

Forlì 22 Novembre 2023

“Eventi climatici estremi e realtà locali. Segni e Suoni di Vaia”

L’IPCC. Le ricerche effettuate, i report prodotti e come sono stati comunicati e metabolizzati

Susanna Corti (CNR-ISAC)

Leading Author Chapter 4 “Future Global Climate:
Scenario-Based Projections and Near-Term Information”

#ClimateReport

#IPCC





[Credit: NASA]

“ I recenti cambiamenti climatici sono generalizzati, rapidi e si stanno intensificando. Non hanno precedenti in migliaia di anni.



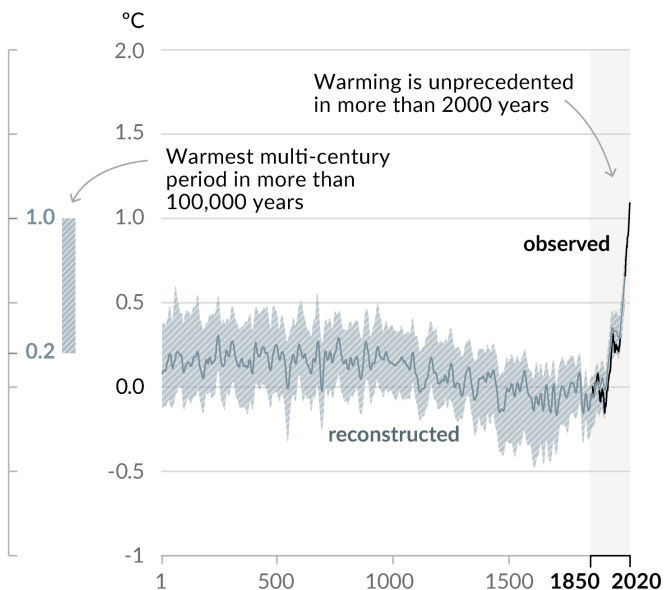
[Credit: Yoda Adaman | Unsplash]

“ È indiscutibile che siano le attività umane a causare il cambiamento climatico, rendendo gli eventi climatici estremi - tra cui ondate di calore, forti piogge e siccità - più frequenti e gravi.

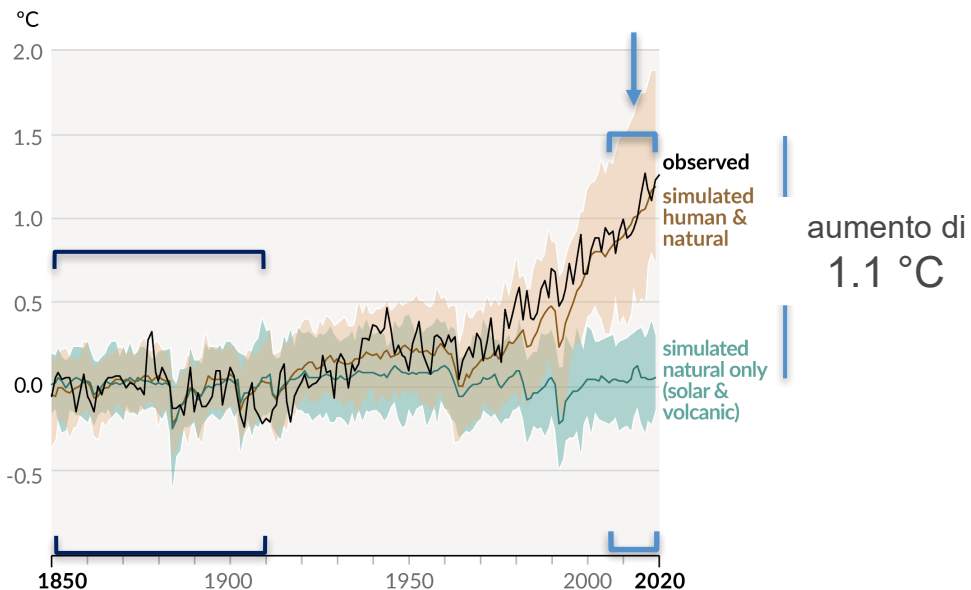
L'influenza umana ha riscaldato il clima a un ritmo che non ha precedenti negli ultimi 2000 anni (almeno).

Changes in global surface temperature relative to 1850-1900

a) Change in global surface temperature (decadal average) as **reconstructed** (1-2000) and **observed** (1850-2020)



b) Change in global surface temperature (annual average) as **observed** and simulated using **human & natural** and **only natural** factors (both 1850-2020)



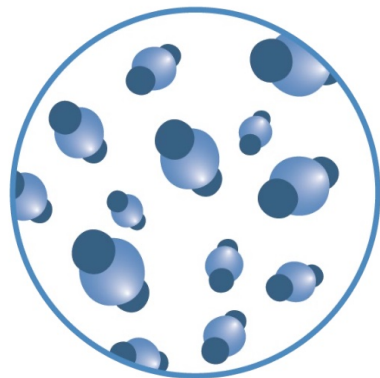


[Credit: Hong Nguyen | Unsplash]

“ Il cambiamento climatico sta già colpendo ogni regione della Terra, in molteplici modi.

I cambiamenti che già vediamo aumenteranno con l'ulteriore riscaldamento

CO₂ concentration



Highest

in at least

2 million years

Sea level rise



Fastest rates

in at least

3000 years

Arctic sea ice area



Lowest level

in at least

1000 years

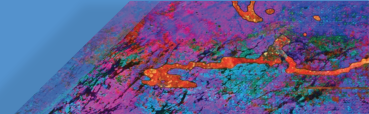
Glaciers retreat



Unprecedented

in at least

2000 years



Extreme heat

More frequent

More intense



Heavy rainfall

More frequent

More intense



Drought

Increase in some
regions



Fire weather

More frequent



Ocean

Warming
Acidifying
Losing oxygen

Il cambiamento climatico sta già interessando ogni regione abitata del mondo. L'influenza umana contribuisce a molte variazioni osservate nelle condizioni meteorologiche e negli estremi climatici.

Estremi caldi

a) Synthesis of assessment of observed change in **hot extremes** and confidence in human contribution to the observed changes in the world's regions

Type of observed change in hot extremes

Increase (41)

Decrease (0)

Low agreement in the type of change (2)

Limited data and/or literature (2)

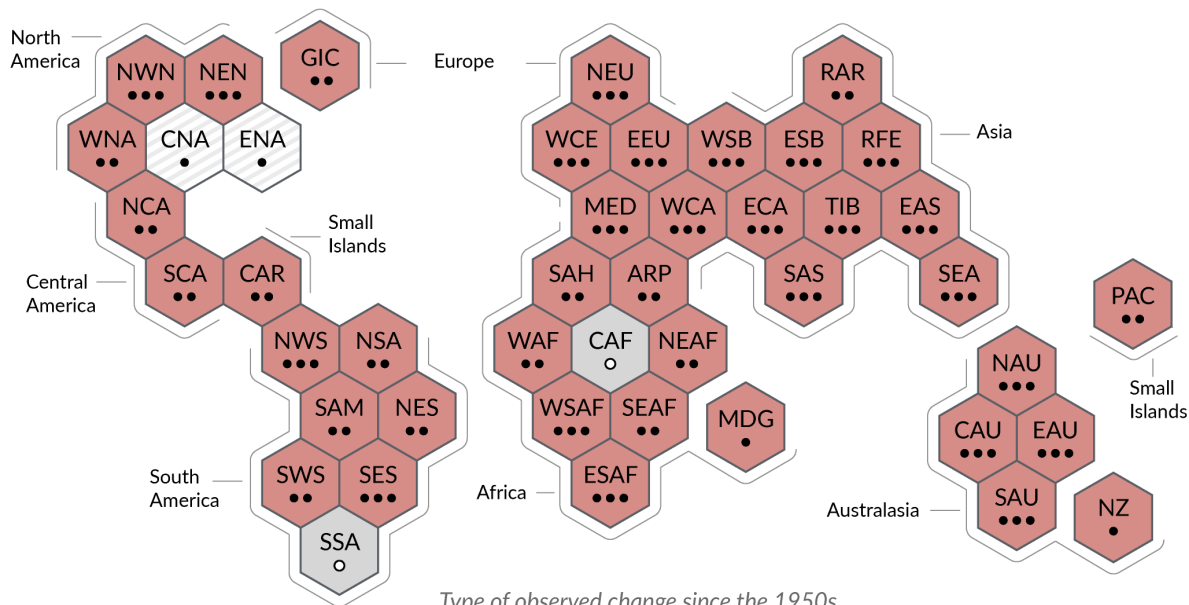
Confidence in human contribution to the observed change

●●● High

●● Medium

● Low due to limited agreement

○ Low due to limited evidence



Type of observed change since the 1950s



[Credit: Shari Gearheard | NSIDC]

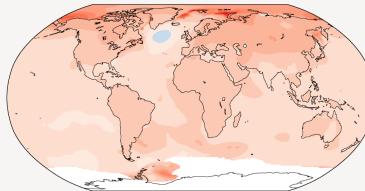
“ Da alcuni cambiamenti climatici non si torna indietro. Tuttavia, alcuni di essi potrebbero essere rallentati e altri potrebbero essere fermati limitando il riscaldamento.

Ogni incremento del riscaldamento globale comporta ulteriori variazioni nella temperatura media e nelle precipitazioni.

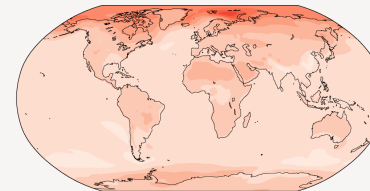
a) Annual mean temperature change (°C) at 1 °C global warming

Warming at 1 °C affects all continents and is generally larger over land than over the oceans in both observations and models. Across most regions, observed and simulated patterns are consistent.

Observed change per 1 °C global warming



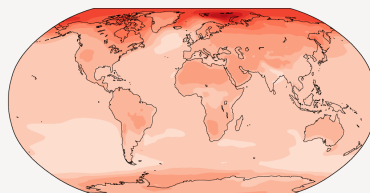
Simulated change at 1 °C global warming



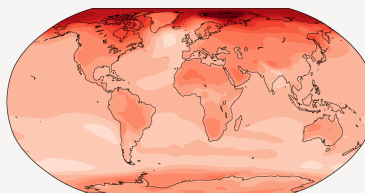
b) Annual mean temperature change (°C) relative to 1850-1900

Across warming levels, land areas warm more than oceans, and the Arctic and Antarctica warm more than the tropics.

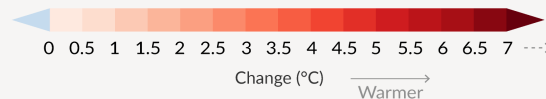
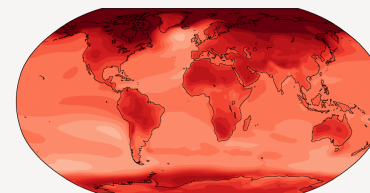
Simulated change at 1.5 °C global warming



Simulated change at 2 °C global warming



Simulated change at 4 °C global warming

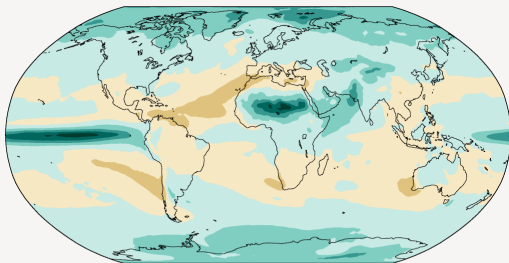


Ogni incremento del riscaldamento globale comporta ulteriori variazioni nella temperatura media e nelle precipitazioni.

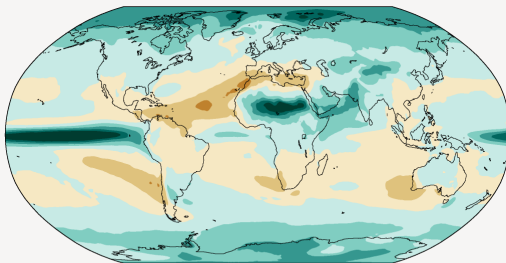
c) Annual mean precipitation change (%) relative to 1850-1900

Precipitation is projected to increase over high latitudes, the equatorial Pacific and parts of the monsoon regions, but decrease over parts of the subtropics and in limited areas of the tropics.

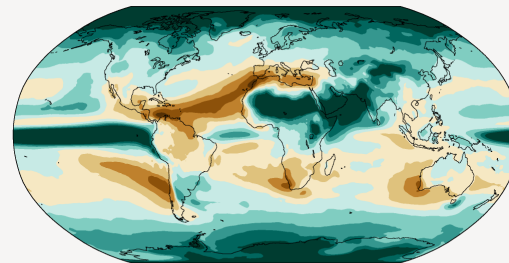
Simulated change at 1.5 °C global warming



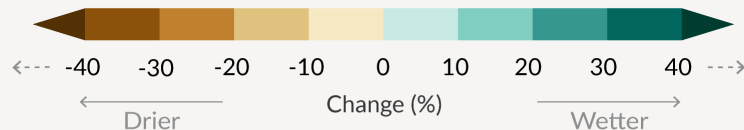
Simulated change at 2 °C global warming



Simulated change at 4 °C global warming



Relatively small absolute changes may appear as large % changes in regions with dry baseline conditions



Il Clima del futuro

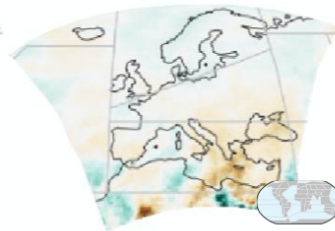
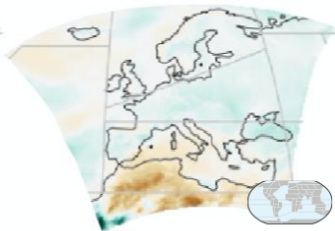
Temperatura media
invernale

Temperatura media
estiva

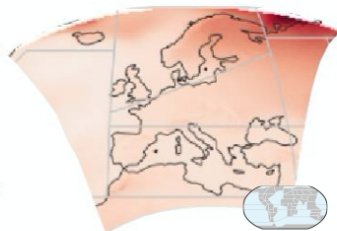
Precipitazione media
invernale

Precipitazione media
estiva

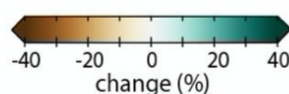
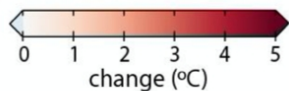
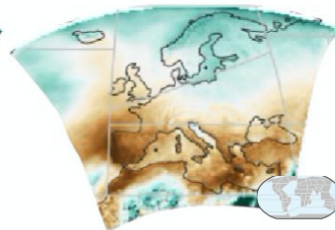
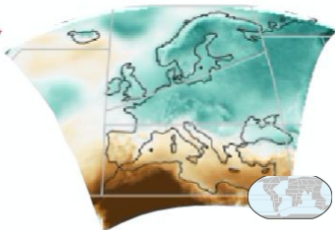
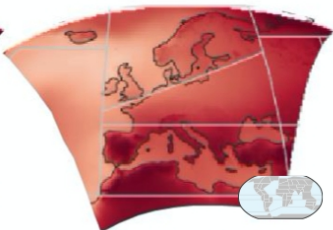
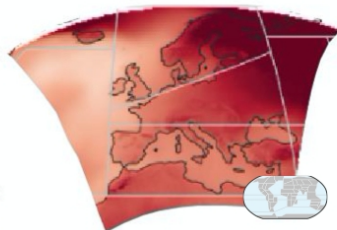
1.5°C global warming



2°C global warming



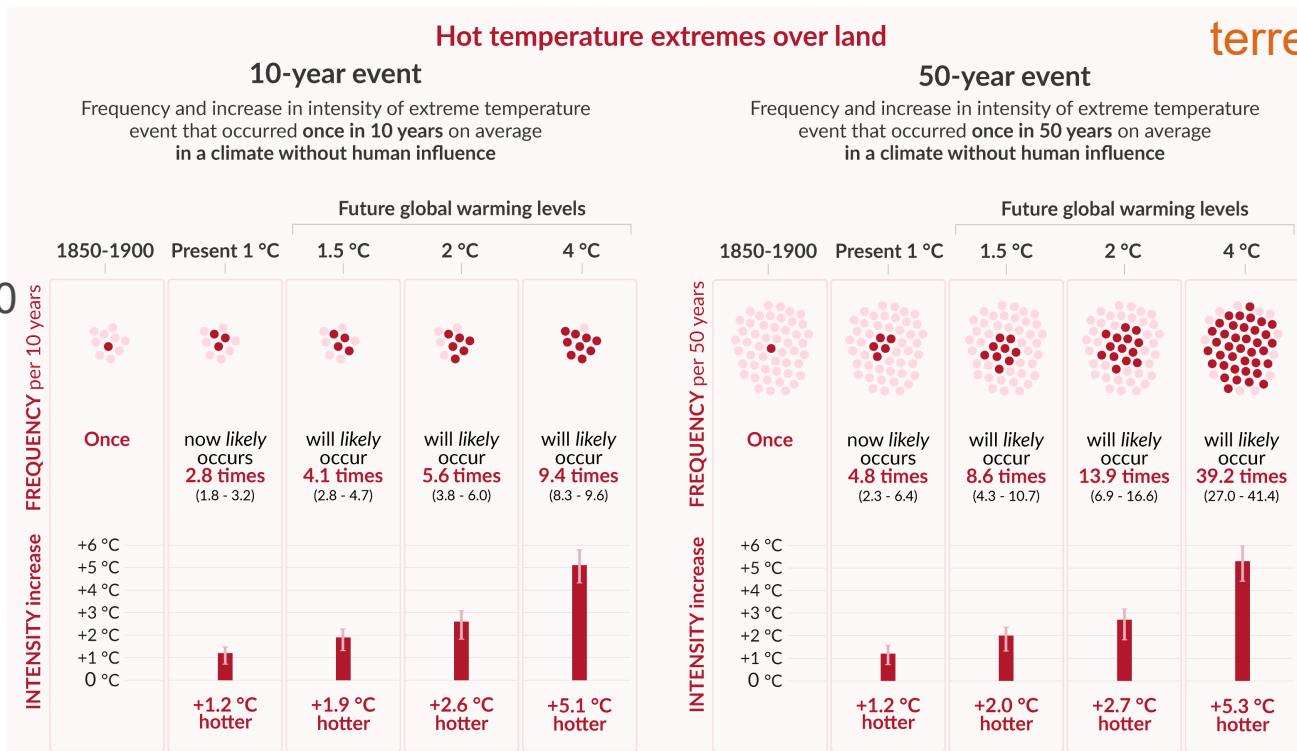
4°C global warming



Ad ogni incremento del riscaldamento globale i cambiamenti previsti negli estremi saranno maggiori in frequenza e intensità

Estremi caldi sulle terre emerse

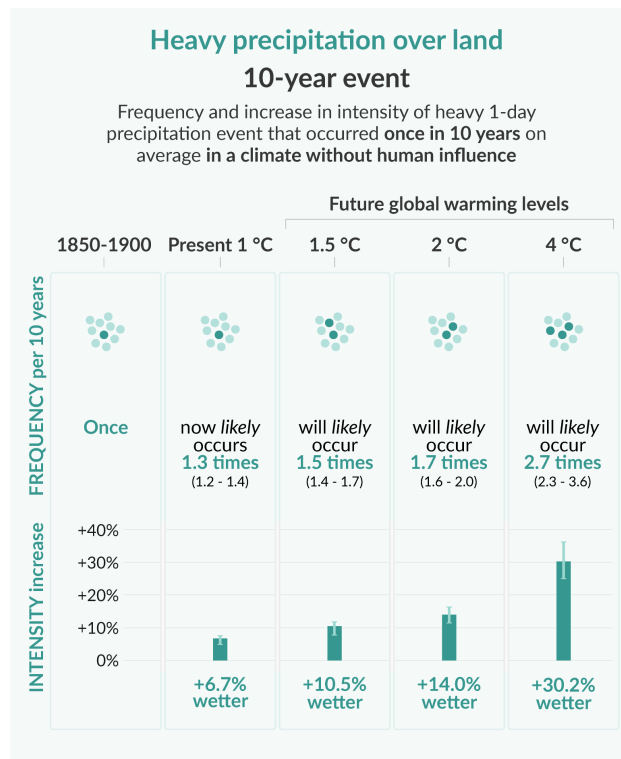
Una volta
in 10 anni
nel 1850-1900



Una volta
in 50 anni
nel 1850-1900

Ad ogni incremento del riscaldamento globale i cambiamenti previsti negli estremi saranno maggiori in frequenza e intensità

Una volta
in 10 anni
nel 1850-1900



Estremi di
precipitazione
sulle terre emerse

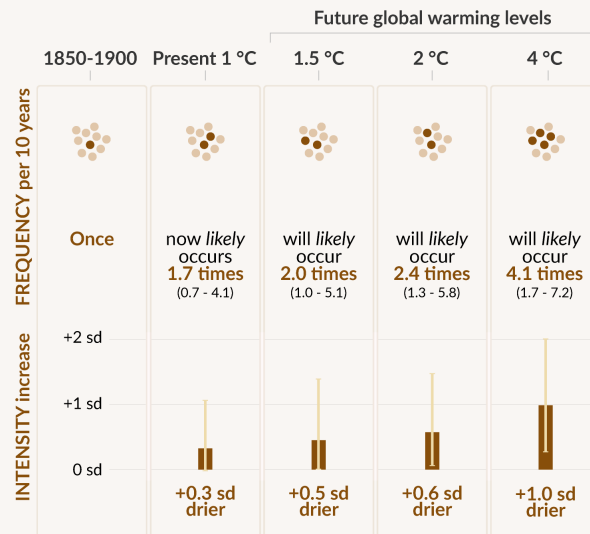
Ad ogni incremento del riscaldamento globale i cambiamenti previsti negli estremi saranno maggiori in frequenza e intensità

Una volta
in 10 anni
nel 1850-1900

Agricultural & ecological droughts in drying regions

10-year event

Frequency and increase in intensity of an agricultural and ecological drought event that occurred **once in 10 years** on average across drying regions in a climate without human influence



Estremi siccitosi
sulle terre emerse



[Credit: Peter John Maridable | Unsplash]

“

Senza riduzioni immediate, rapide e su larga scala delle emissioni di gas serra, limitare il riscaldamento a 1,5°C sarà fuori portata.



[Credit: Evgeny Nelmin | Unsplash]



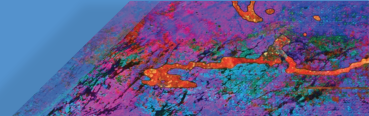
Per limitare il riscaldamento globale sono necessarie riduzioni forti, rapide e sostenute di CO₂, metano e altri gas serra.

Ciò non solo ridurrebbe le conseguenze del cambiamento climatico, ma migliorerebbe anche la qualità dell'aria.

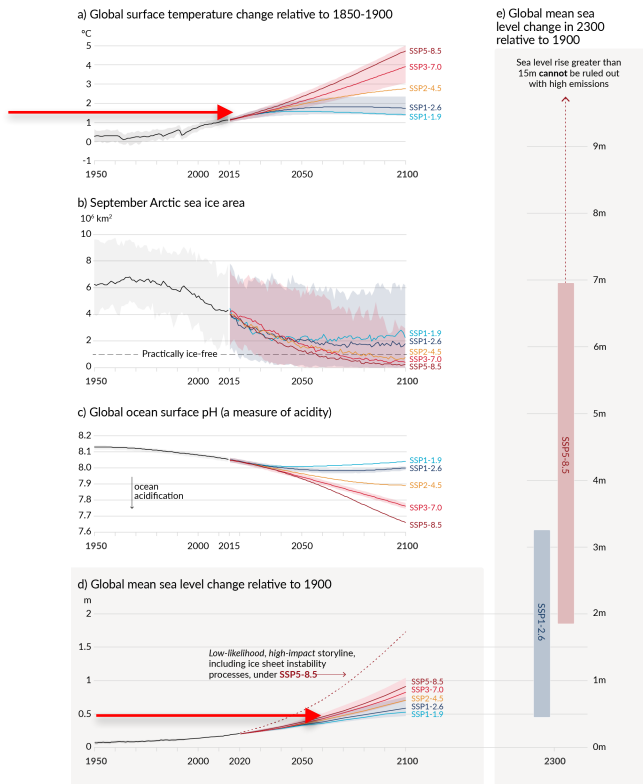
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INTERGOVERNMENTAL PANEL ON climate change



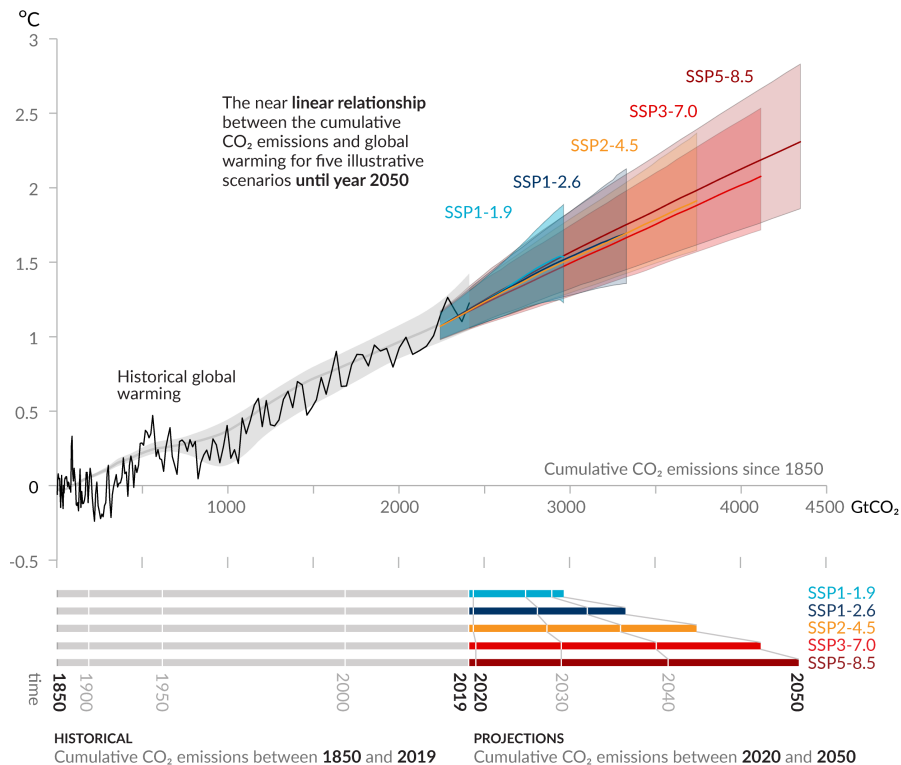


Le attività umane colpiscono tutte le principali componenti del sistema climatico. In alcuni casi la risposta avviene nel corso di decenni in altri nel corso di secoli



Ogni tonnellata di emissioni di CO₂ fa aumentare il riscaldamento globale

Global surface temperature increase since 1850-1900 (°C) as a function of cumulative CO₂ emissions (GtCO₂)



Emissioni attuali: 40Gt/anno
Accumulate 2400 circa

Per restare entro 1,5 gradi il budget restante è di 400 Gt

Per restare sotto 2 gradi il budget restante è di 1200 Gt

Future cumulative CO₂ emissions differ across scenarios, and determine how much warming we will experience

Emissioni globali di gas serra e possibili scenari futuri

Ad ogni "percorso" è associata un'incertezza rappresentata dalle aree colorate che corrispondono a ciascuno scenario
Il riscaldamento è riferito all'innalzamento di temperatura media globale che ci aspettiamo per ciascuno scenario nel 2100 rispetto ai livelli pre-industriali.

Emissioni globali di gas serra per anno

In gigatonnellate di CO₂ equivalenti

150 Gt

100 Gt

50 Gt

Greenhouse gas emissions
up to the present

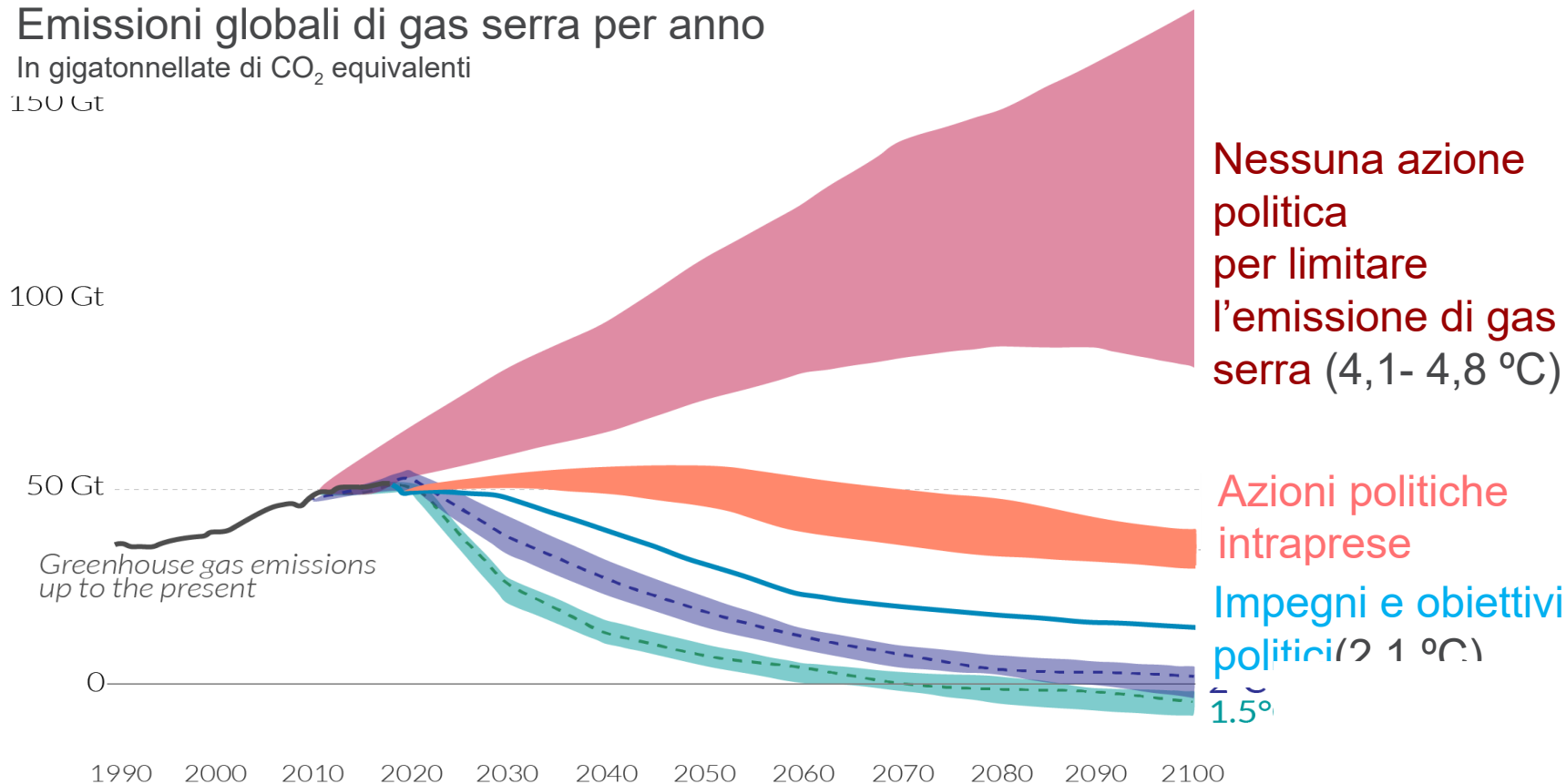
0

1990 2000 2010 2020 2030 2040 2050 2060 2070 2080 2090 2100

Nessuna azione politica per limitare l'emissione di gas serra (4,1- 4,8 °C)

Azioni politiche intraprese

Impegni e obiettivi politici (2,1 °C)
1.5°

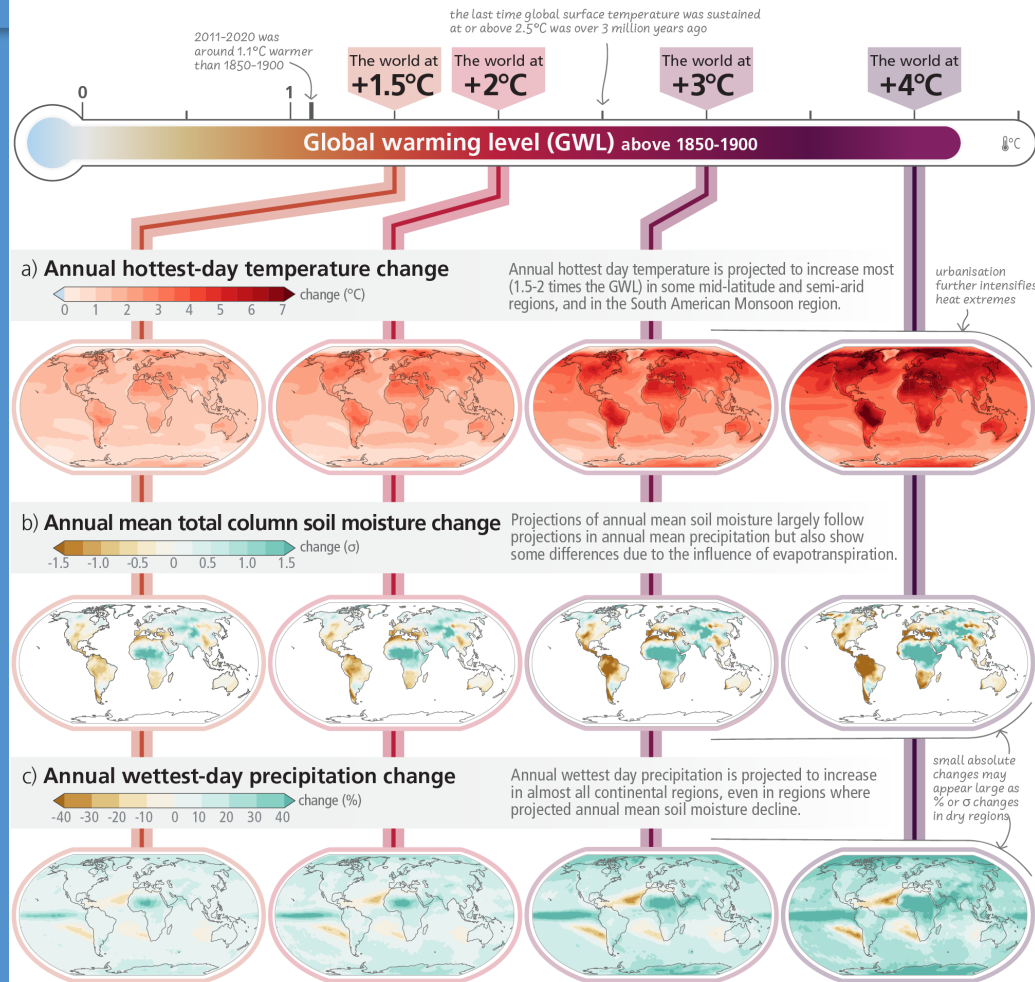


SIXTH ASSESSMENT REPORT

Working Group I – The Physical Science Basis

From IPCC AR6
Synthesis Report
20-03-2023

With every increment of global warming, regional changes in mean climate and extremes become more widespread and pronounced

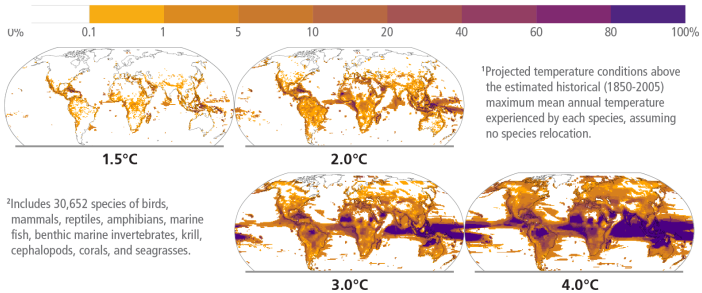


Si prevede che i futuri cambiamenti climatici aumenteranno la gravità degli impatti sui sistemi naturali e umani e aumenteranno le differenze tra le diverse regioni del mondo.

Dal rapporto di sintesi di IPCC AR6 reso pubblico il 20/02/2022

Rischio per le specie

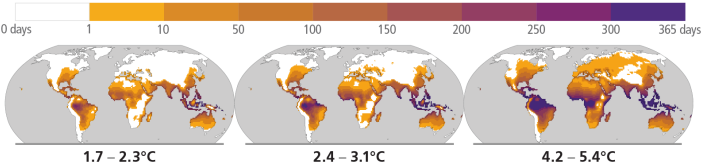
a) RISK OF species losses
 Percentage of animal species and seagrasses exposed to potentially dangerous temperature conditions^{1,2}



Rischio per la salute umana causato da umidità e calore



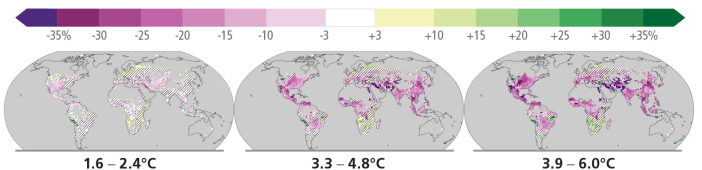
Days per year where combined temperature and humidity conditions pose a risk of mortality to individuals³



Impatto sulla produzione di cibo

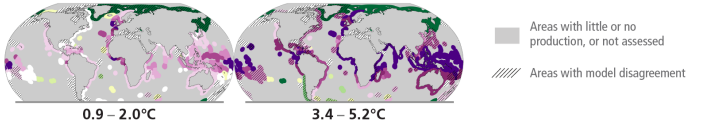


Rese del mais (variazione %)



⁴Projected regional impacts reflect biophysical responses to changing temperature, precipitation, solar radiation, humidity, wind, and CO₂ enhancement of growth and water retention in currently cultivated areas. Models assume that irrigated areas are not water-limited. Models do not represent pests, diseases, future agro-technological changes and some extreme climate responses.

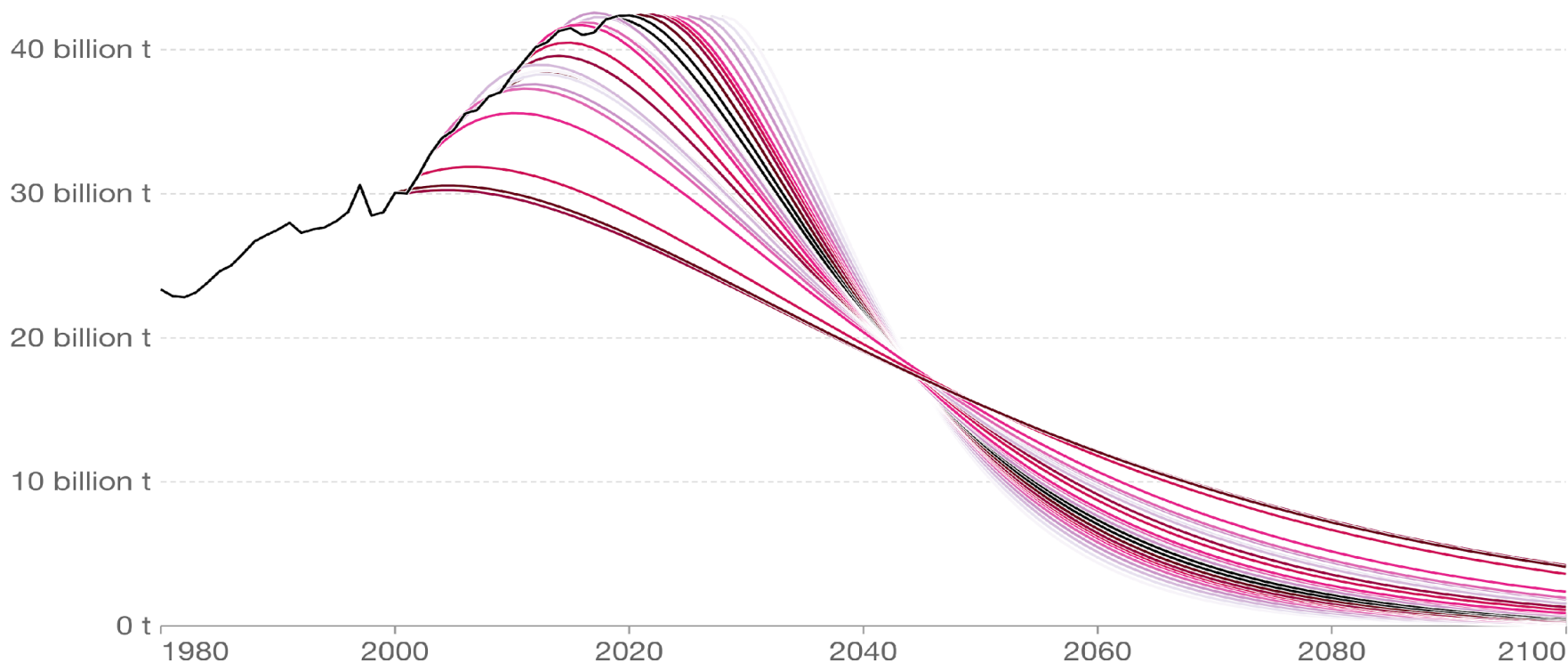
Rese della pesca (variazione %)



⁵Projected regional impacts reflect fisheries and marine ecosystem responses to ocean physical and biogeochemical conditions such as temperature, oxygen level and net primary production. Models do not represent changes in fishing activities and some extreme climatic

CO₂ reductions needed to keep global temperature rise below 2°C

Annual emissions of carbon dioxide under various mitigation scenarios to keep global average temperature rise below 2°C. Scenarios are based on the CO₂ reductions necessary if mitigation had started – with global emissions peaking and quickly reducing – in the given year.



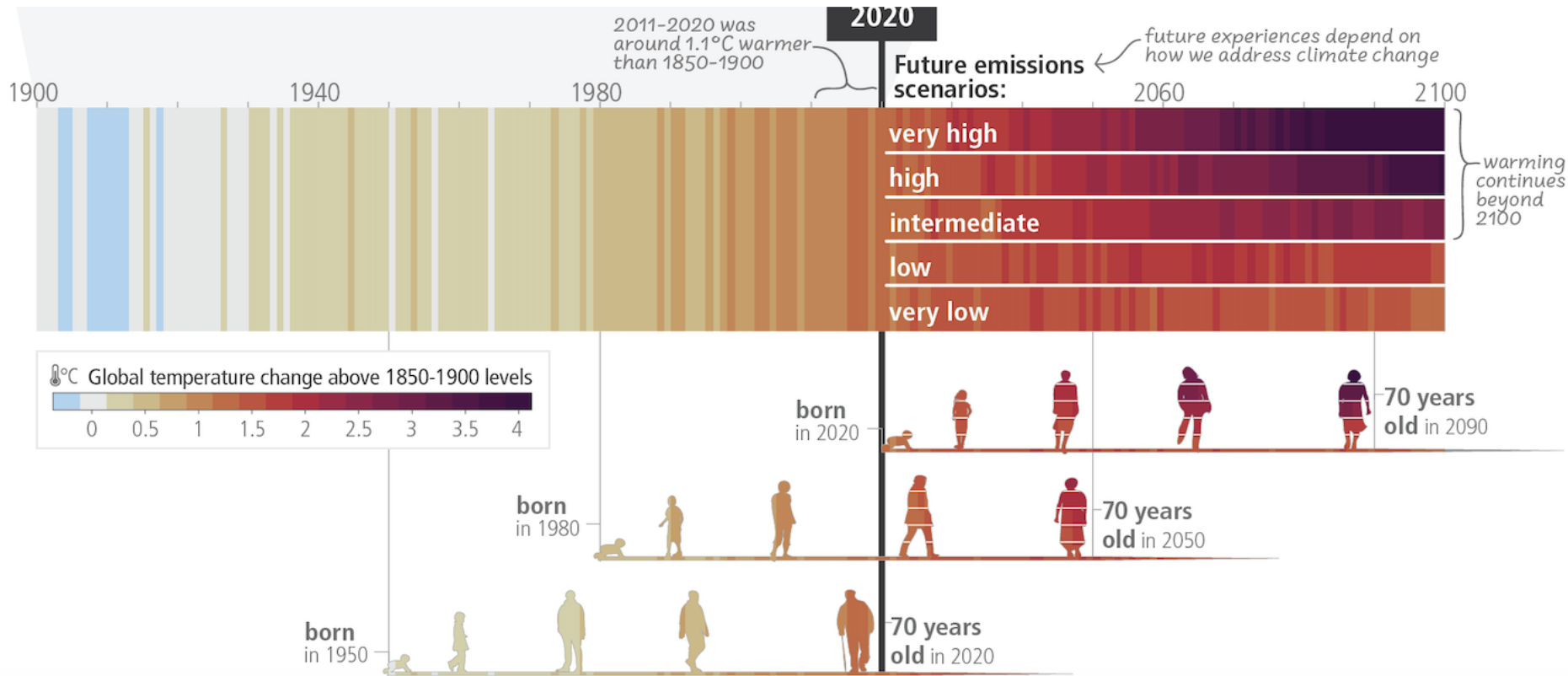
Source: Robbie Andrews (2019); based on Global Carbon Project & IPCC SR15

Note: Carbon budgets are based on a >66% chance of staying below 2°C from the IPCC's SR15 Report.

OurWorldInData.org/co2-and-other-greenhouse-gas-emissions • CC BY

Dal rapporto di Sintesi IPCC AR6 reso pubblico il 20-03-2023

Il mondo in cui vivranno i bambini e i giovani di oggi dipende dalle nostre scelte di adesso



Grazie.

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