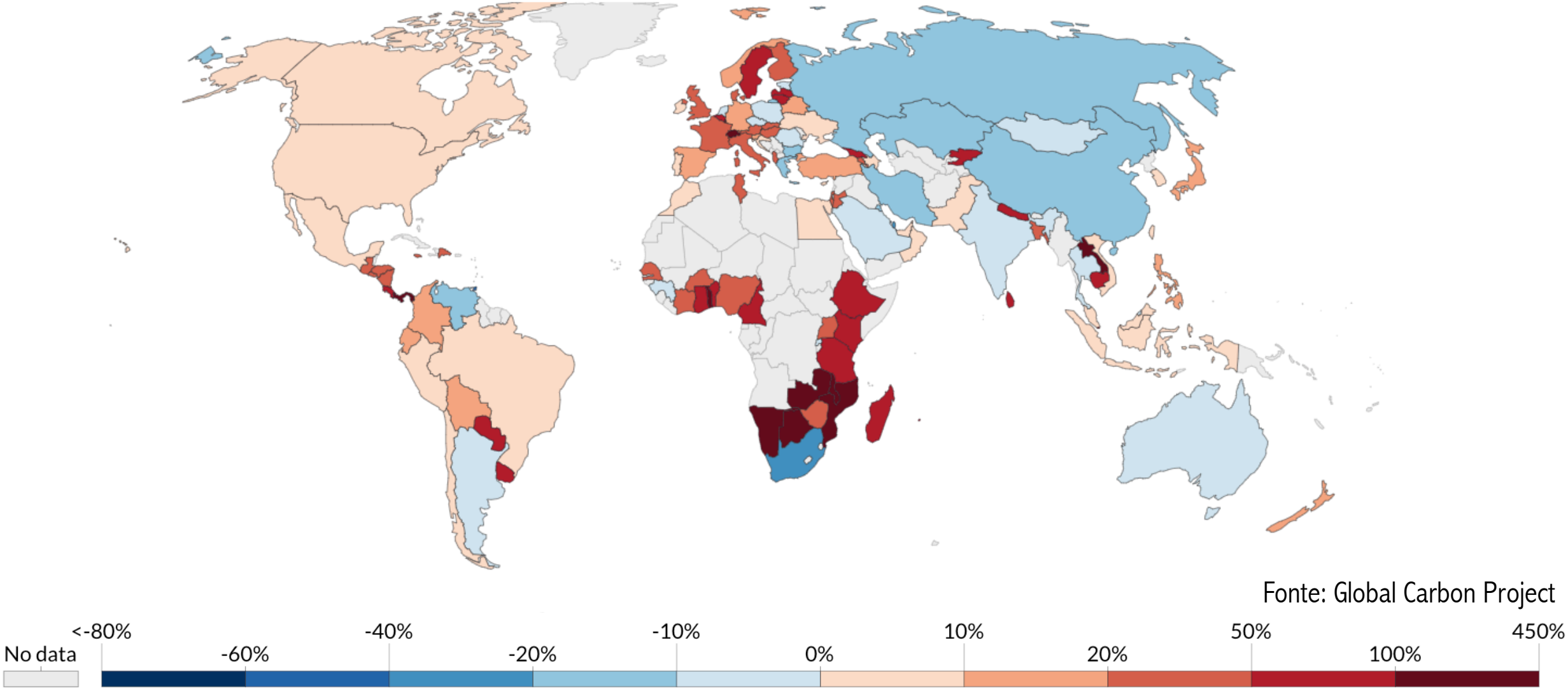
Emissioni globali di CO2 per settore (miliardi di tonnellate)

Fonte: Our world in data (https://ourworldindata.org/grapher/greenhouse-gas-emissions-by-sector)



Carbonio incorporato nelle importazioni

% rispetto alle emissioni nazionali



ENERGIA CLIMA 2030

Piano Nazionale Integrato per l'Energia e il Clima

MINISTERO DELL'AMBIENTE E DELLA TUTELA DEL TERRITORIO E DEL MARE

Ministero dello Sviluppo Economico

MIT Ministero delle Infrastrutture e dei Trasporti

- 56%

DI EMISSIONI NEL SETTORE DELLA GRANDE INDUSTRIA

- 34,6%

TERZIARIO, TRASPORTI TERRESTRE E CIVILE

30%

OBIETTIVO RINNOVABILI

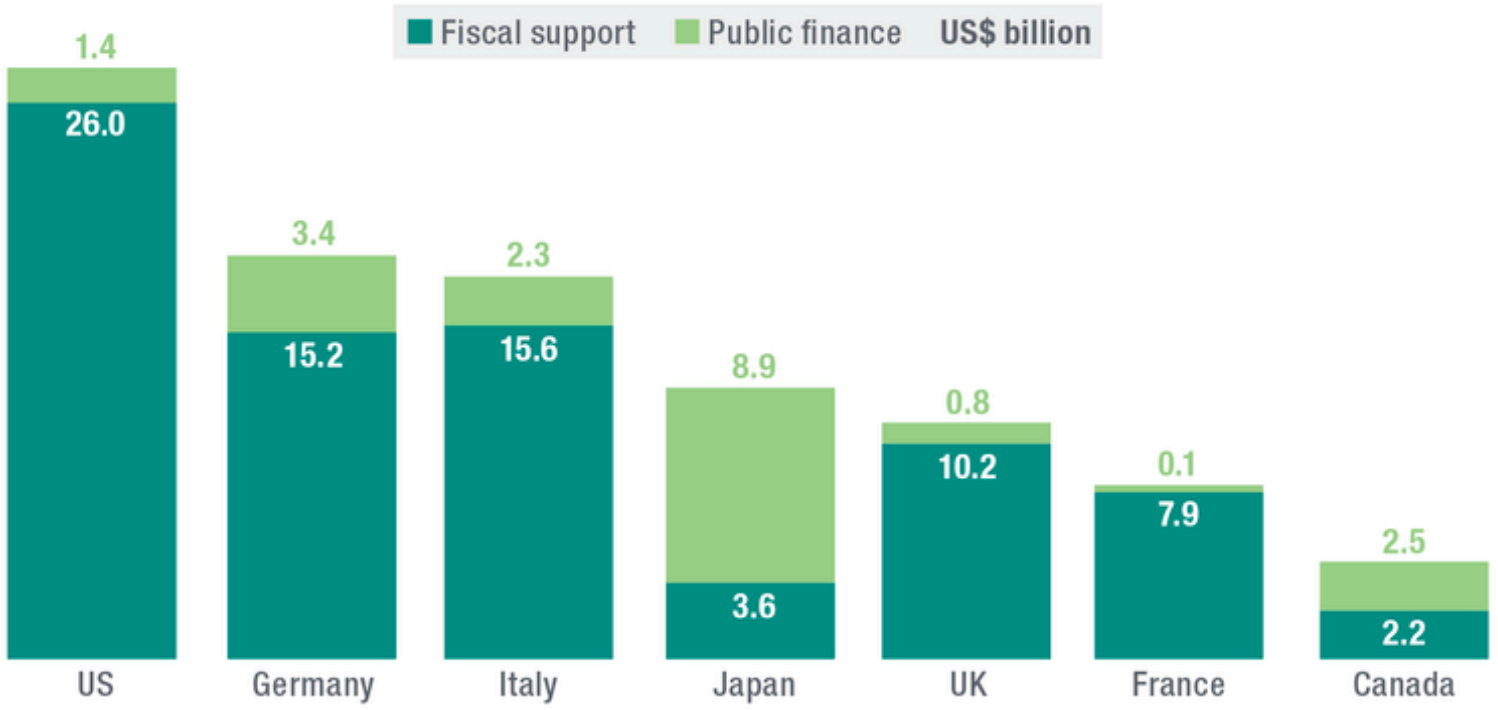
https://www.mise.gov.it/images/stories/documenti/Proposta_di_Piano_Nazionale_Integrato_per_Energia_e_il_Clima_Italiano.pdf

Despite repeated pledges to phase out fossil fuel subsidies since 2009...

Read more at:
odi.org/g7-scorecard

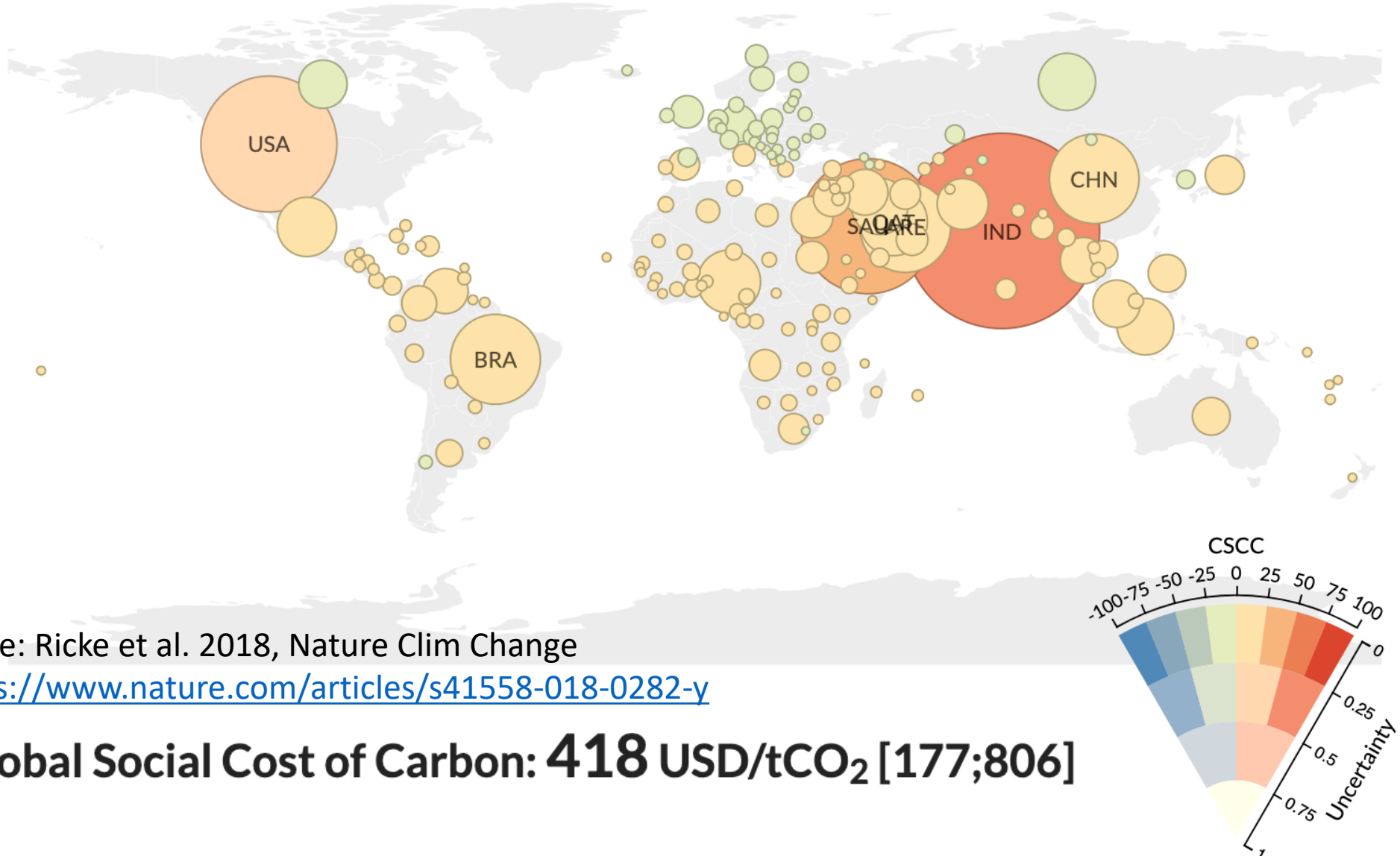
#G7scorecard

G7 countries continue to provide at least **$100 billion** a year supporting fossil fuels.



Future projection: SSP1/RCP60 | **SSP2/RCP60** | SSP3/RCP85 | SSP4/RCP60 | SSP5/RCP85

Damage: BHM SR **Discounting:** Growth-adjusted

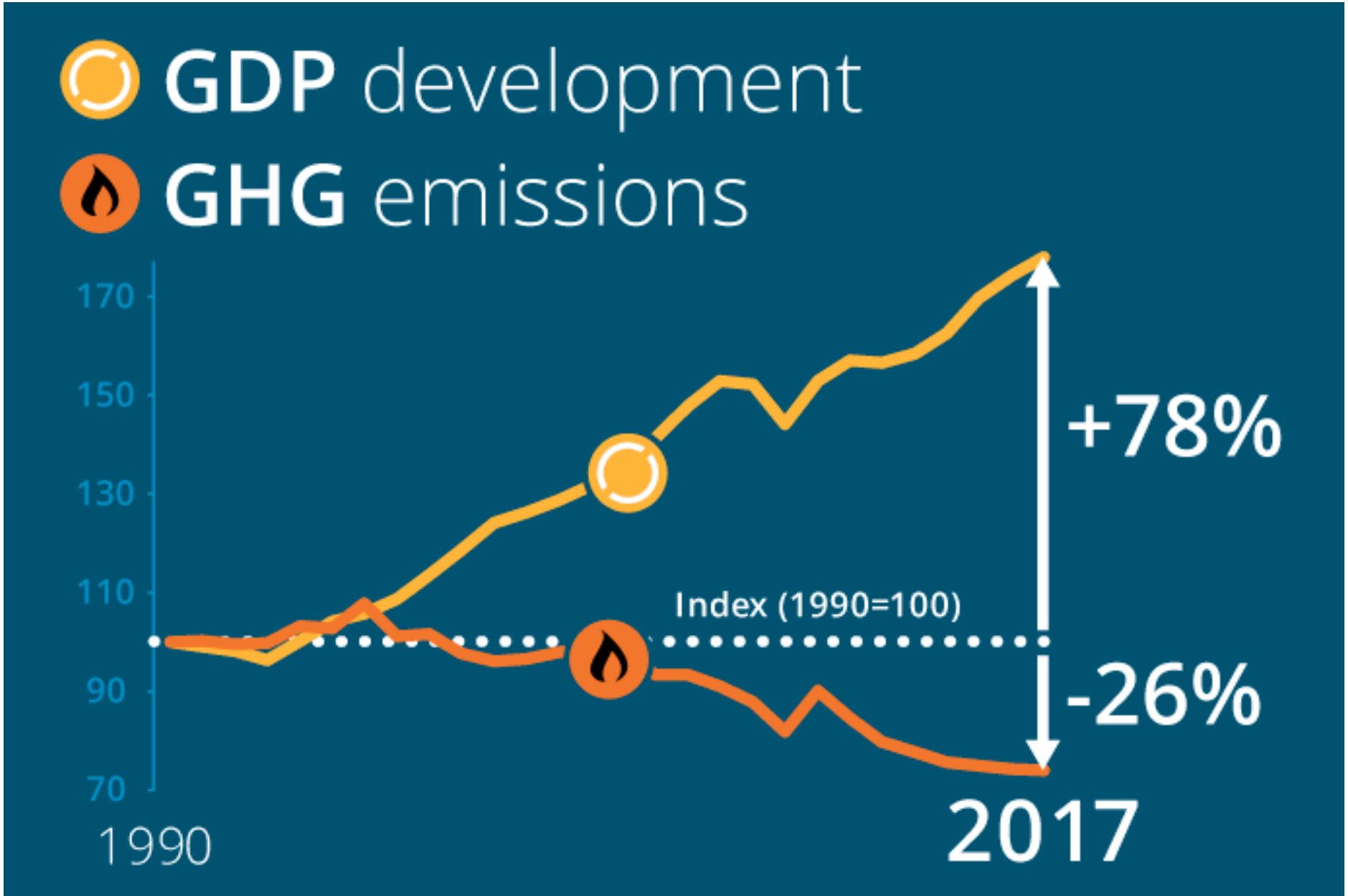


Fonte: Ricke et al. 2018, Nature Clim Change
https://www.nature.com/articles/s41558-018-0282-y

Global Social Cost of Carbon: 418 USD/tCO_2 [177;806]

Effetti della carbon tax (introdotta nel 1991) in Svezia

https://www.government.se/government-policy/taxes-and-tariffs/swedens-carbon-tax/




Guarda più tardi

Destinazione della CO_2 emessa dal 1750 al 2012 (in miliardi di t)

Fonte: Global Carbon Project (https://www.globalcarbonproject.org/carbonbudget/18/highlights.htm)

Atmosfera

879 Gt

Oceani

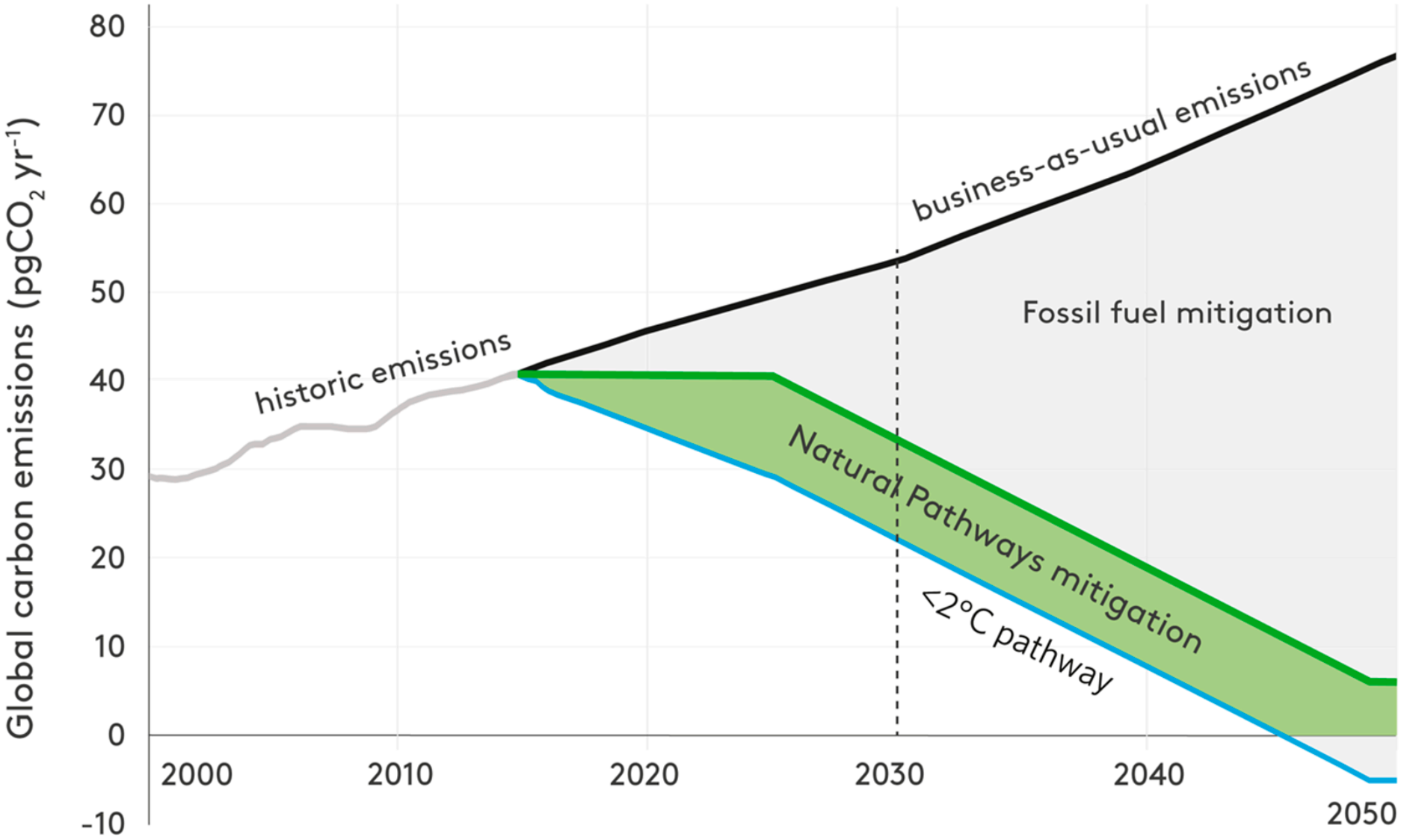
590 Gt

Ecosistemi terrestri

528 Gt

Photo: Pixabay

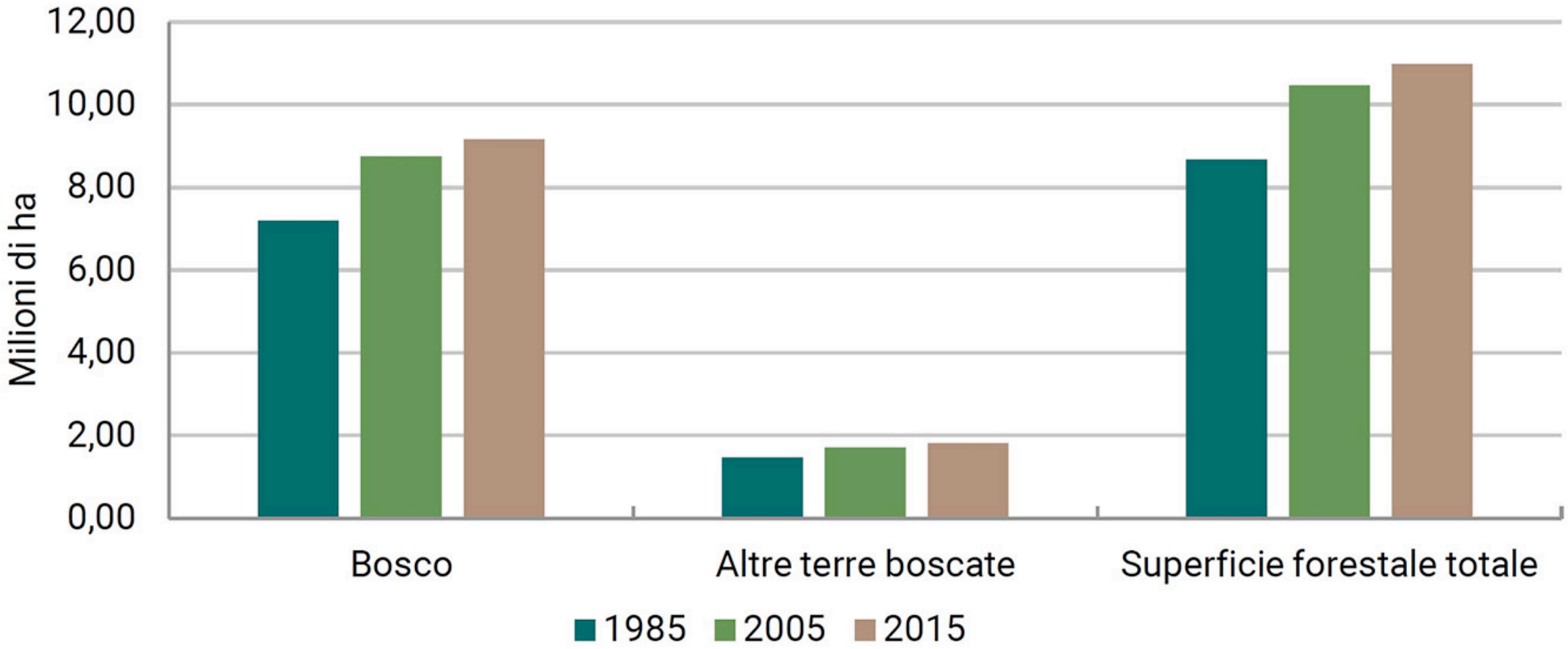
Contributo delle nature based solutions alla mitigazione



Fonte: Griscom et al. 2017, PNAS

https://www.pnas.org/content/114/44/11645

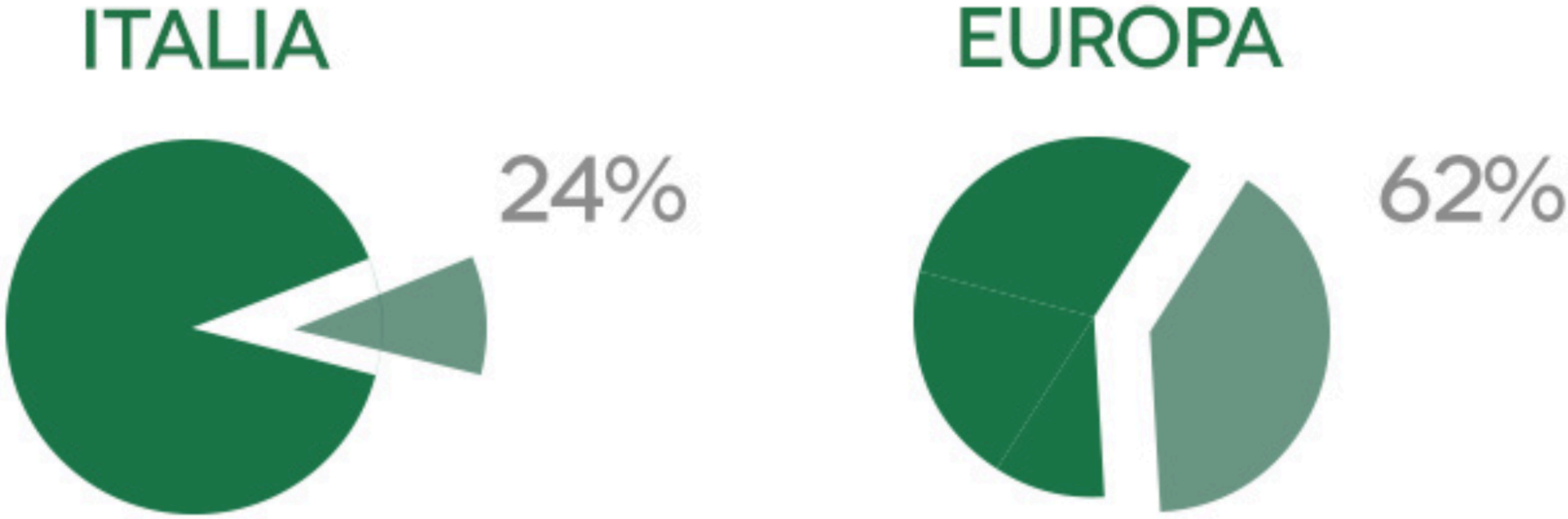
Espansione delle foreste italiane: +50.000 ettari/anno



Fonte: Rapporto Annuale sullo Stato delle Foreste italiane 2018

https://www.reterurale.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/19231

% DI PRELIEVO RISPETTO ALL'INCREMENTO



Fonte: Rapporto Annuale sullo Stato delle Foreste italiane 2018
https://www.reterurale.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/19231

Effetti di sostituzione

Combustibili

Effetti di sostituzione

Edilizia

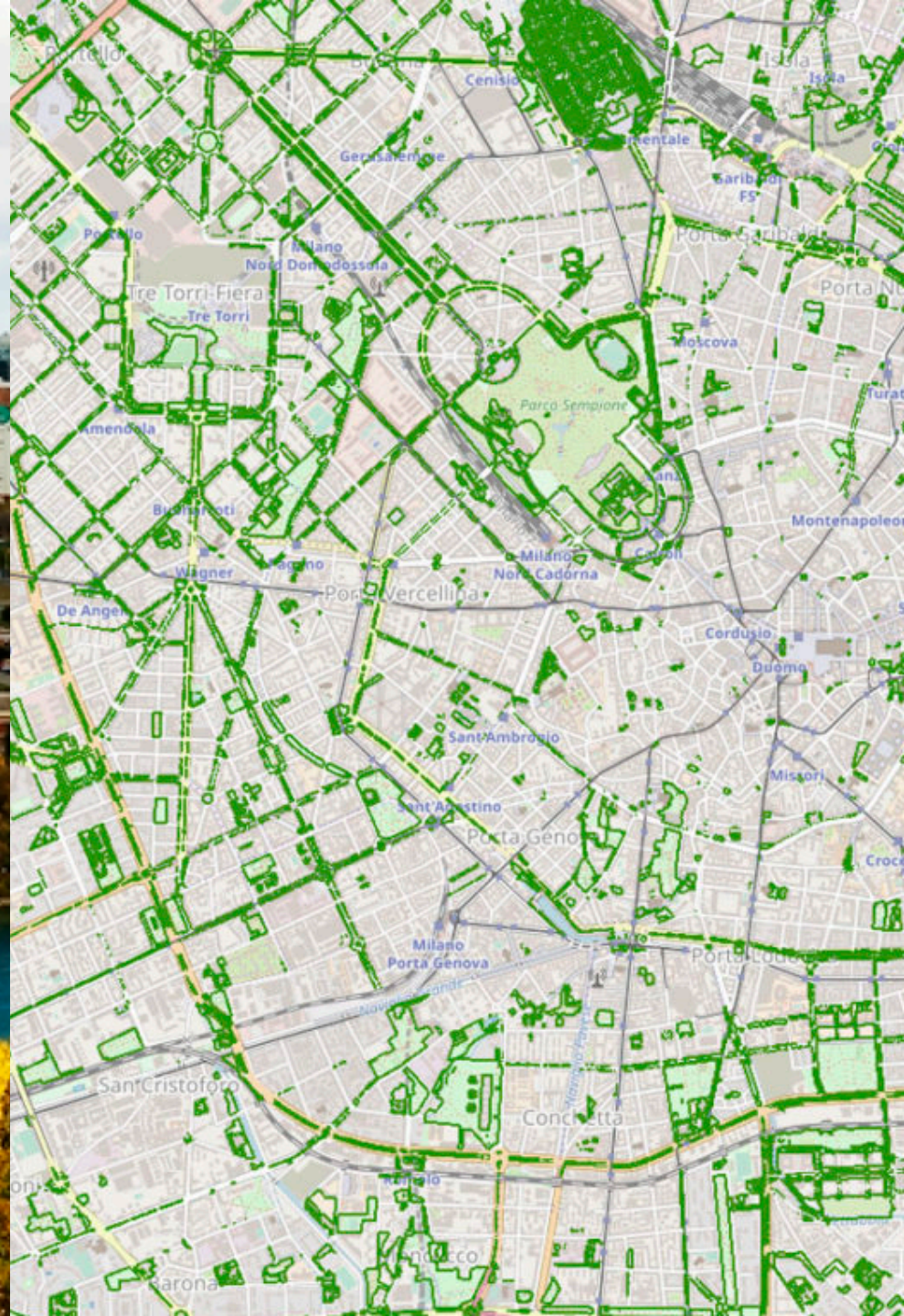
Fonte: European Forest Institute

https://www.efi.int/publications-bank/substitution-effects-wood-based-products-climate-change-mitigation

Una foresta, molte funzioni


TREE:
HERO

https://www.unimontagna.it/progetti/tree-hero/


Cenisio
Isola
Gerusalemme
Garibaldi FS
Milano Nord Domodossola
Tre Torri-Fiera
Tre Torri
Moscova
Parco Sempione
Amendola
Montenapoleone
Milano Nord Cadorna
Wagner
De Angeli
Cordusio
Duomo
Sant'Ambrogio
Missori
Sant'Agostino
Milano Porta Genova
San Cristoforo
Concorezzo

1- Regolazione del deflusso idrico

Gli alberi aumentano **l'infiltrazione** al suolo, **intercettano** la precipitazione rallentandone il **deflusso**

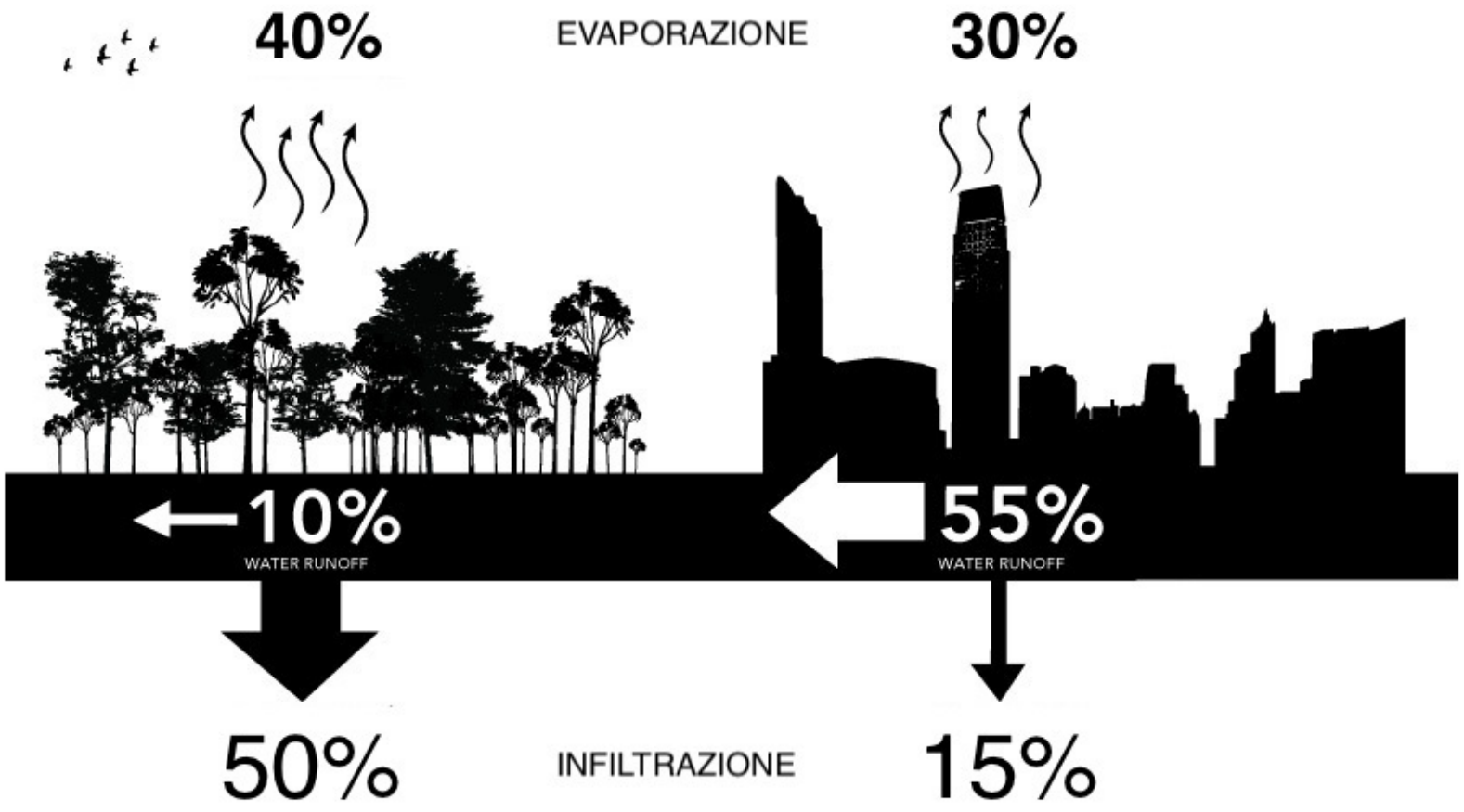
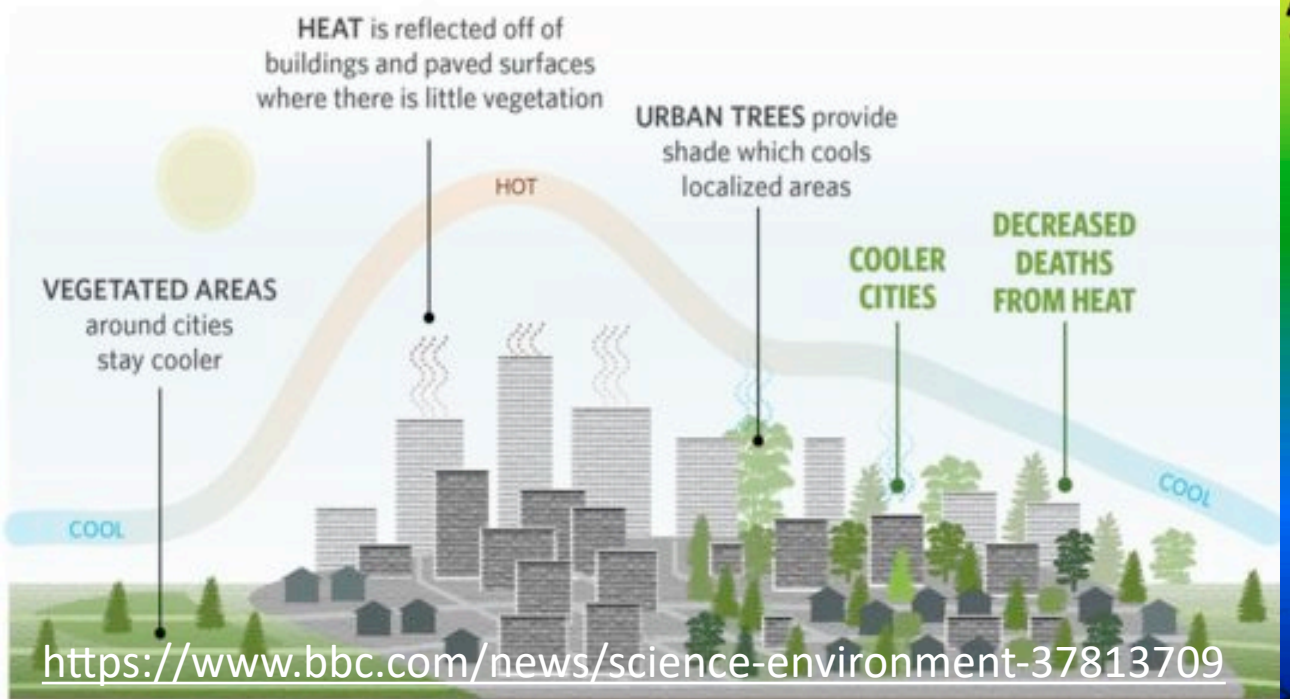


Figura: https://www.architectkidd.com/index.php/2012/03/deforestation-increases-floods/
Dati: Environmental Protection Agency 2003

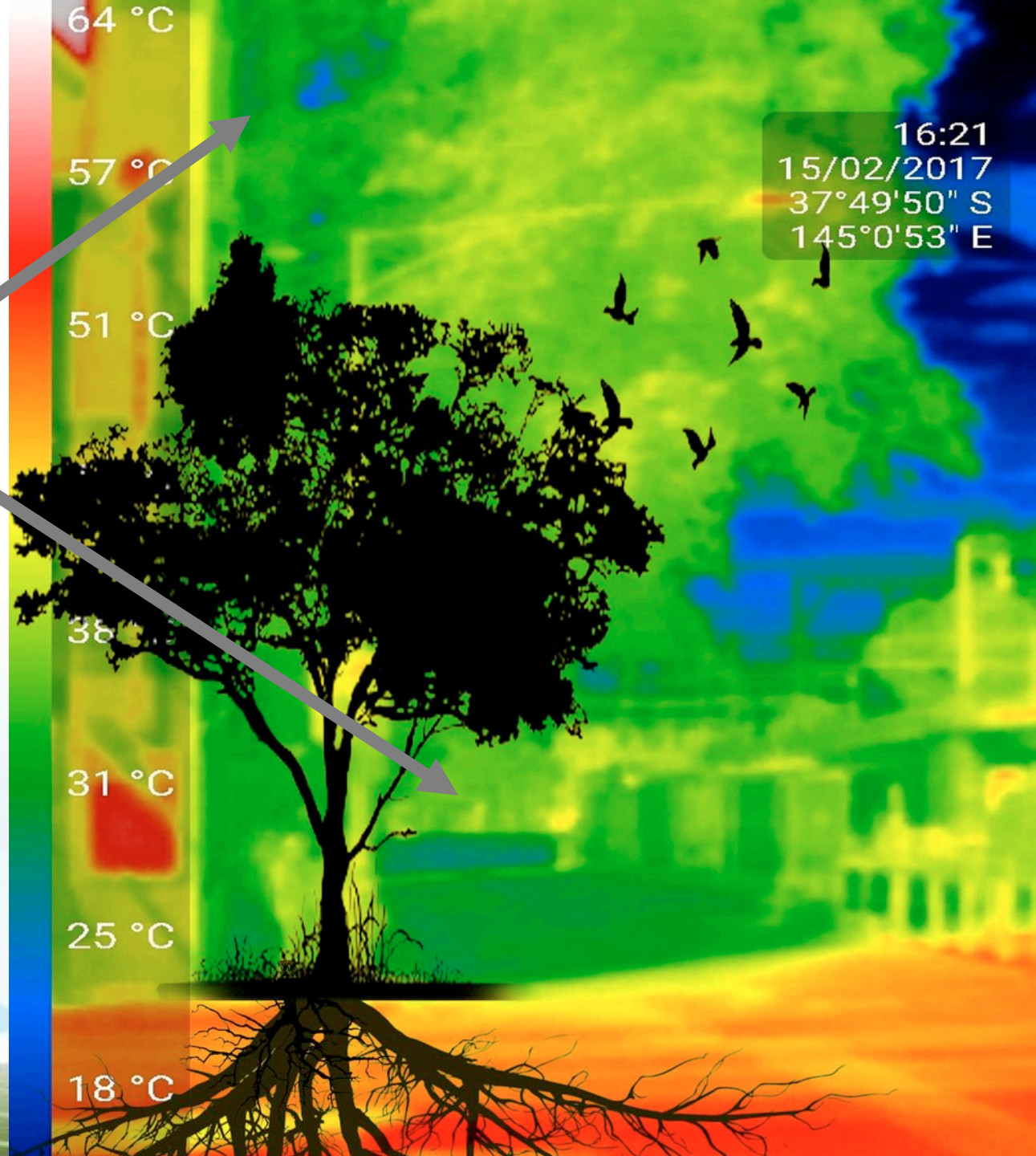
2- Mitigazione dell'effetto isola di calore

Evapotraspirazione

Ombreggiamento



https://www.bbc.com/news/science-environment-37813709



60 Milioni di Alberi

La Fondazione Laudato Si', con il Vescovo di Rieti e il supporto di due importanti personalità vicine alle tematiche ambientali come Carlo Petrini e Stefano Mancuso, ha lanciato un appello a piantare 1 albero per ogni cittadino italiano per contrastare la crisi climatica.

Istituzioni, Associazioni, Imprese e tecnici che hanno aderito all'appello si sono dati appuntamento a Novembre a Palermo (Congresso SISEF 2019) per avviare un percorso scientifico, tecnico e operativo adatto a contrastare la crisi climatica non solo attraverso la corretta piantagione di alberi, ma anche con la gestione sostenibile di quelli che già sono presenti nei boschi, nelle aree urbane e periurbane italiane.

www.60milionidialberi.it

Affrontare l’incredulità


Non limitarsi agli stili di vita individuali

Puntare alle relazioni:
tutto è connesso a tutto

….e se ci riuscissimo?

Mondadori, novembre 2019

www.giorgiovacchiano.com