Globális éghajlatváltozás és lokális / regionális hatásai.

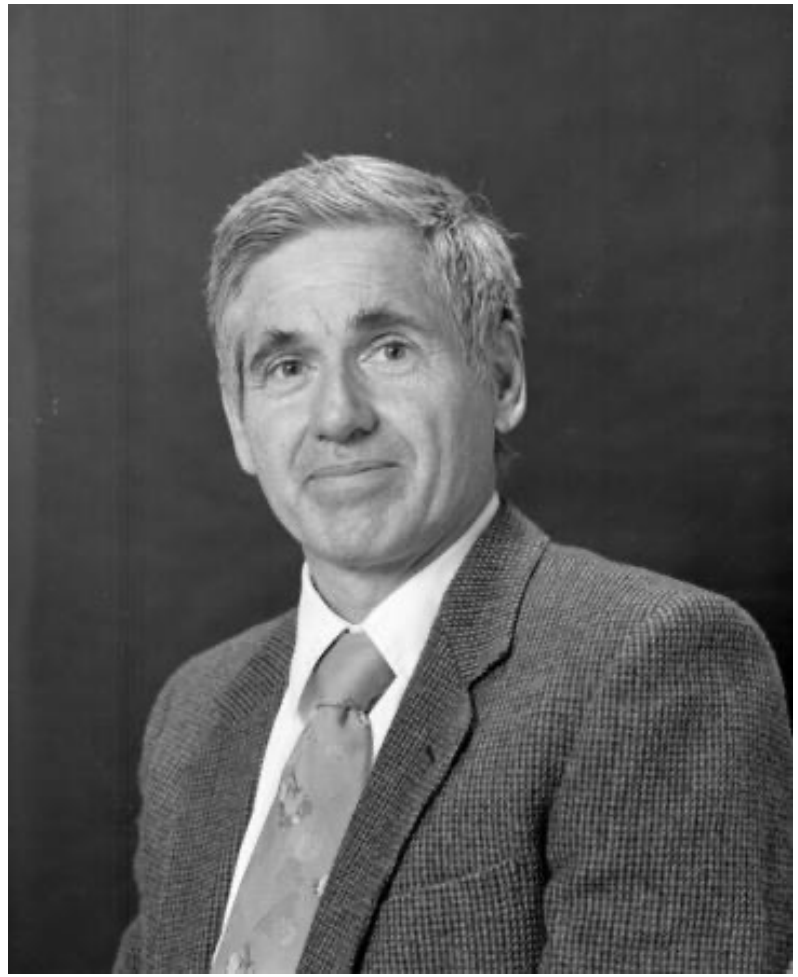
Hajdu László Hunor, PhD

Vázlat

- Az eddigi történet
- A tudományos alap
- Globális probléma
- Hatások, alkalmazkodás és sebezhetőség
- Lokális következmények – terepmunka Nagy-Hagymás
- Az éghajlatváltozás mérséklése III. – terepmunka (Nagyhagymás) és számítógépes munka (https://en-roads.climateinteractive.org/).

Az eddigi történet

Svante Arrhenius (1859-1927)
Svéd fizikus és kémikus, 1903- Nobel-díj

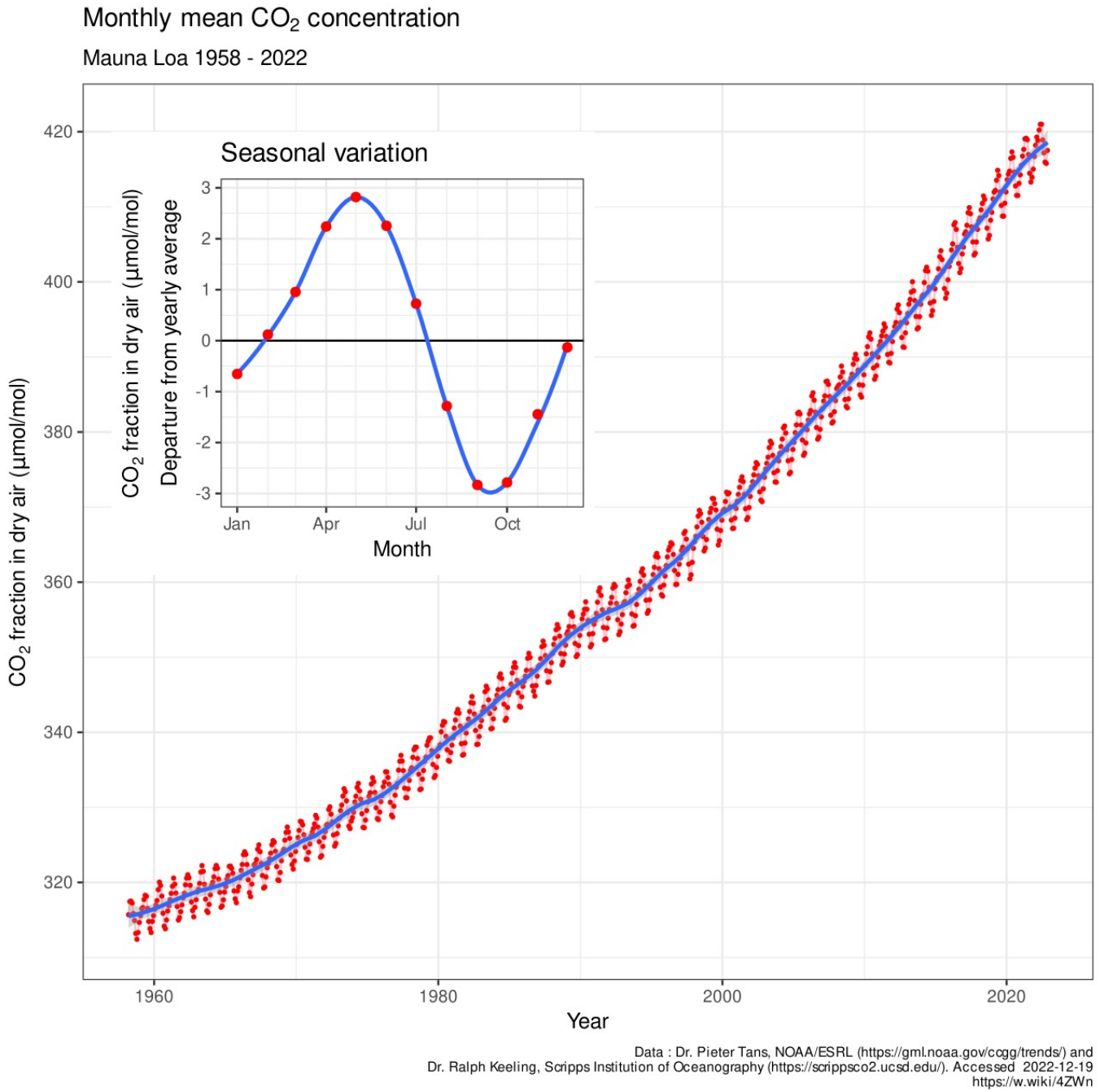


Charles David Keeling (1928-2005)

1958! – Pontos CO_2 mérés a légkörből

Az eddigi történet

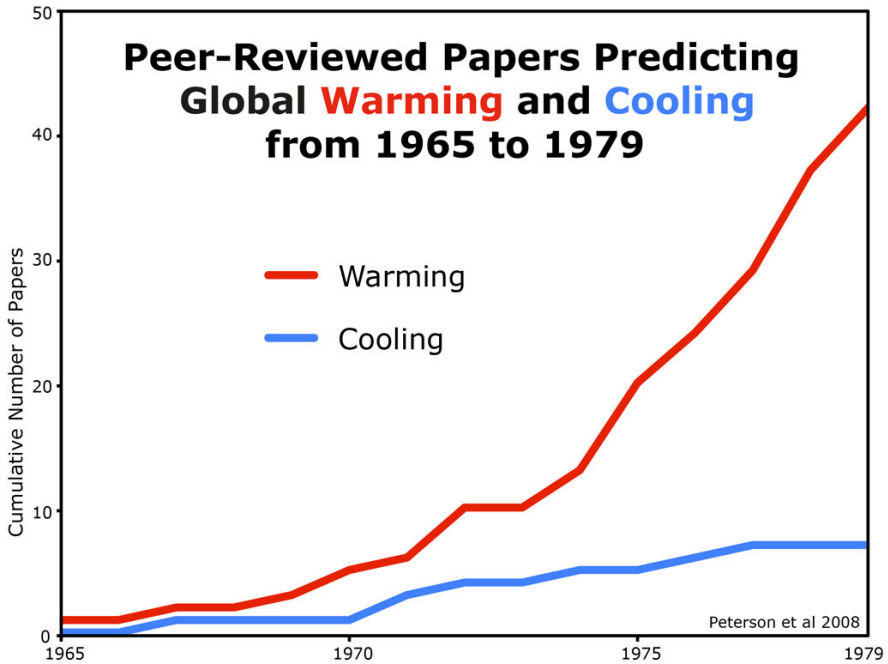
Keeling görbe

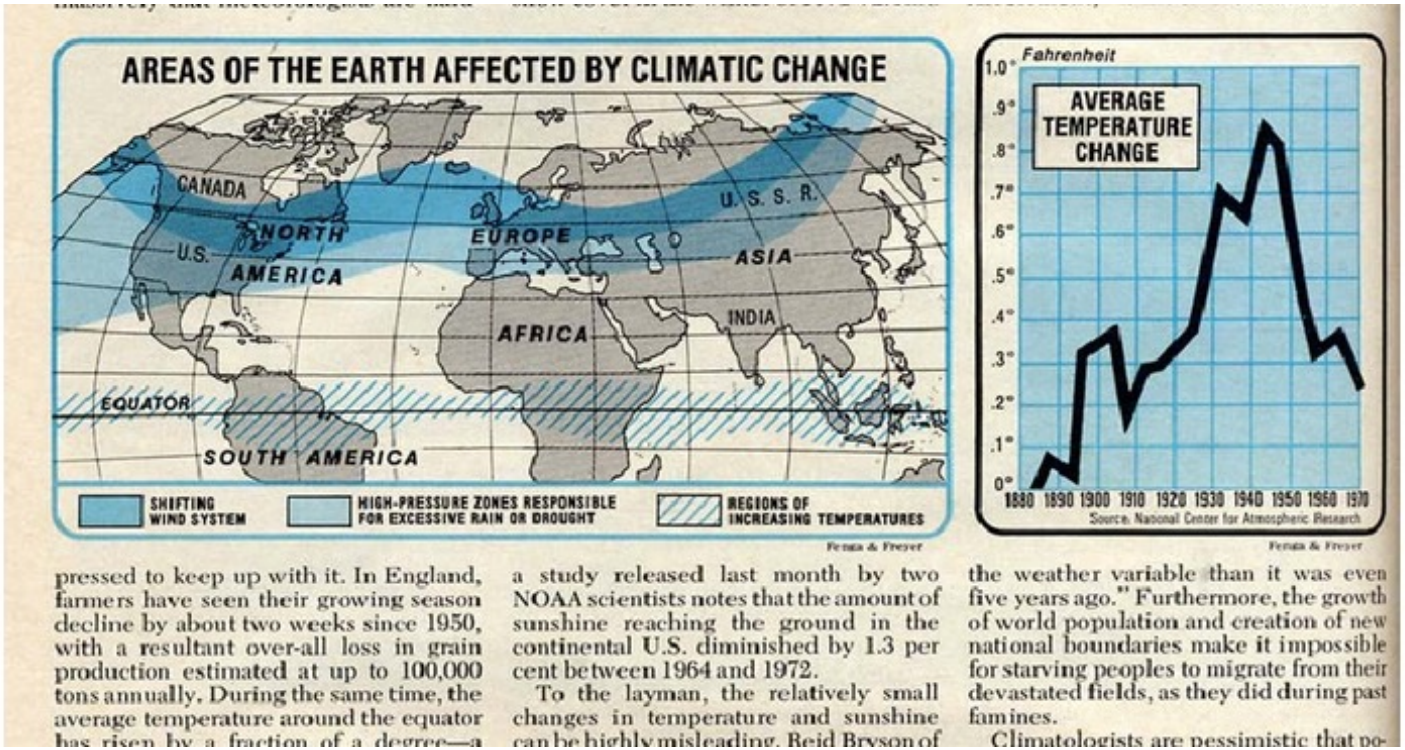


Az eddigi történet

A 70-es évek béli probléma ami mai napig velünk tart

- ideiglenes enyhe hűlés az aeroszolok (szilárd részecskék) miatt a 20-ik század közepe fele.





pressed to keep up with it. In England, farmers have seen their growing season decline by about two weeks since 1950, with a resultant over-all loss in grain production estimated at up to 100,000 tons annually. During the same time, the average temperature around the equator has risen by a fraction of a degree—a

a study released last month by two NOAA scientists notes that the amount of sunshine reaching the ground in the continental U.S. diminished by 1.3 per cent between 1964 and 1972.

To the layman, the relatively small changes in temperature and sunshine can be highly misleading. Reid Bryson of

the weather variable than it was even five years ago." Furthermore, the growth of world population and creation of new national boundaries make it impossible for starving peoples to migrate from their devastated fields, as they did during past famines.

Climatologists are pessimistic that po-

Az eddigi történet

1988 – IPCC (Intergovernmental Panel on Climate Change / Éghajlatváltozási Kormányközi Testület) megalakulása

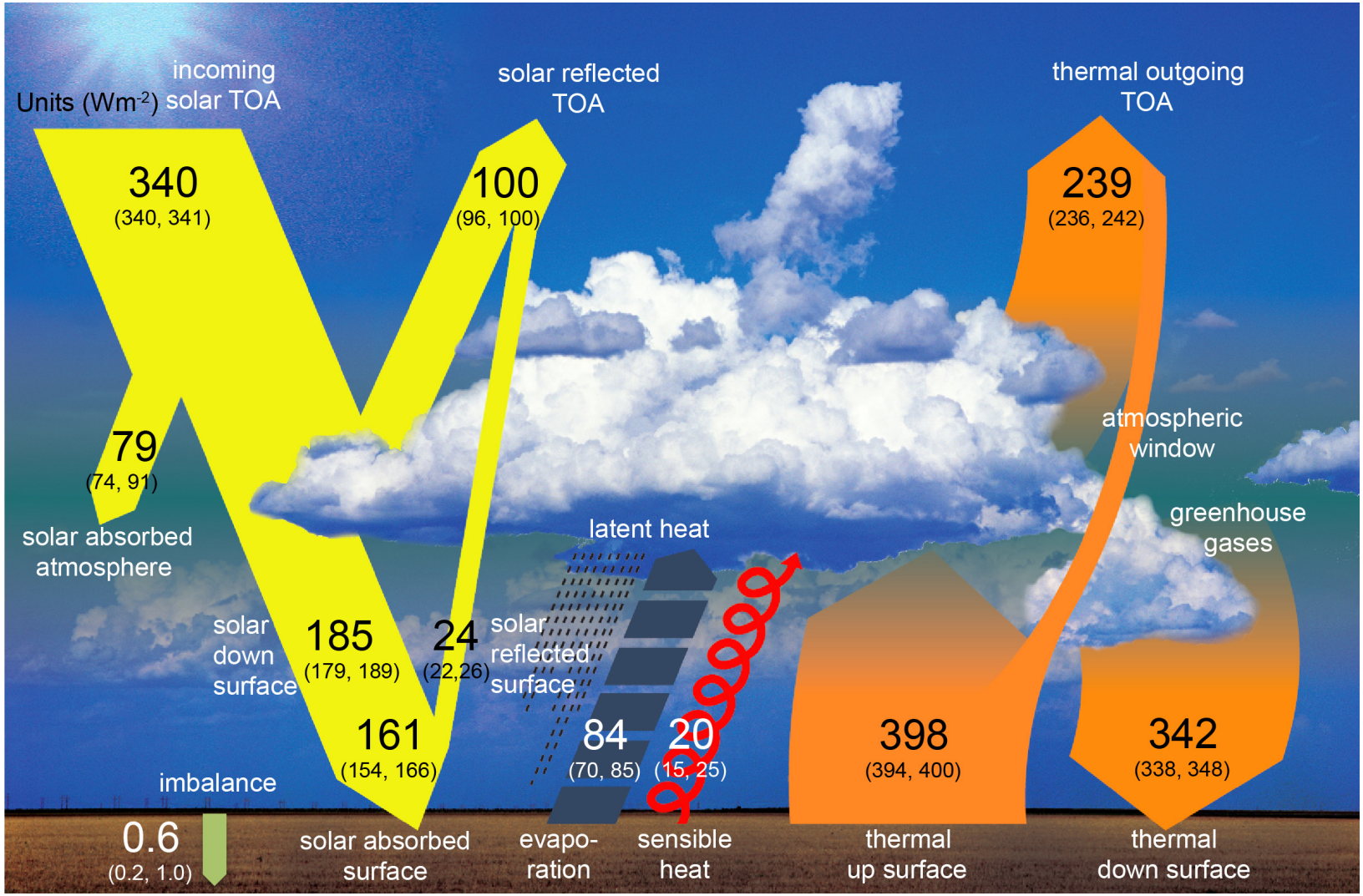
I-es jelentés. 1990
II-es jelentés. 1996
III-es jelentés. 2001
IV-es jelentés. 2007 – Béke Nobel díj – Al Gore
V-es jelentés. 2013/2014
VI-es jelentés. 2021:

1. Tudományos alapok (The physical science basis)
   234 szerző 66 országból, 2049 oldalas ,
   14.000 tudományos cikkre alapszik.
2. Hatások, alkalmazkodás és sebezhetőség (3068 oldal)
3. Az éghajlatváltozás mérséklése (2042 oldal)

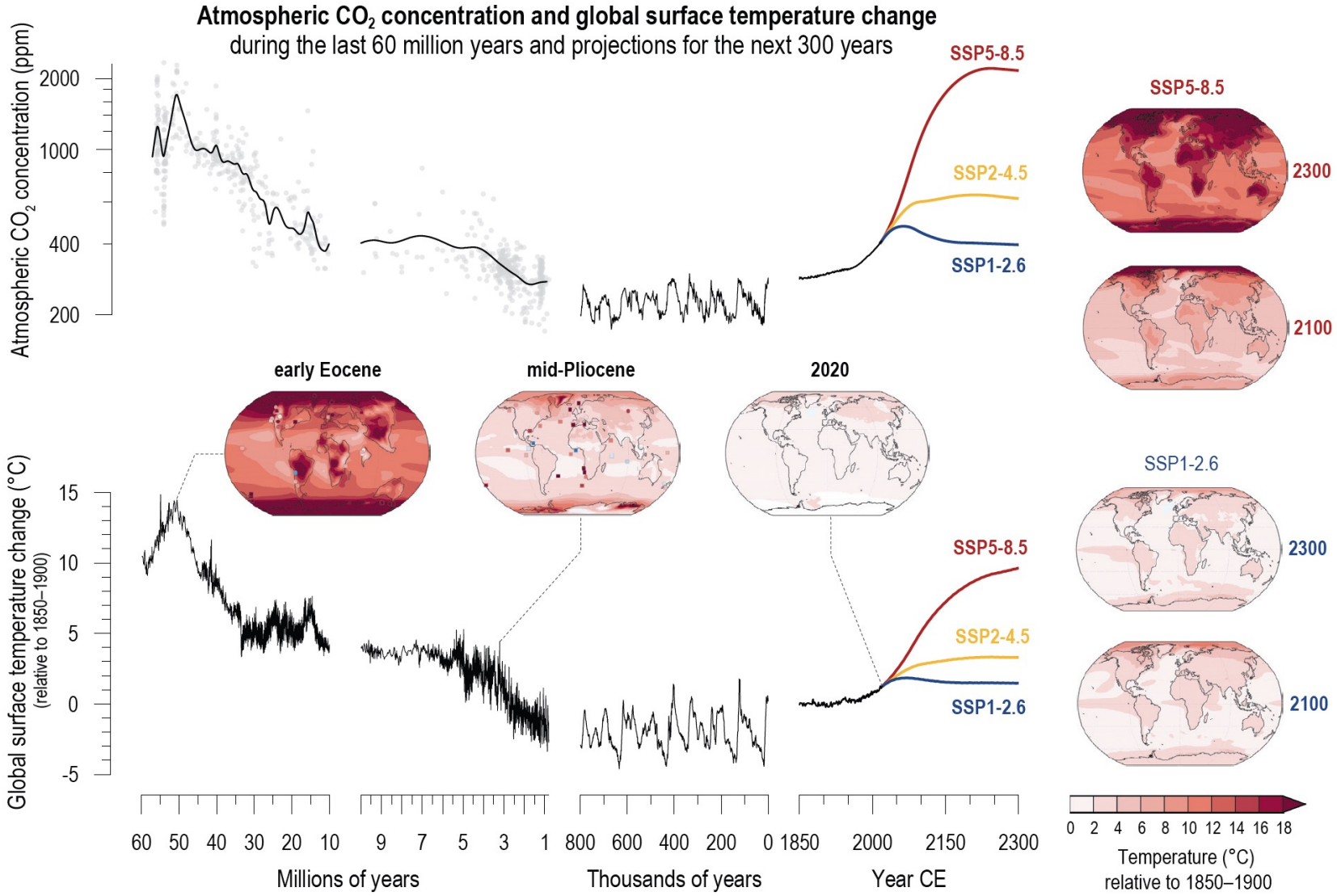
Tudományos alap

Átlaghőmérséklet a földfelszínen: **13.9 C°**

Légkőr nélkül: **-13.2 C°**



Tudományos alap – hőmérséklet és légköri CO_2 növekedés



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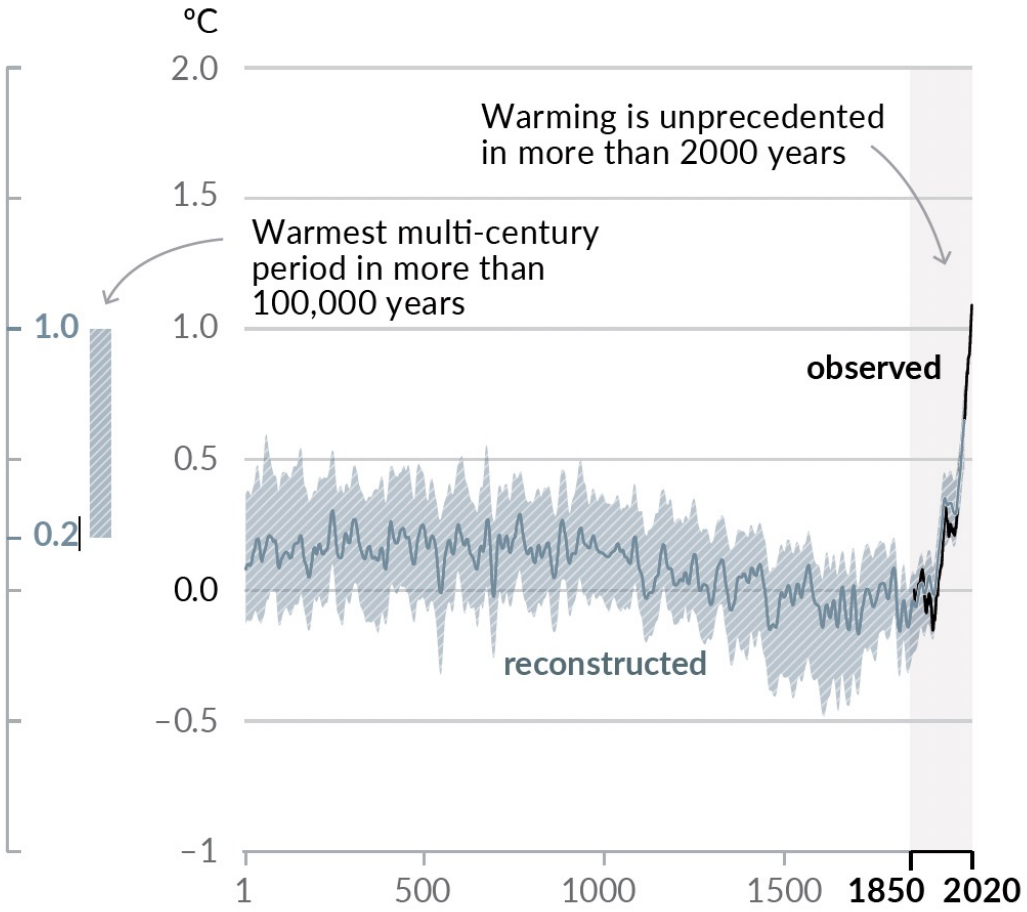
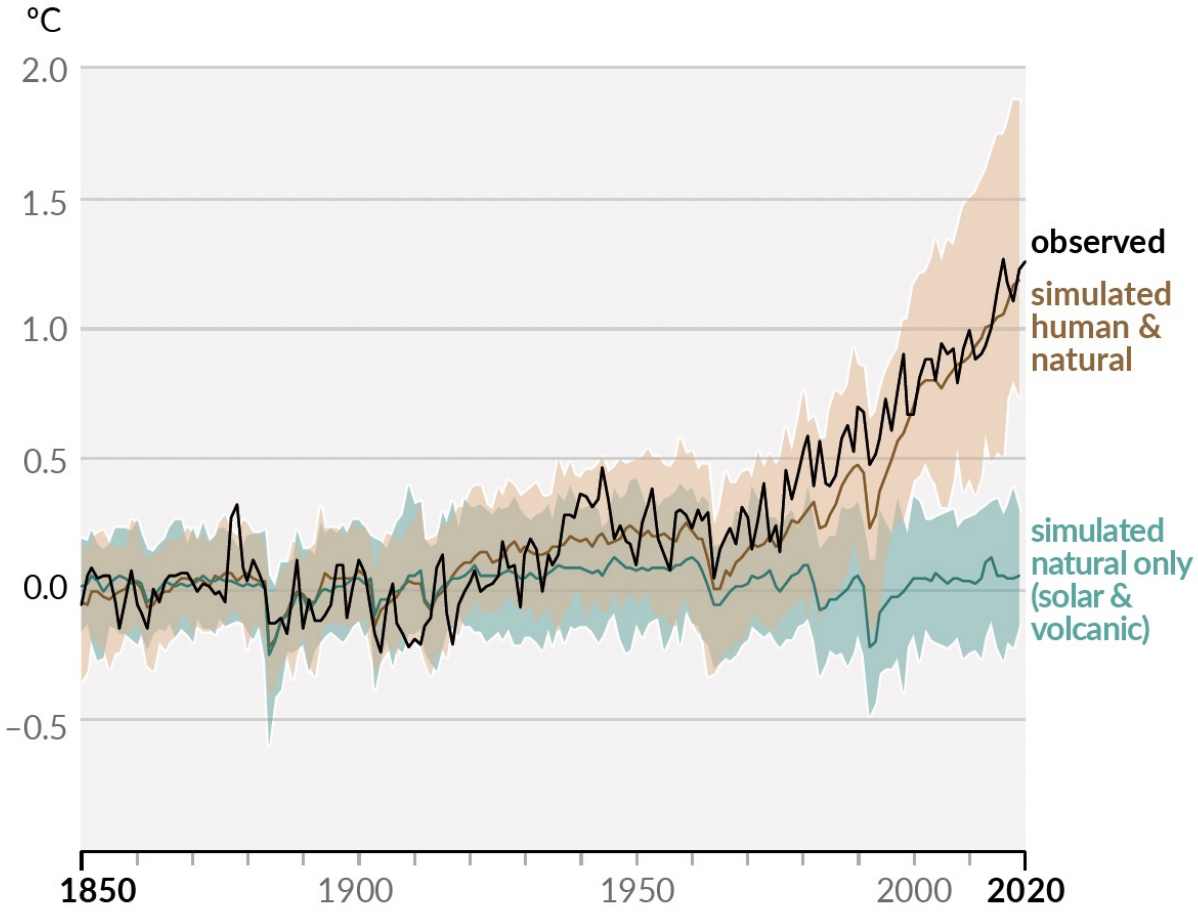
Tudományos alap – hőmérséklet növekedés

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)



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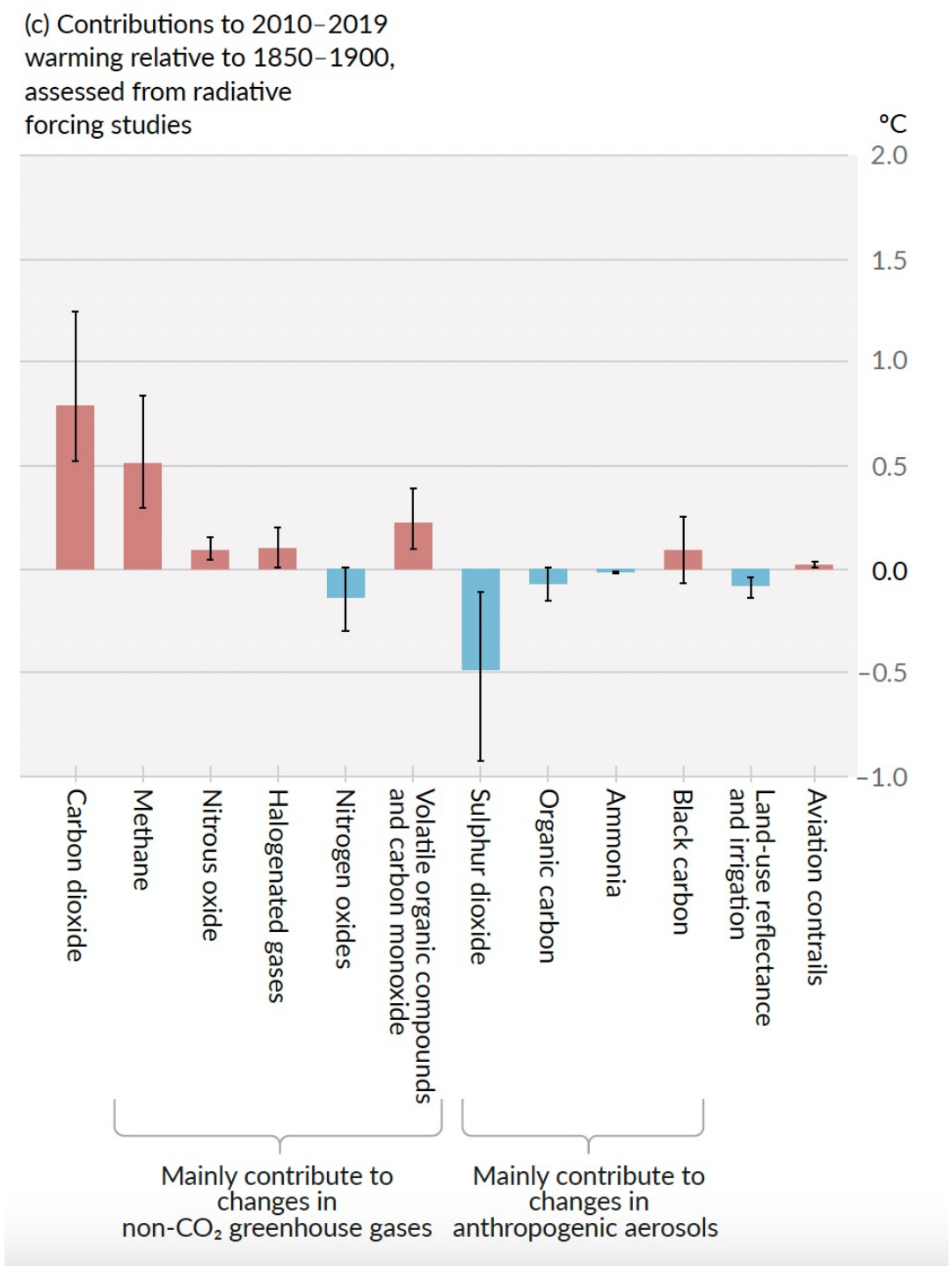
Tudományos alap
Mi okolható?



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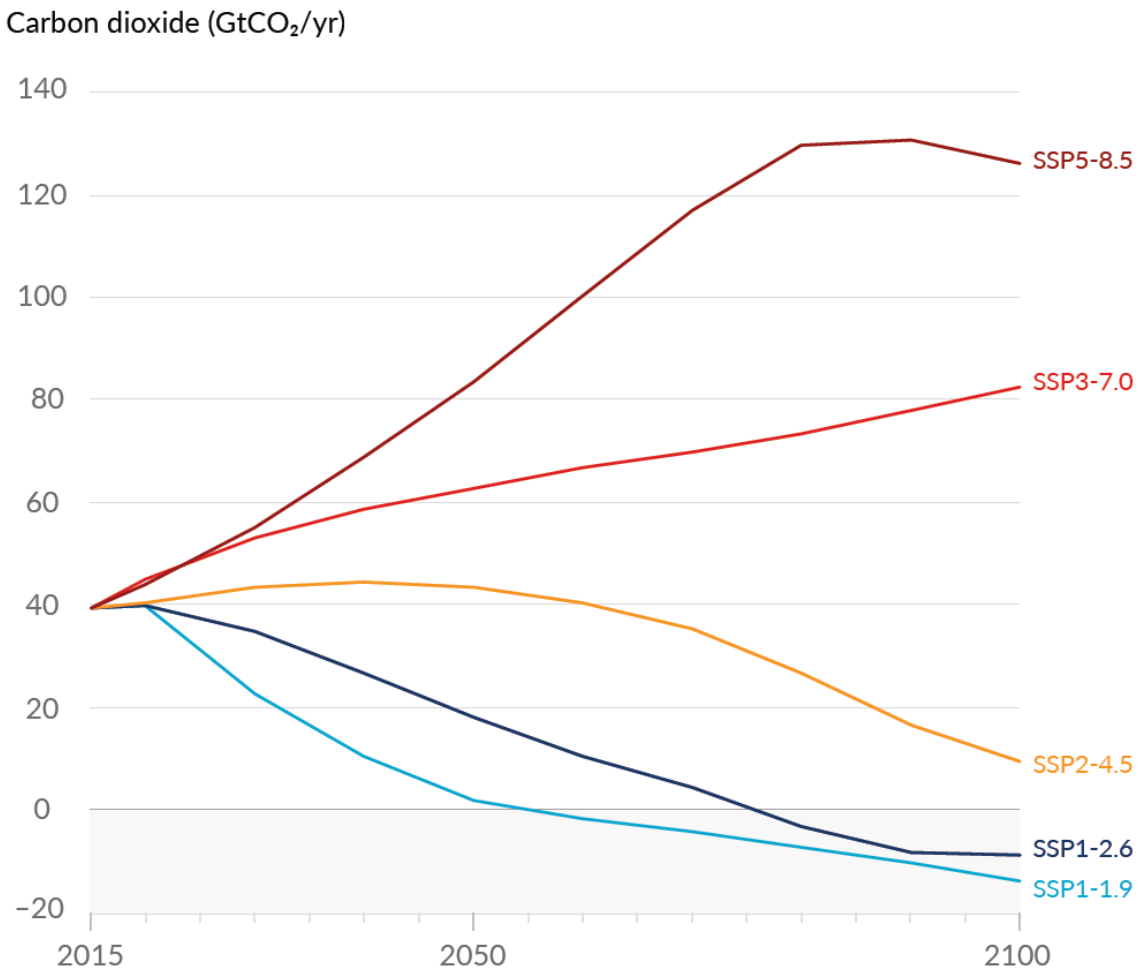
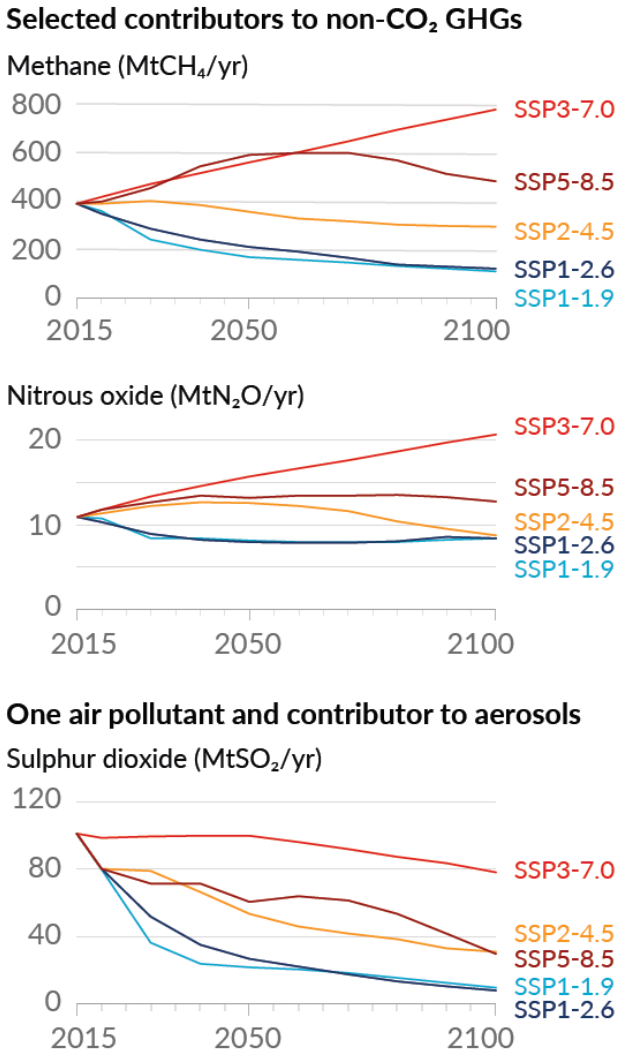
Tudományos alap - forgatókönyvek, éghajlatmodellek





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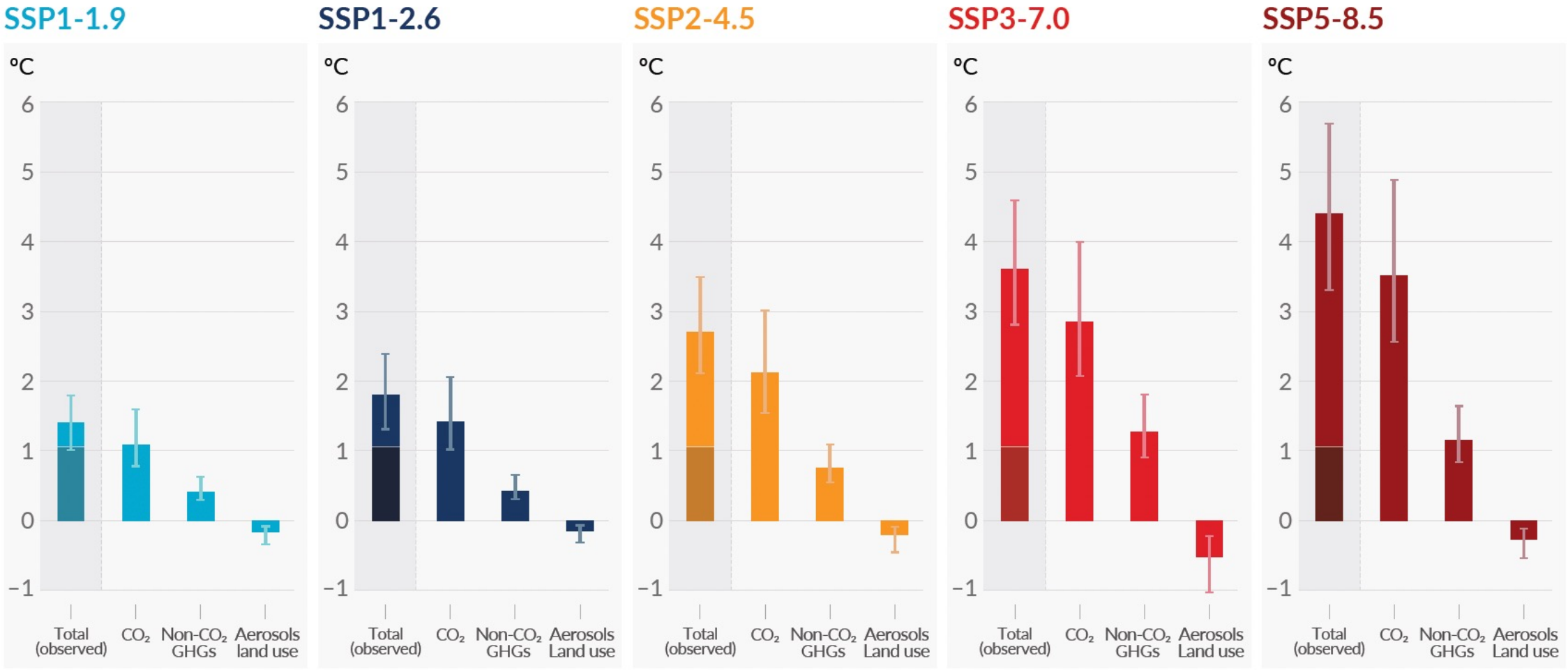

Total warming (observed warming to date in darker shade), warming from CO_2, warming from non-CO_2 GHGs and cooling from changes in aerosols and land use

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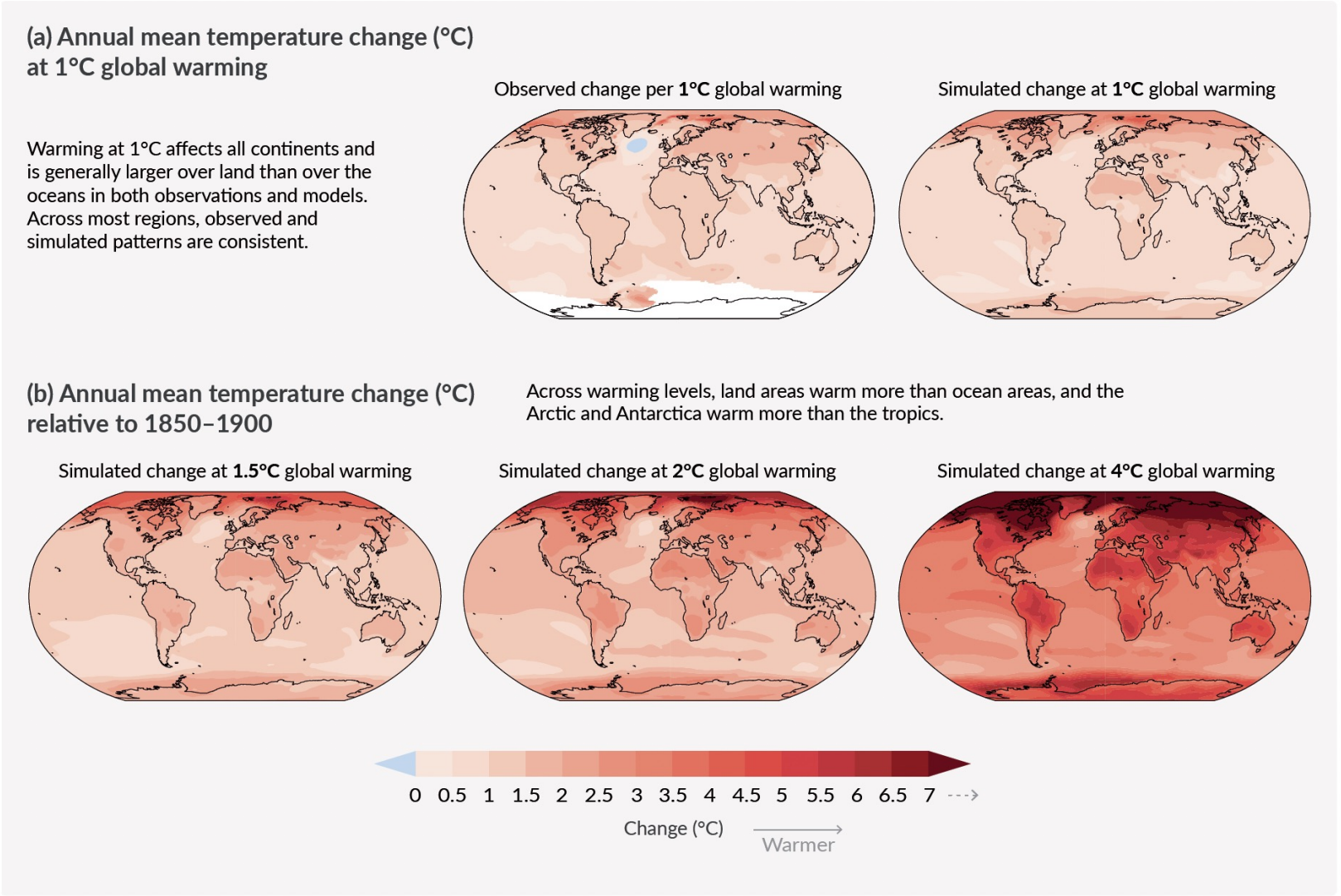
Tudományos alap - előrejelzések



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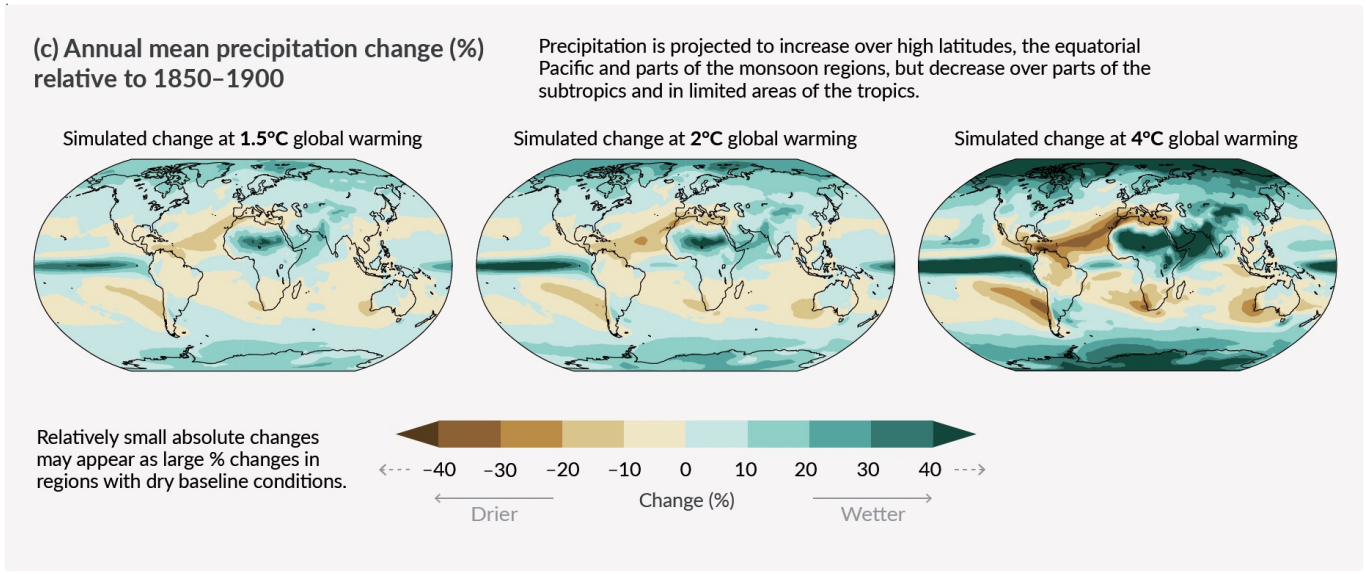

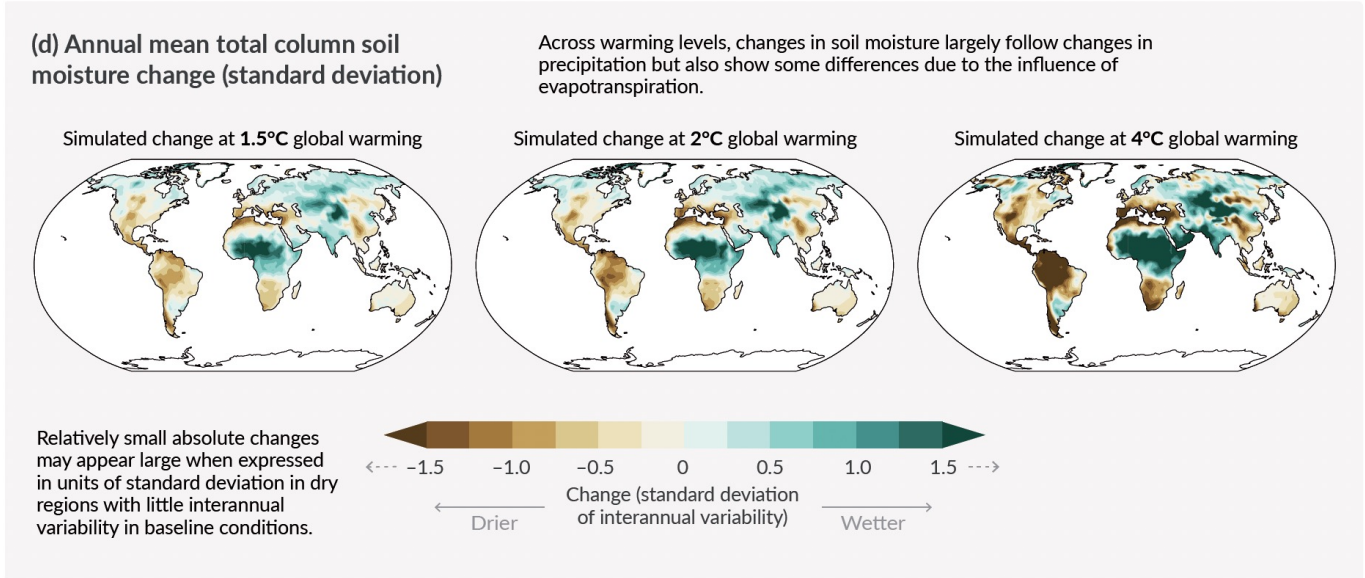

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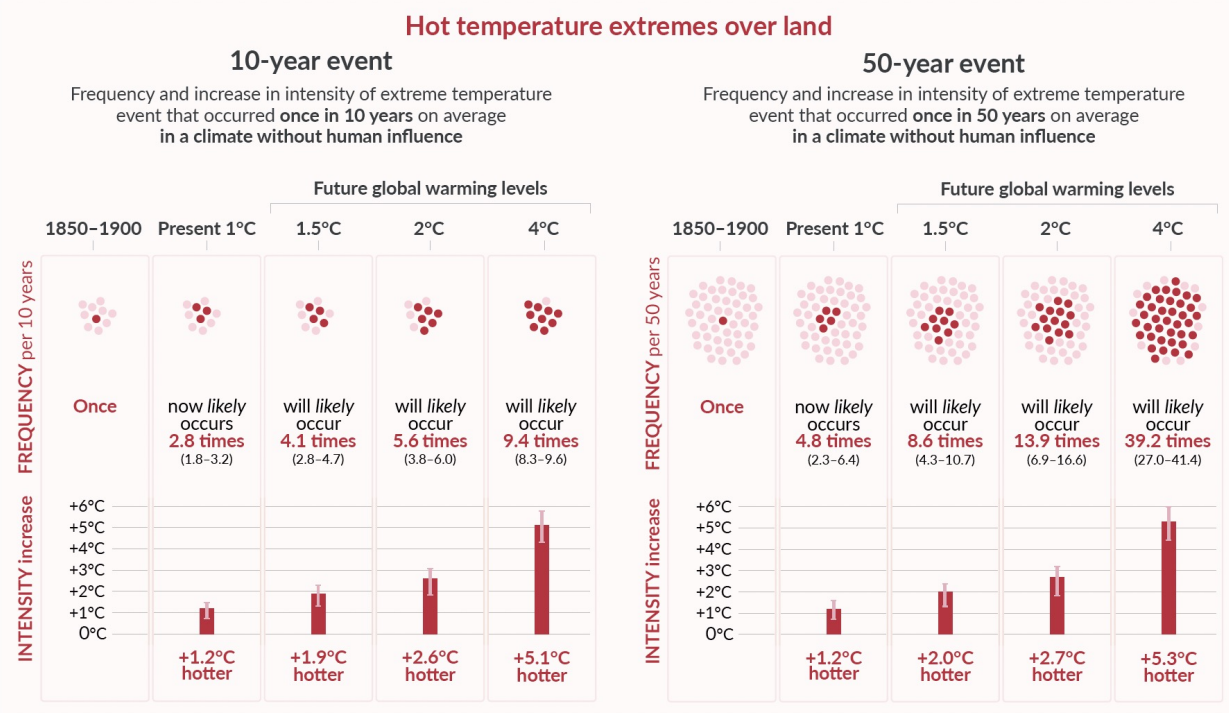

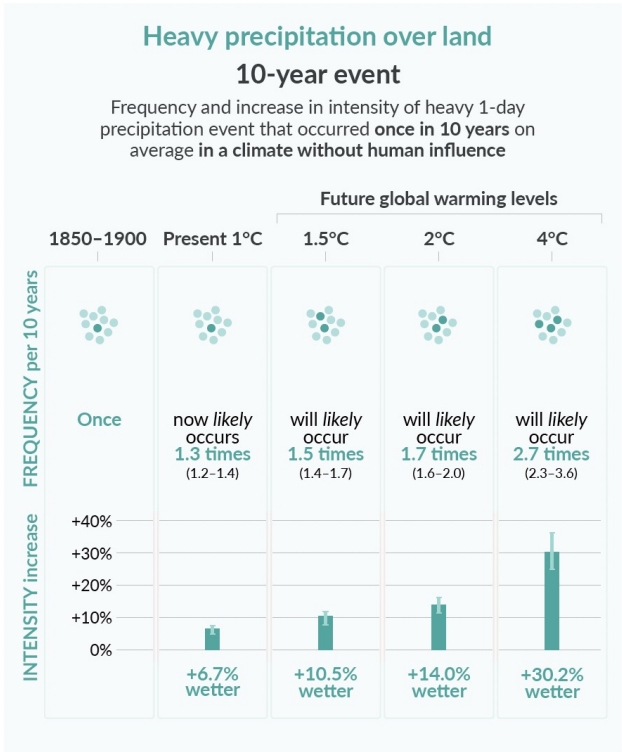

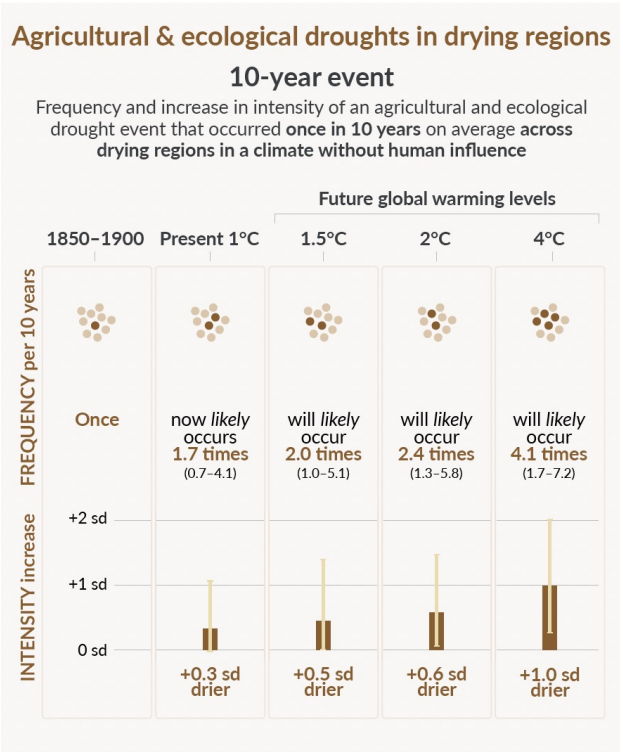

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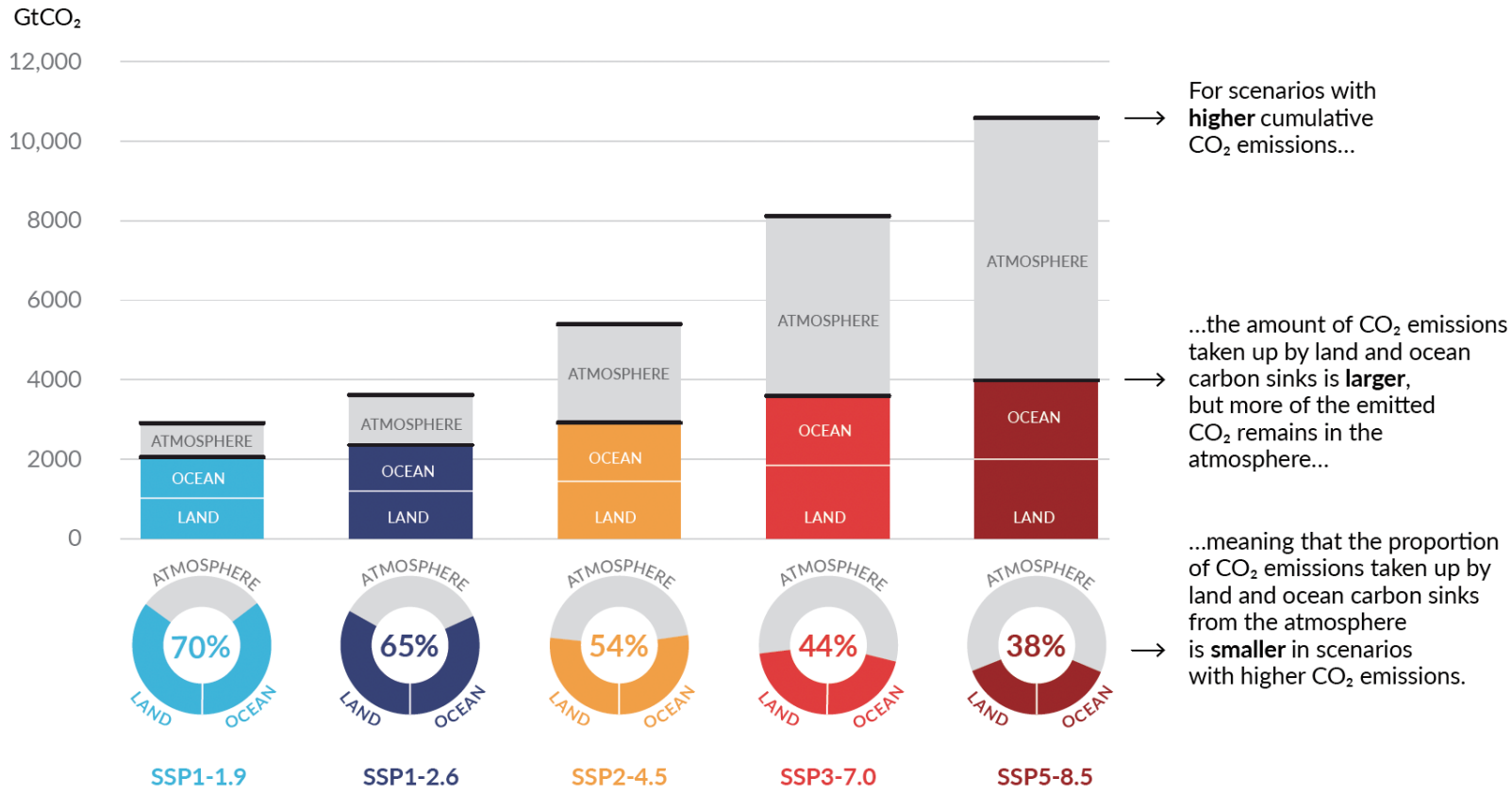

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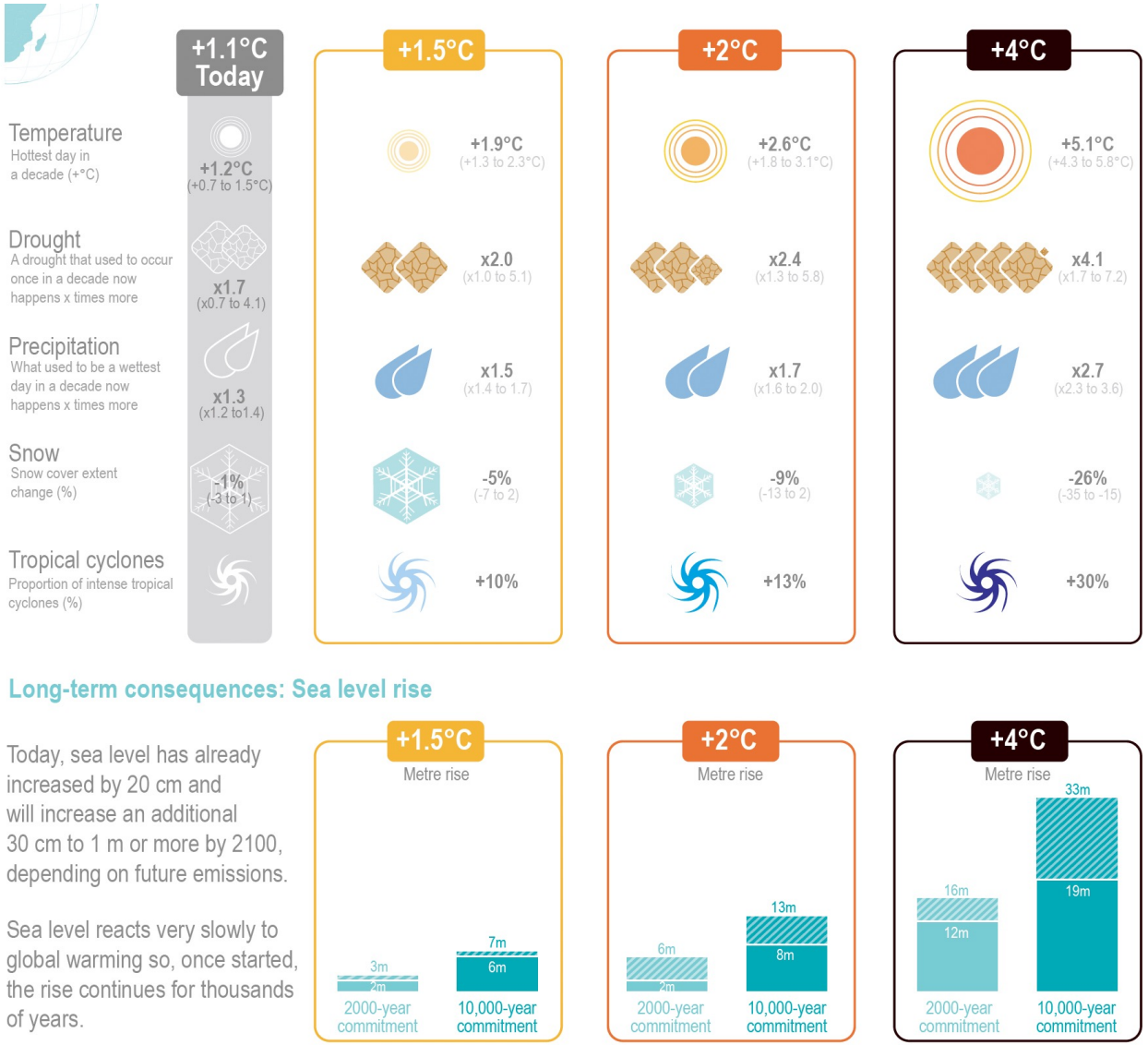

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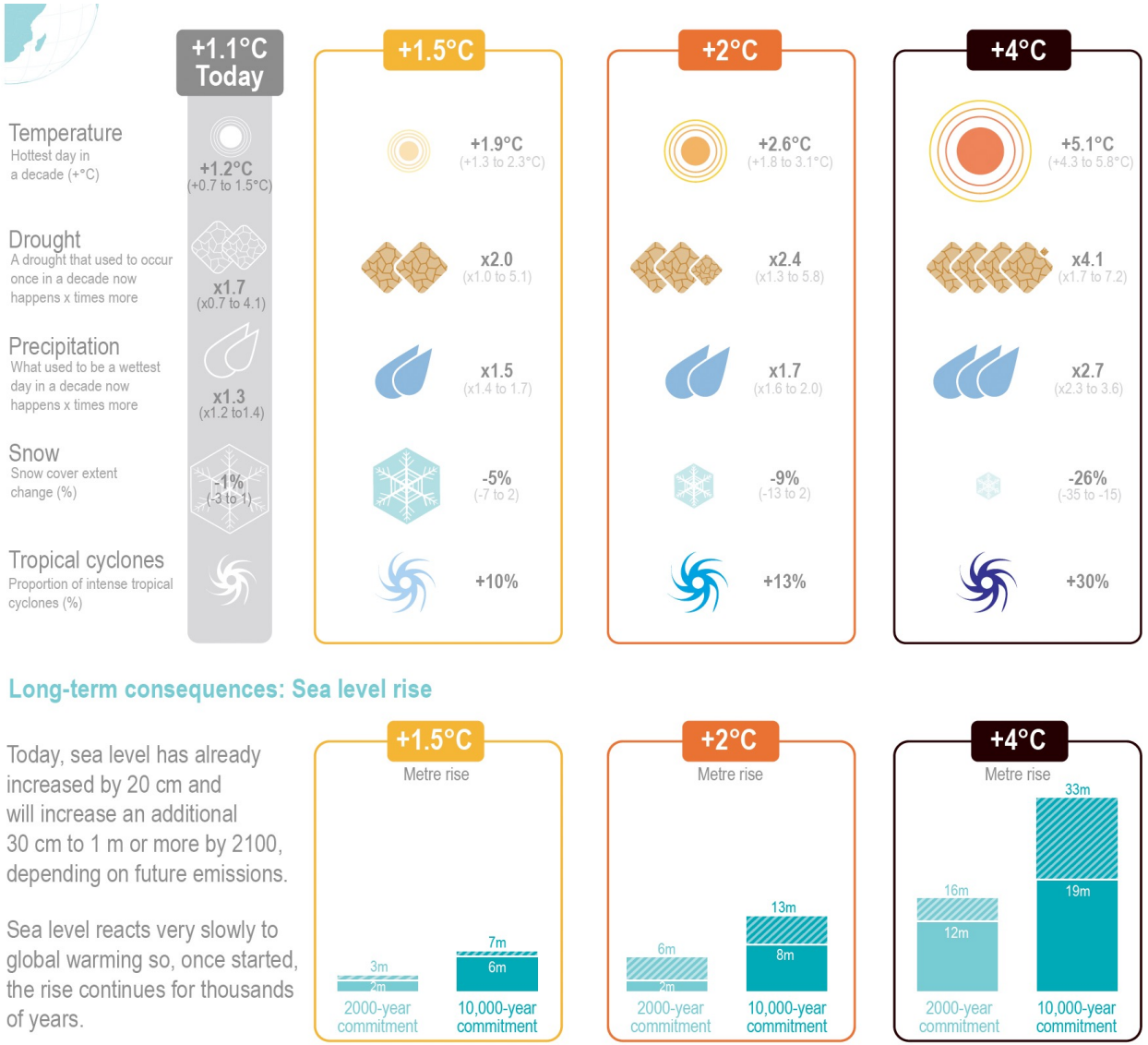

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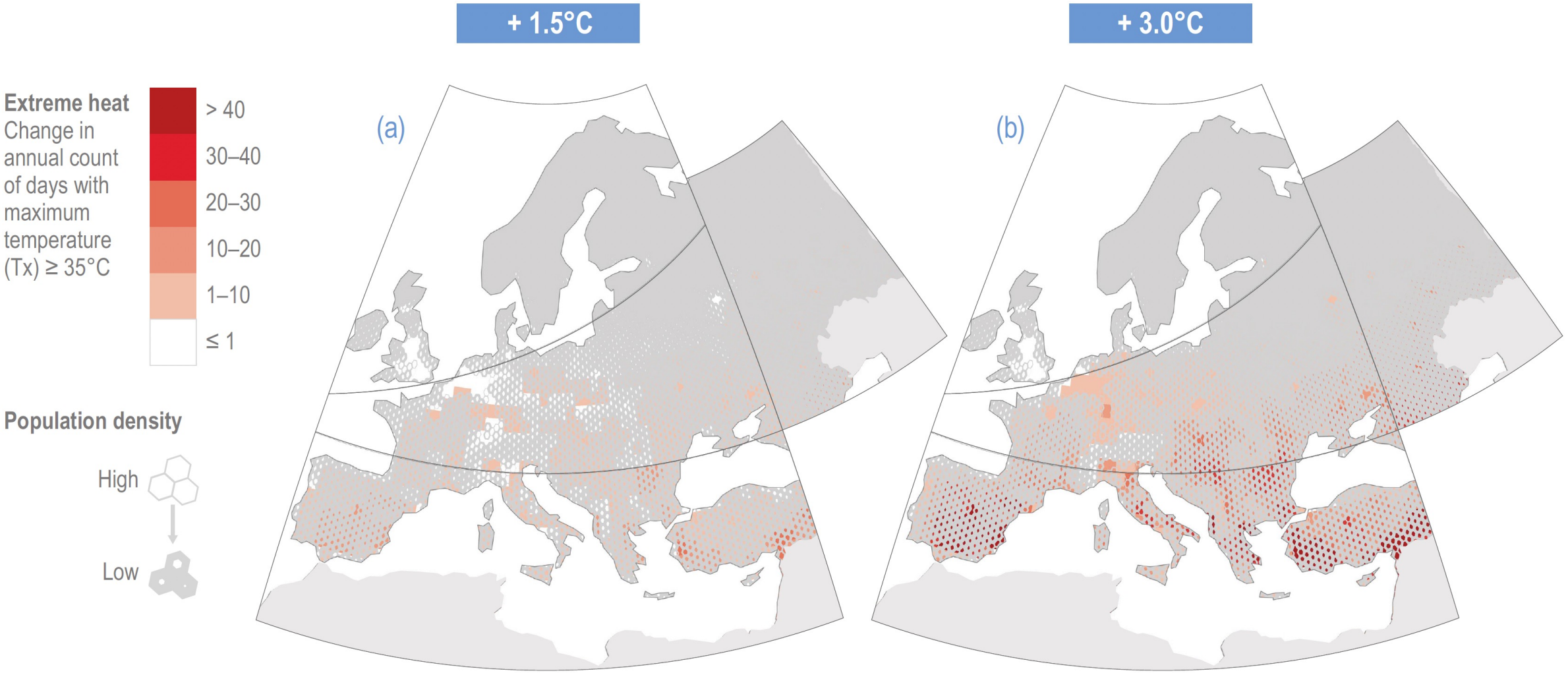

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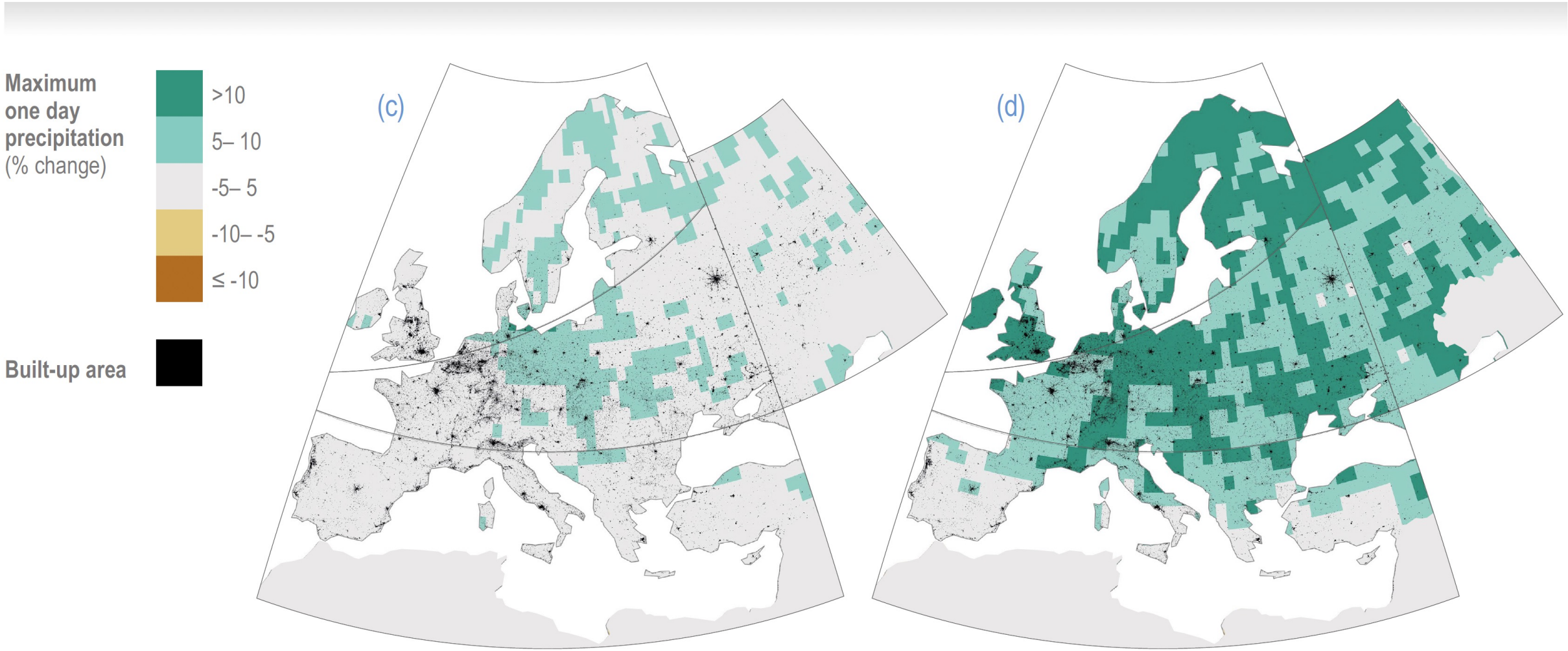

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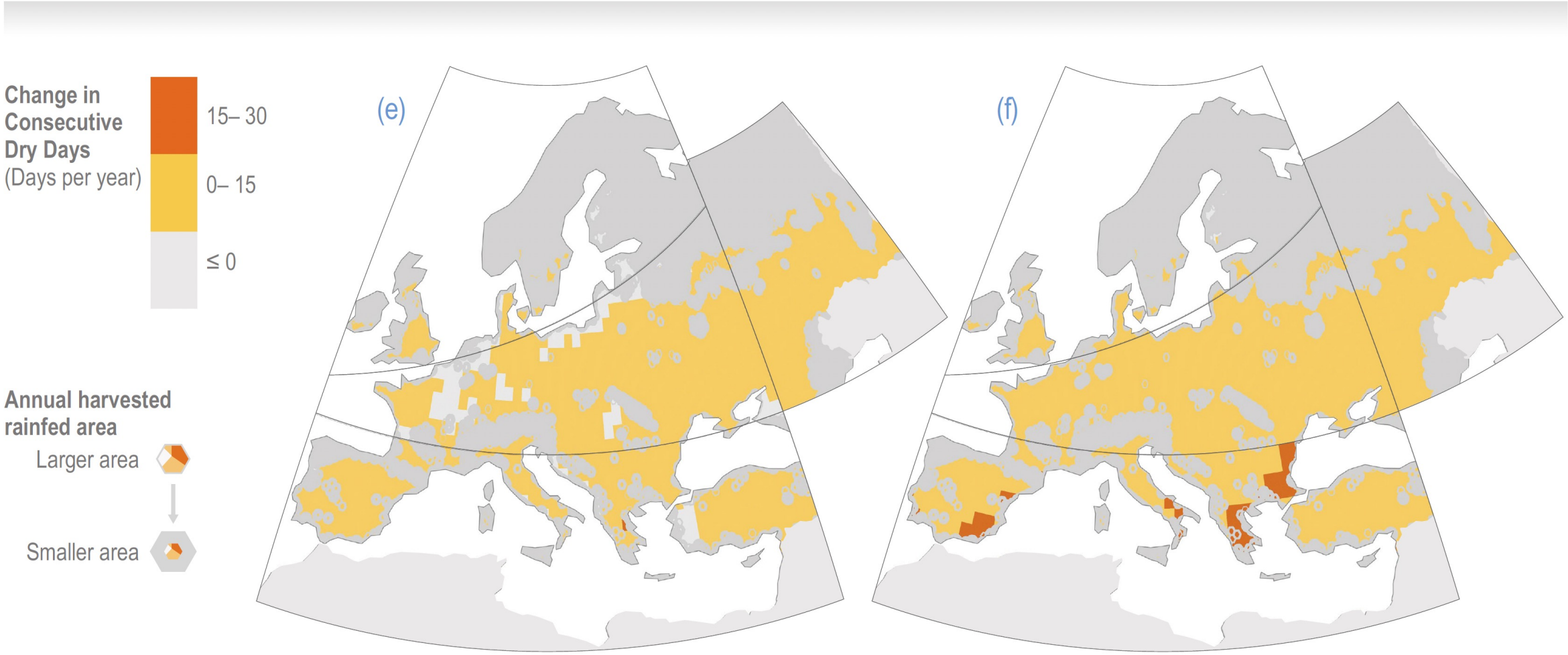

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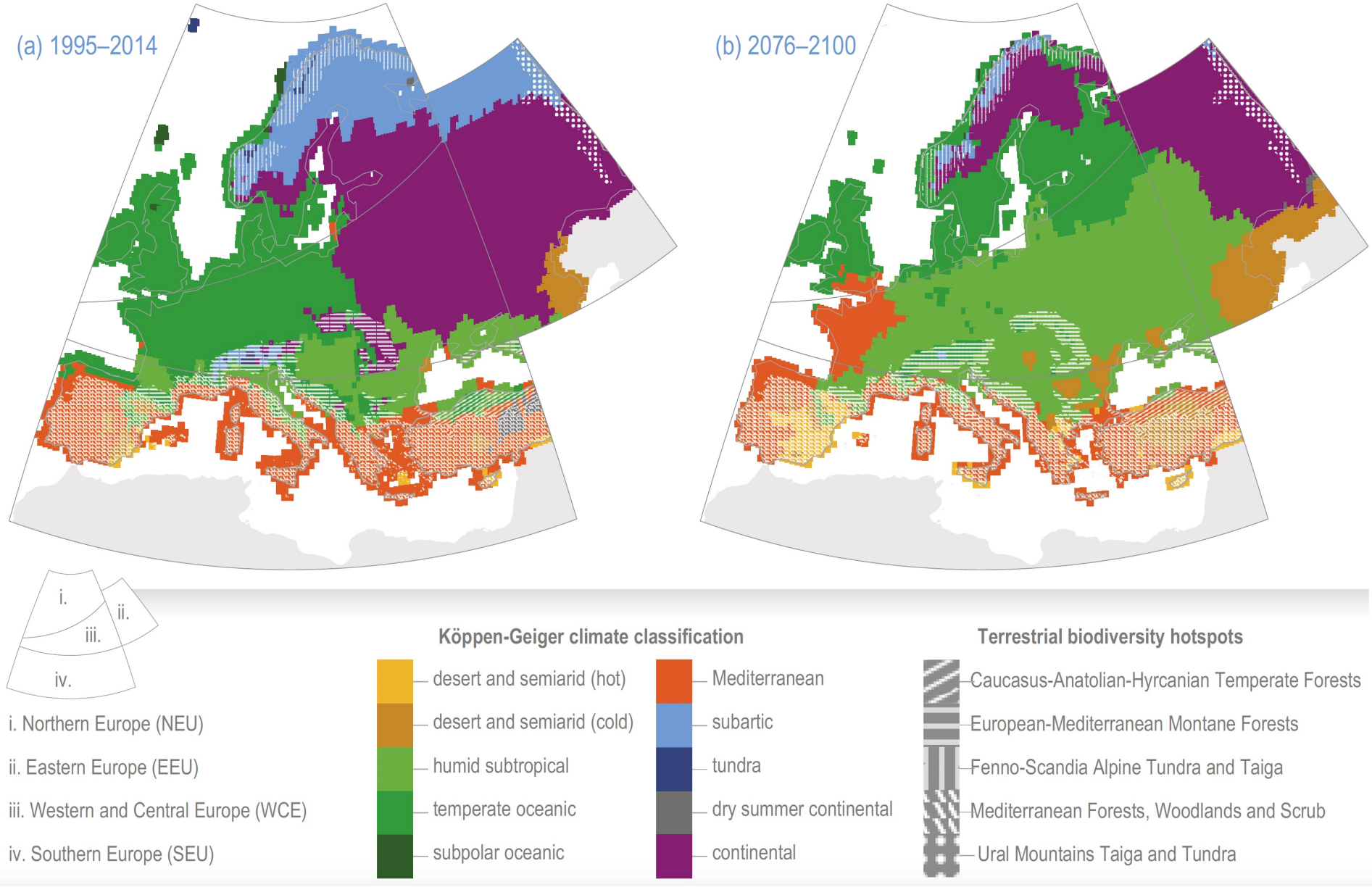

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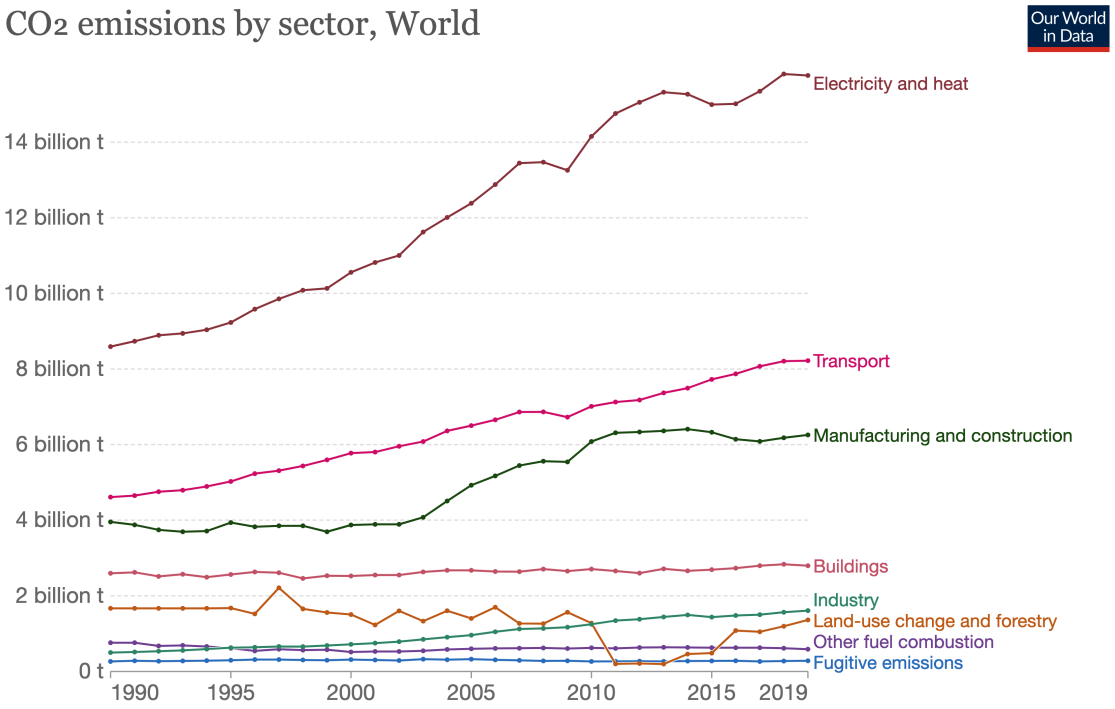
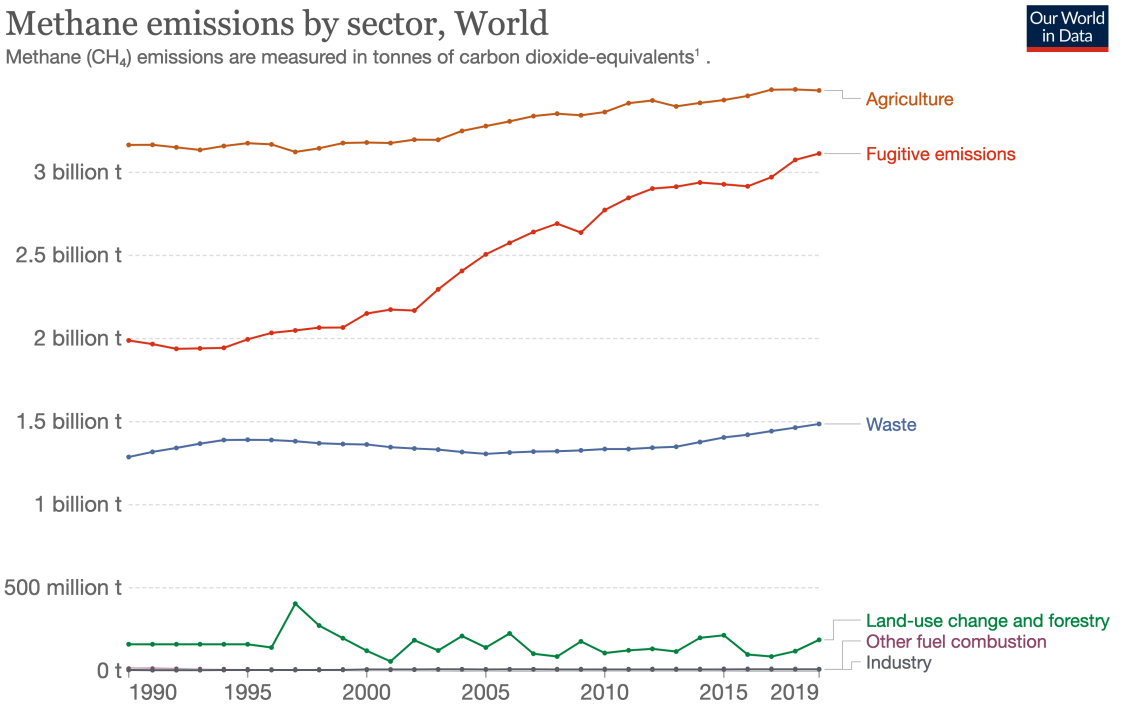
Források



Source: Our World in Data based on Climate Analysis Indicators Tool (CAIT).
OurWorldInData.org/co2-and-greenhouse-gas-emissions • CC BY



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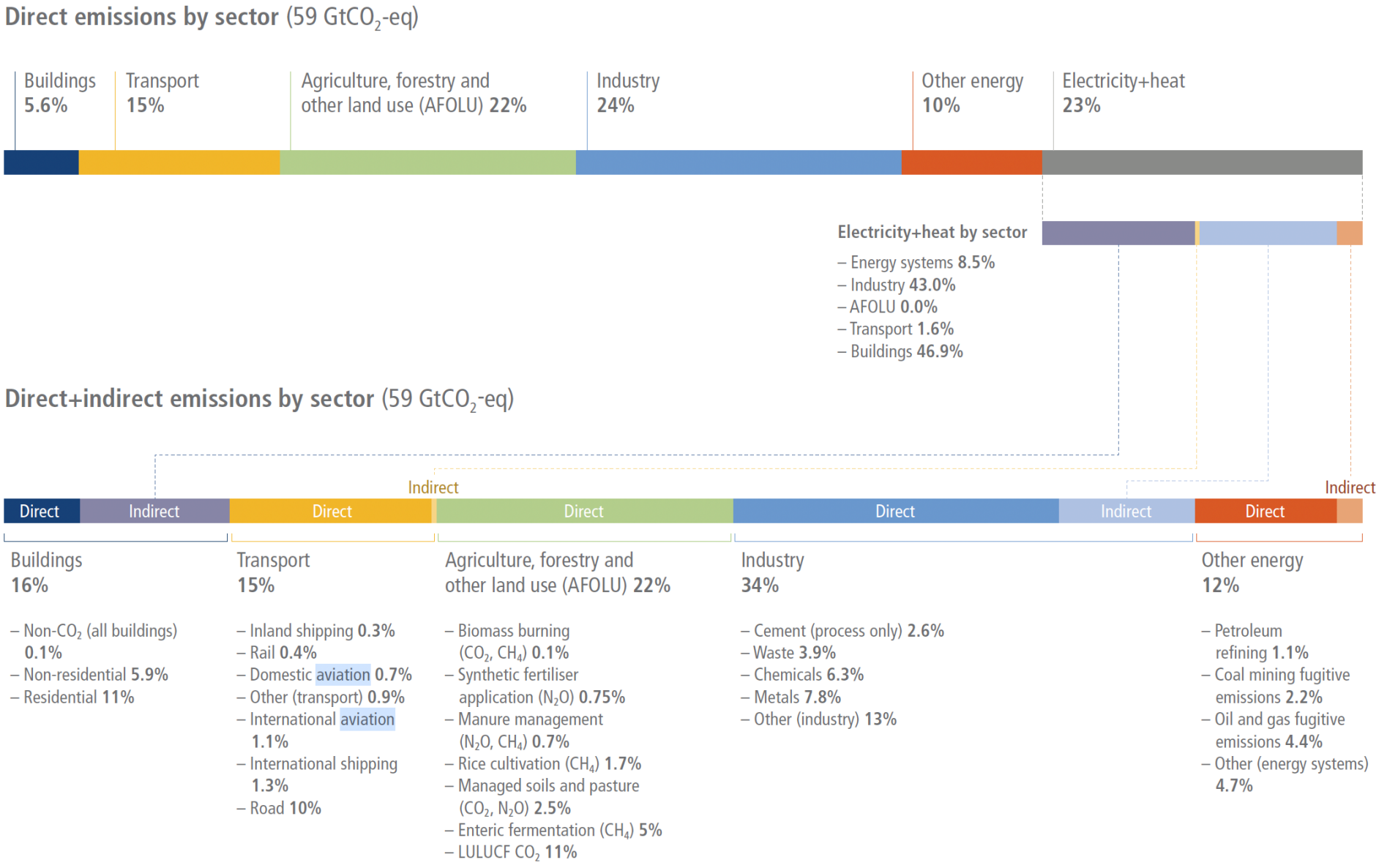
OurWorldInData.org/co2-and-greenhouse-gas-emissions • CC BY

1. Carbon dioxide-equivalents (CO_2eq): Carbon dioxide is the most important greenhouse gas, but not the only one. To capture all greenhouse gas emissions, researchers express them in 'carbon dioxide-equivalents' (CO_2eq). This takes all greenhouse gases into account, not just CO_2. To express all greenhouse gases in carbon dioxide-equivalents (CO_2eq), each one is weighted by its global warming potential (GWP) value. GWP measures the amount of warming a gas creates compared to CO_2. CO_2 is given a GWP value of one. If a gas had a GWP of 10 then one kilogram of that gas would generate ten times the warming effect as one kilogram of CO_2. Carbon dioxide-equivalents are calculated for each gas by multiplying the mass of emissions of a specific greenhouse gas by its GWP factor. This warming can be stated over different timescales. To calculate CO_2eq over 100 years, we'd multiply each gas by its GWP over a 100-year timescale (GWP100). Total greenhouse gas emissions – measured in CO_2eq – are then calculated by summing each gas' CO_2eq value.

Források


Direct emissions by sector (59 GtCO2-eq)
Buildings 5.6%
Transport 15%
Agriculture, forestry and other land use (AFOLU) 22%
Industry 24%
Other energy 10%
Electricity+heat 23%
Electricity+heat by sector
– Energy systems 8.5%
– Industry 43.0%
– AFOLU 0.0%
– Transport 1.6%
– Buildings 46.9%
Direct+indirect emissions by sector (59 GtCO2-eq)
Indirect
Indirect
Direct
Indirect
Direct
Direct
Direct
Indirect
Direct
Buildings 16%
– Non-CO2 (all buildings) 0.1%
– Non-residential 5.9%
– Residential 11%
Transport 15%
– Inland shipping 0.3%
– Rail 0.4%
– Domestic aviation 0.7%
– Other (transport) 0.9%
– International aviation 1.1%
– International shipping 1.3%
– Road 10%
Agriculture, forestry and other land use (AFOLU) 22%
– Biomass burning (CO2, CH4) 0.1%
– Synthetic fertiliser application (N2O) 0.75%
– Manure management (N2O, CH4) 0.7%
– Rice cultivation (CH4) 1.7%
– Managed soils and pasture (CO2, N2O) 2.5%
– Enteric fermentation (CH4) 5%
– LULUCF CO2 11%
Industry 34%
– Cement (process only) 2.6%
– Waste 3.9%
– Chemicals 6.3%
– Metals 7.8%
– Other (industry) 13%
Other energy 12%
– Petroleum refining 1.1%
– Coal mining fugitive emissions 2.2%
– Oil and gas fugitive emissions 4.4%
– Other (energy systems) 4.7%