

Možná budoucnost klimatu

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2. ročník, B-GEK FYZG

Podzim 2024



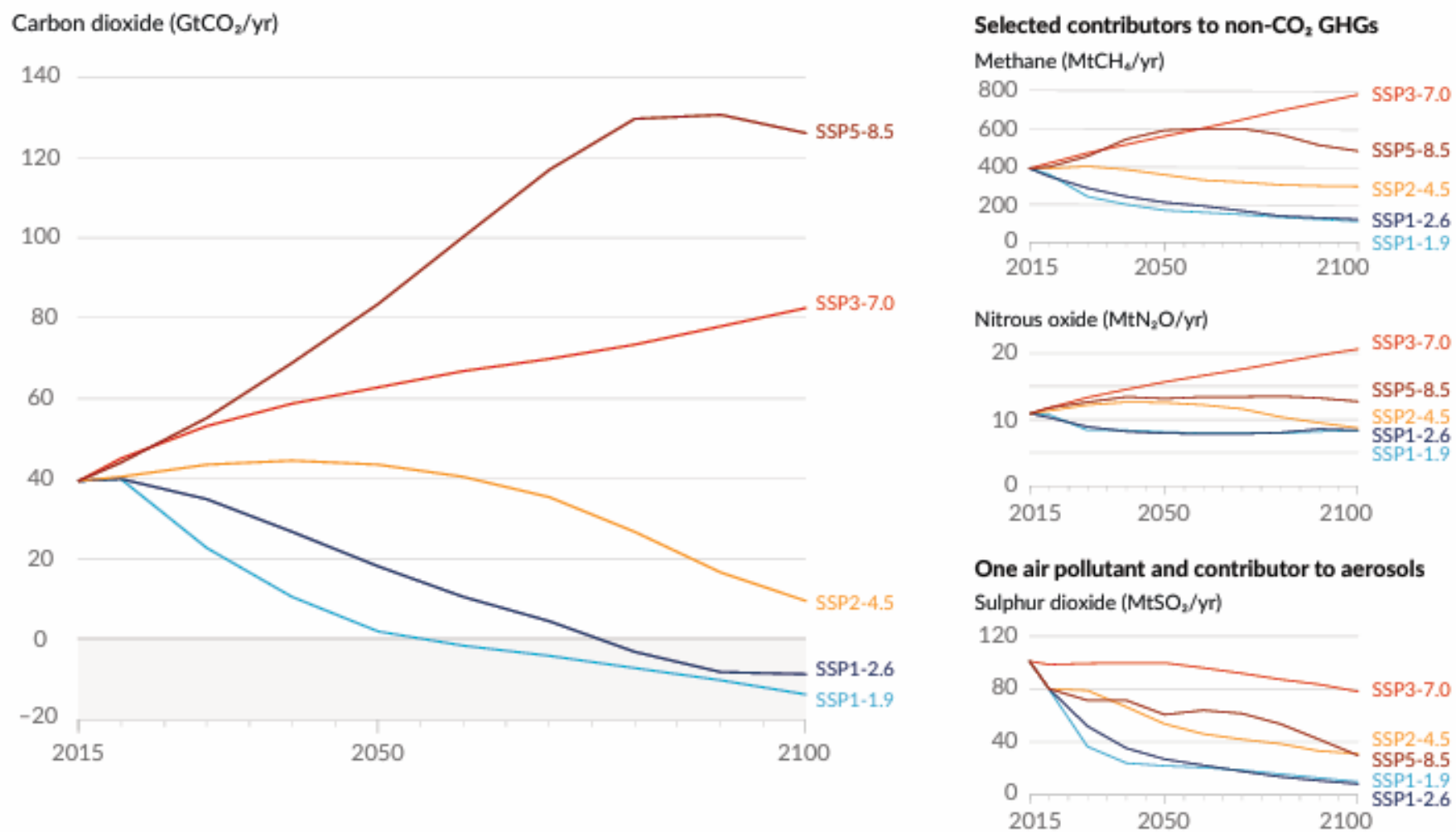
Uvažované scénáře

- SSP1-1.9 – velmi nízké emise
- SSP1-2.6 – nízké emise
- SSP2-4.5 – střední emise
- SSP3-7.0 – vysoké emise
- SSP5-8.5 – velmi vysoké emise



Future emissions cause future additional warming, with total warming dominated by past and future CO₂ emissions

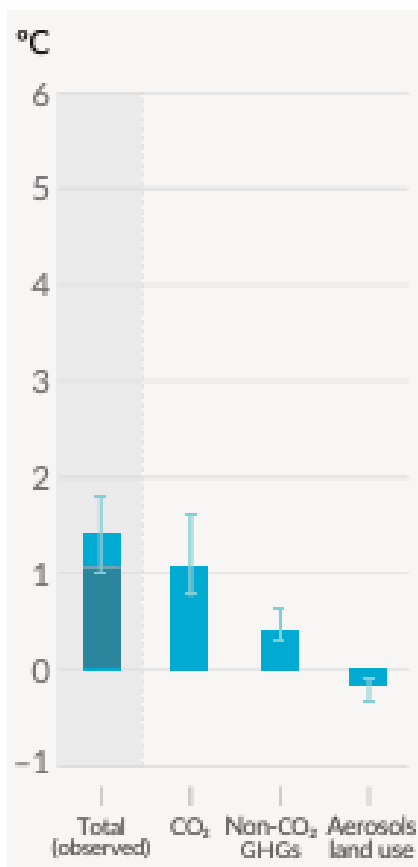
(a) Future annual emissions of CO₂ (left) and of a subset of key non-CO₂ drivers (right), across five illustrative scenarios



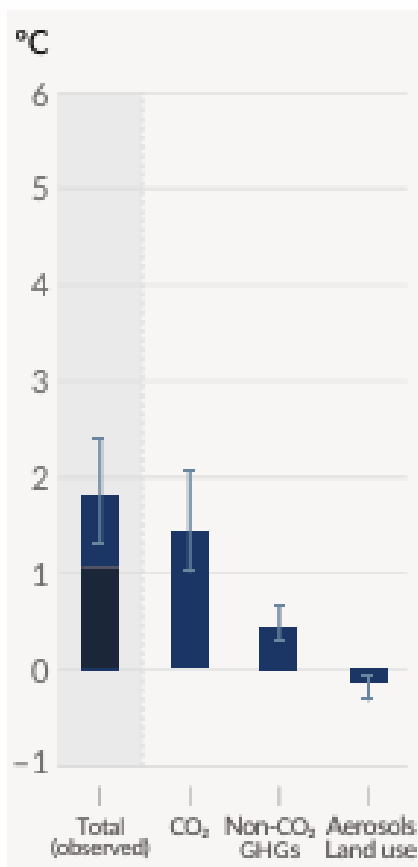
(b) Contribution to global surface temperature increase from different emissions, with a dominant role of CO₂ emissions

Change in global surface temperature in 2081-2100 relative to 1850-1900 (°C)

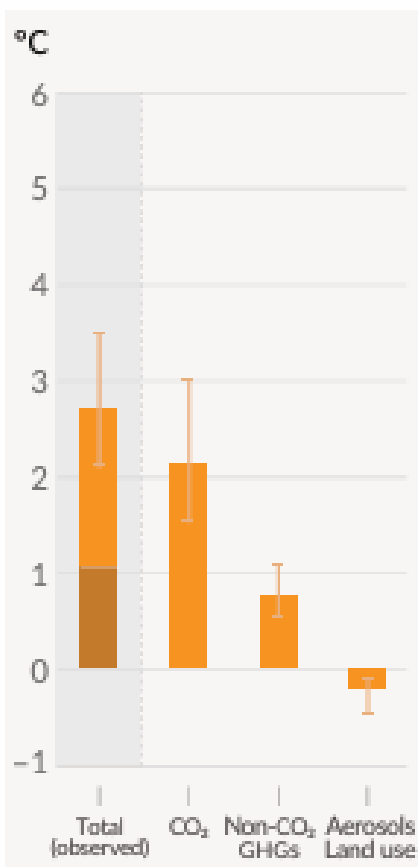
SSP1-1.9



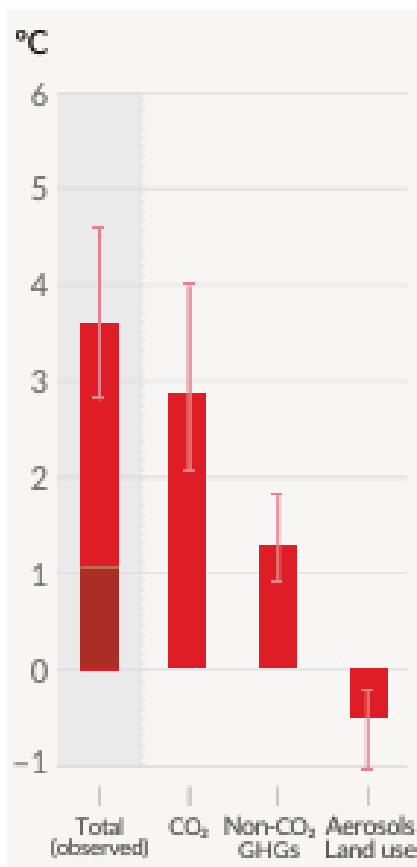
SSP1-2.6



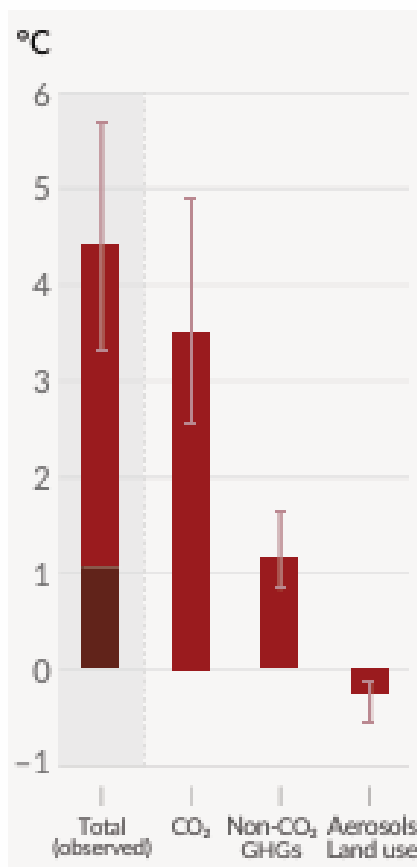
SSP2-4.5





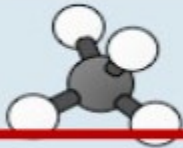

SSP3-7.0



SSP5-8.5



Total warming (observed warming to date in darker shade), warming from CO₂, warming from non-CO₂ GHGs and cooling from changes in aerosols and land use

	Water	Carbon Dioxide	Methane	Nitrous Oxide
				
Atmospheric Concentration	0.01–4%*	385 ppm	1797 ppb	322 ppb
Rate of Increase	n/a	1.5 ppm/yr	7.0 ppb/yr	0.8 ppb/yr
Atmospheric Lifetime	Very short 1–5 days	Variable 5–200 yr	12 yr	120 yr
Global Warming Potential (GWP)	n/a†	1	21	310

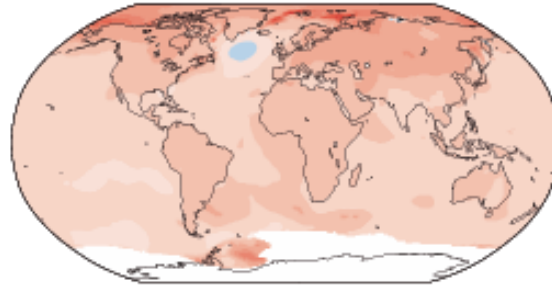
Scénář	Blízká budoucnost (2021 až 2040)		Střednědobí odhad (2041 až 2060)		Dlouhodobý odhad (2081 až 2100)	
	Nejlepší odhad [°C]	Velmi pravděpodobné rozmezí [°C]	Nejlepší odhad [°C]	Velmi pravděpodobné rozmezí [°C]	Nejlepší odhad [°C]	Velmi pravděpodobné rozmezí [°C]
SSP1-1.9	1,5	1,2 až 1,7	1,6	1,2 až 2,0	1,4	1,0 až 1,8
SSP1-2.6	1,5	1,2 až 1,8	1,7	1,3 až 2,2	1,8	1,3 až 2,4
SSP2-4.5	1,5	1,2 až 1,8	2,0	1,6 až 2,5	2,7	2,1 až 3,5
SSP3-7.0	1,5	1,2 až 1,8	2,1	1,7 až 2,6	3,6	2,8 až 4,6
SSP5-8.5	1,6	1,3 až 1,9	2,4	1,9 až 3,0	4,4	3,3 až 5,7

With every increment of global warming, changes get larger in regional mean temperature, precipitation and soil moisture

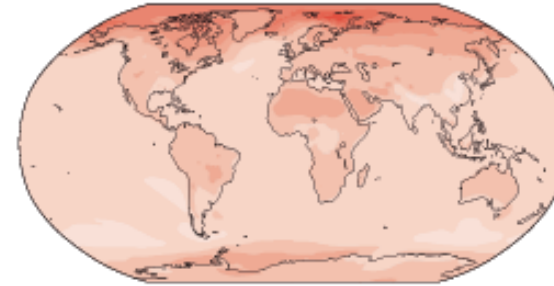
(a) Annual mean temperature change (°C) at 1°C global warming

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



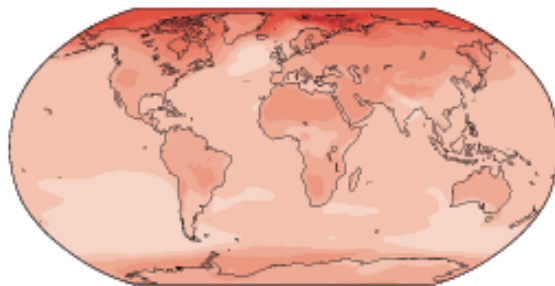
Simulated change at 1°C global warming



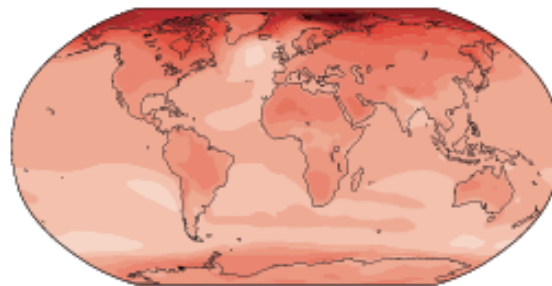
(b) Annual mean temperature change (°C) relative to 1850–1900

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

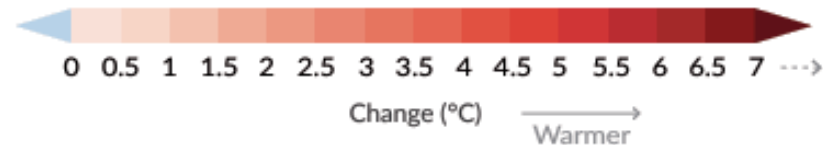
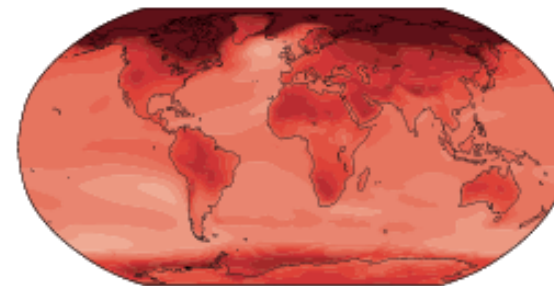
Simulated change at 1.5°C global warming



Simulated change at 2°C global warming



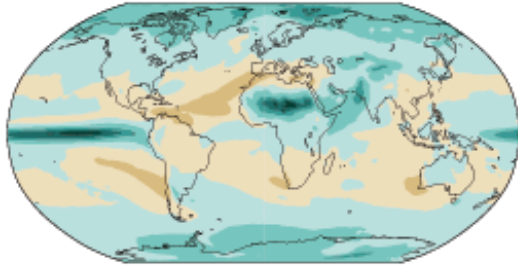
Simulated change at 4°C global warming



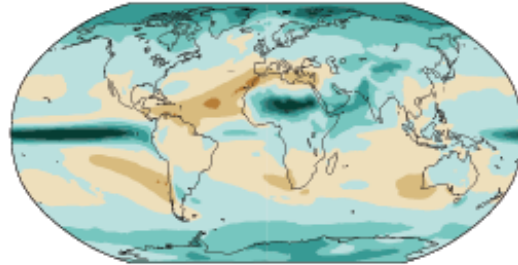
(c) Annual mean precipitation change (%) relative to 1850–1900

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.

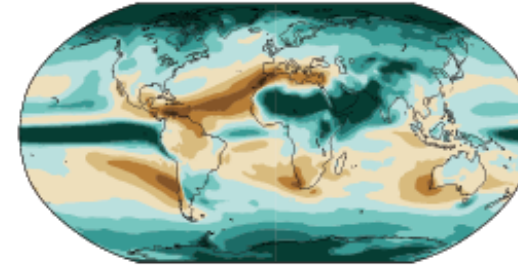
Simulated change at 1.5°C global warming



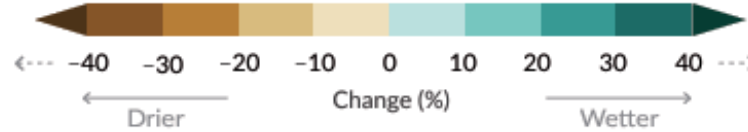
Simulated change at 2°C global warming



Simulated change at 4°C global warming



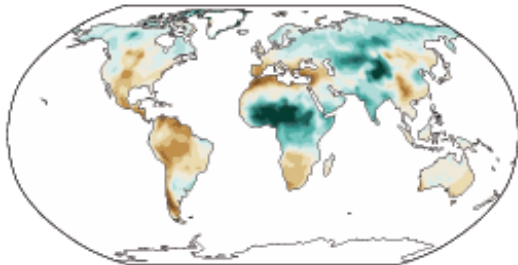
Relatively small absolute changes may appear as large % changes in regions with dry baseline conditions.



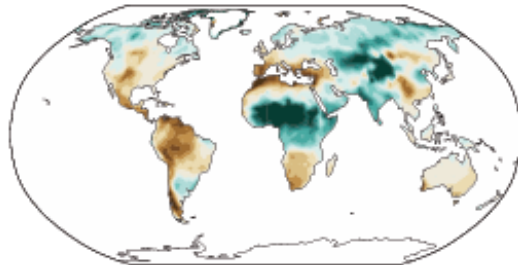
(d) Annual mean total column soil moisture change (standard deviation)

Across warming levels, changes in soil moisture largely follow changes in precipitation but also show some differences due to the influence of evapotranspiration.

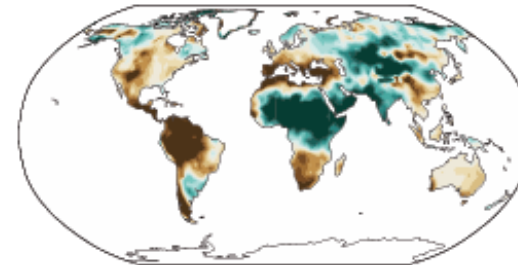
Simulated change at 1.5°C global warming



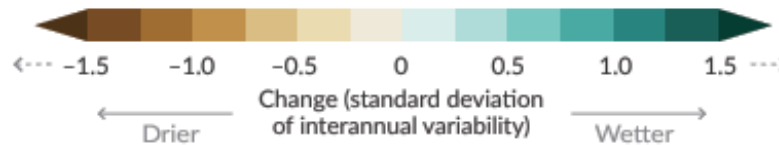
Simulated change at 2°C global warming



Simulated change at 4°C global warming



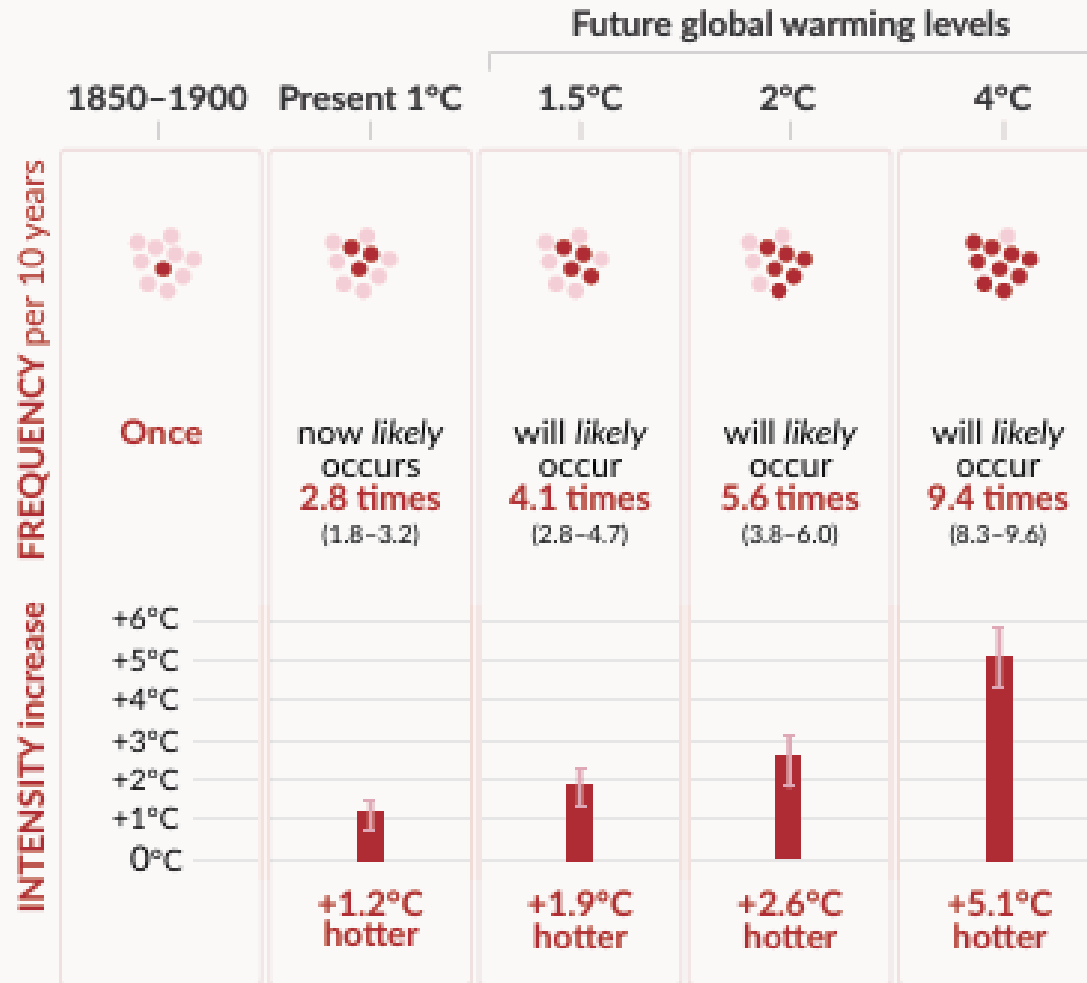
Relatively small absolute changes may appear large when expressed in units of standard deviation in dry regions with little interannual variability in baseline conditions.



Hot temperature extremes over land

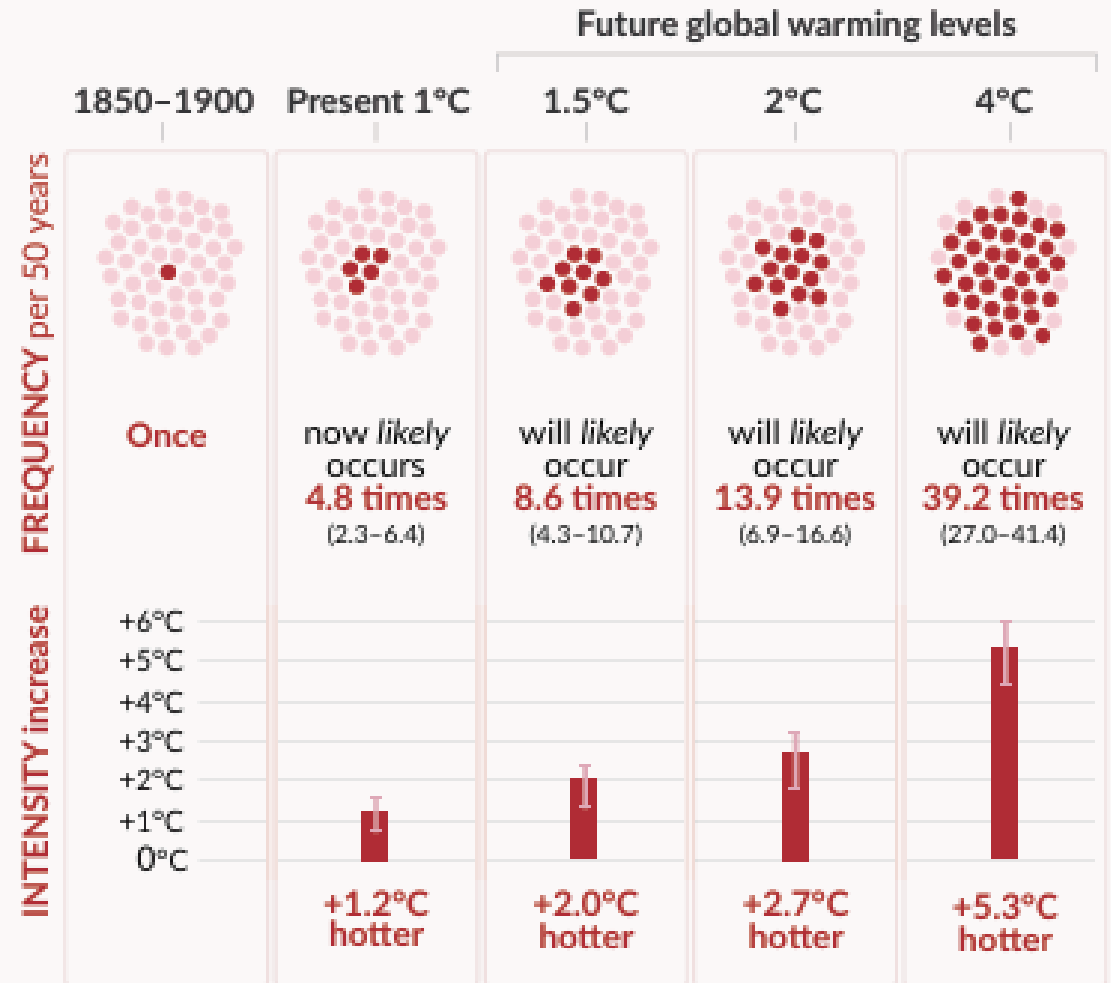
10-year event

Frequency and increase in intensity of extreme temperature event that occurred once in 10 years on average in a climate without human influence



50-year event

Frequency and increase in intensity of extreme temperature event that occurred once in 50 years on average in a climate without human influence

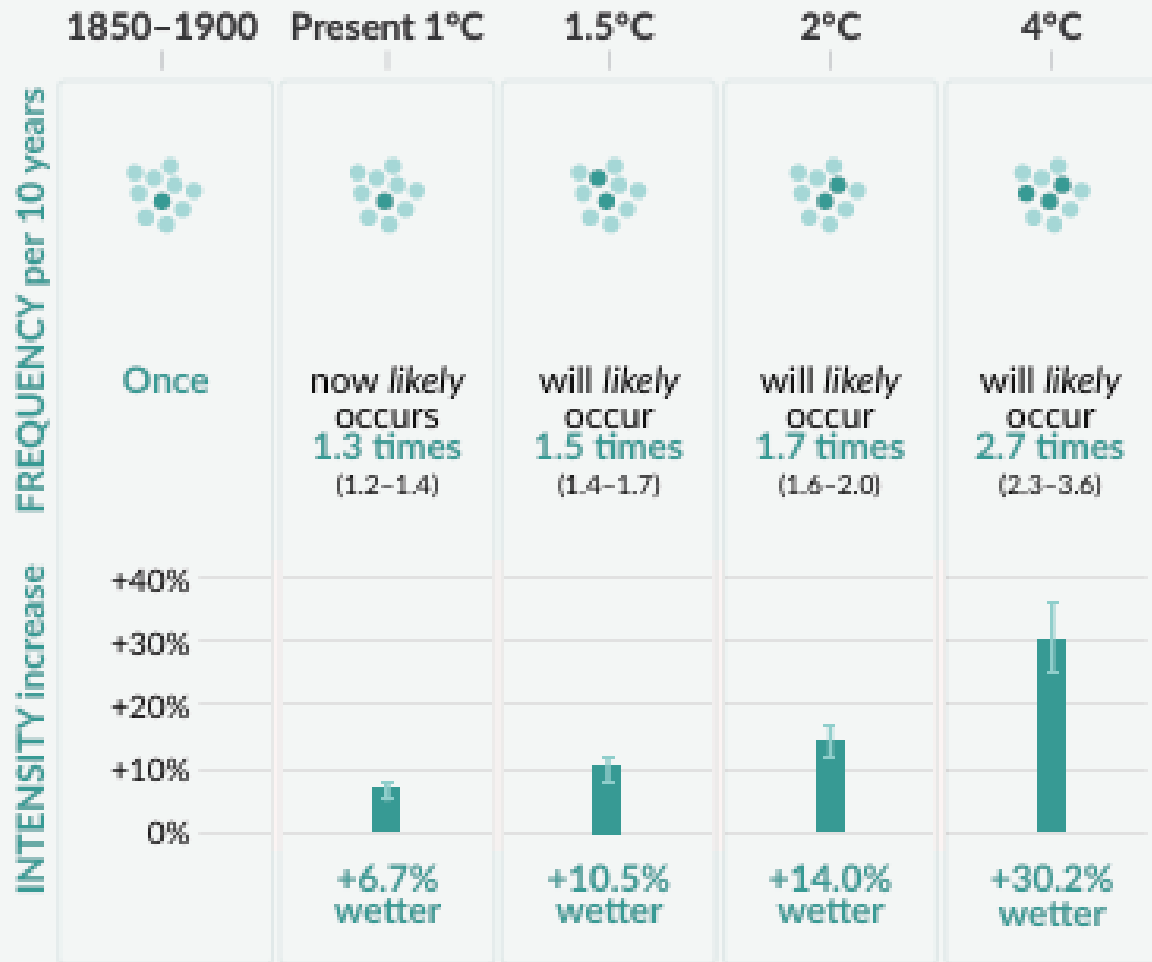


Heavy precipitation over land

10-year event

Frequency and increase in intensity of heavy 1-day precipitation event that occurred once in 10 years on average in a climate without human influence

Future global warming levels

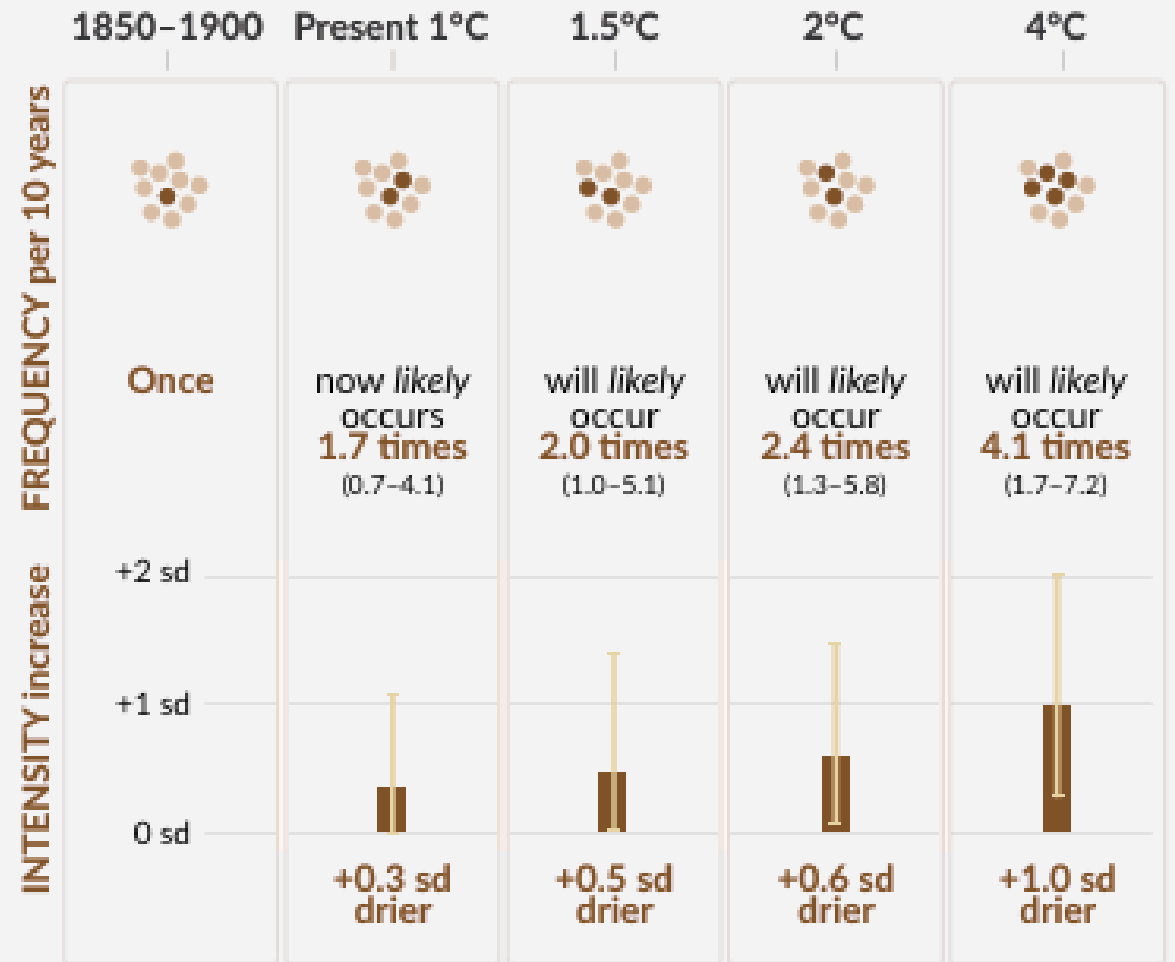


Agricultural & ecological droughts in drying regions

10-year event

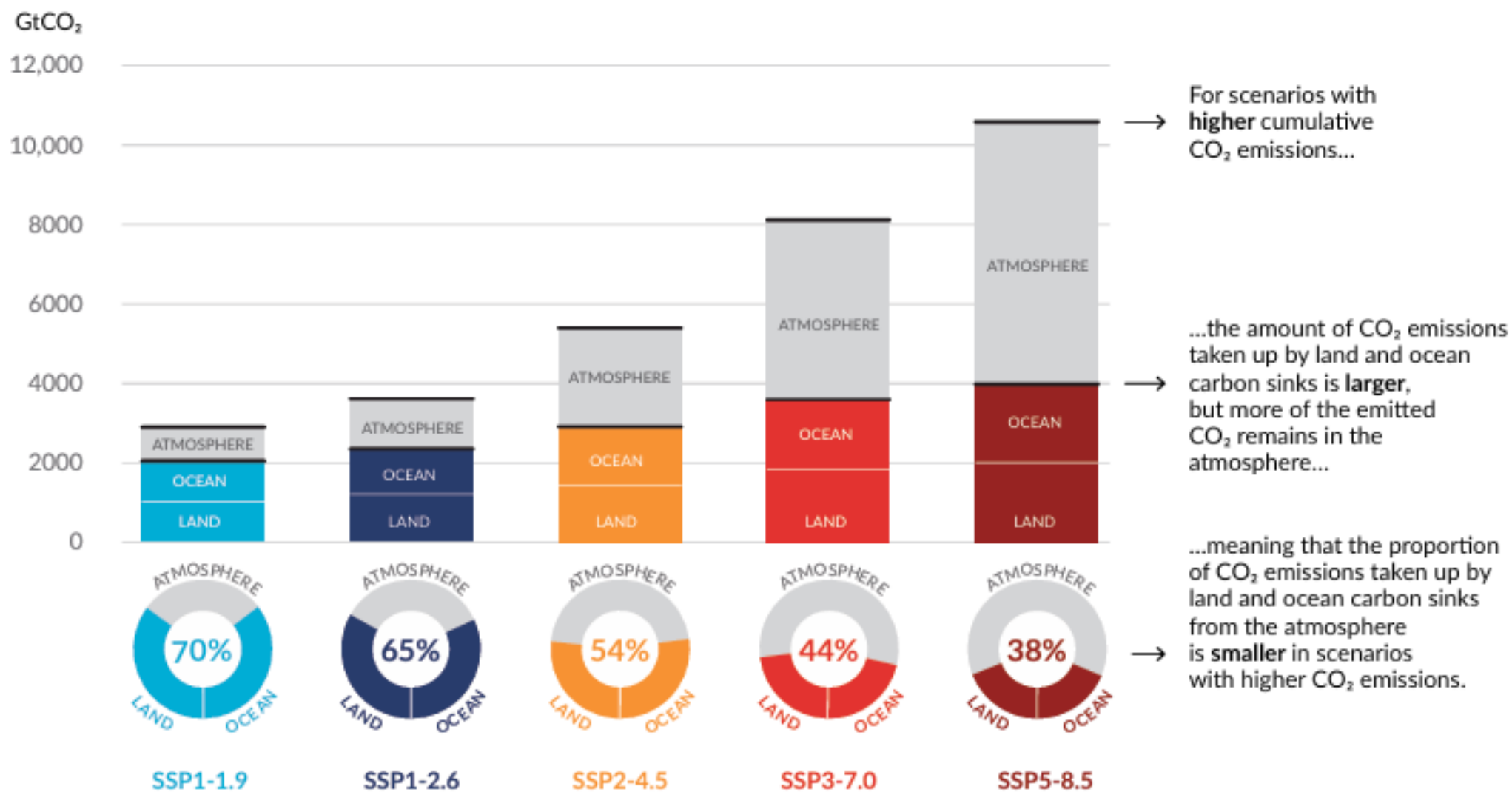
Frequency and increase in intensity of an agricultural and ecological drought event that occurred once in 10 years on average across drying regions in a climate without human influence

Future global warming levels

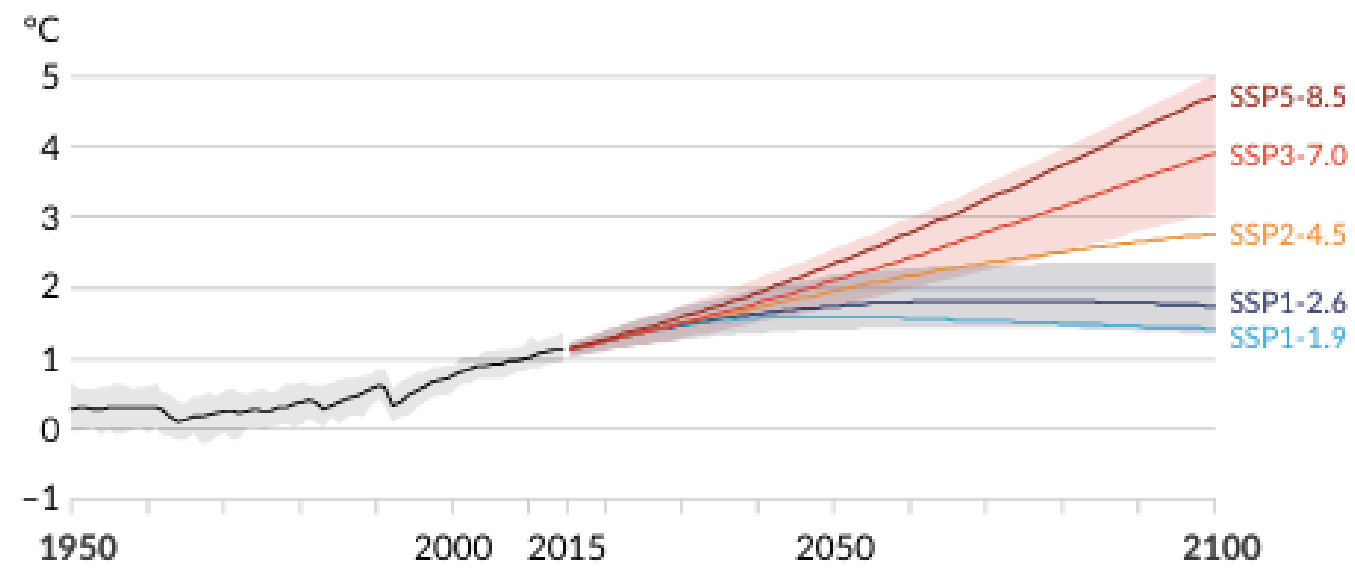


The proportion of CO₂ emissions taken up by land and ocean carbon sinks is smaller in scenarios with higher cumulative CO₂ emissions

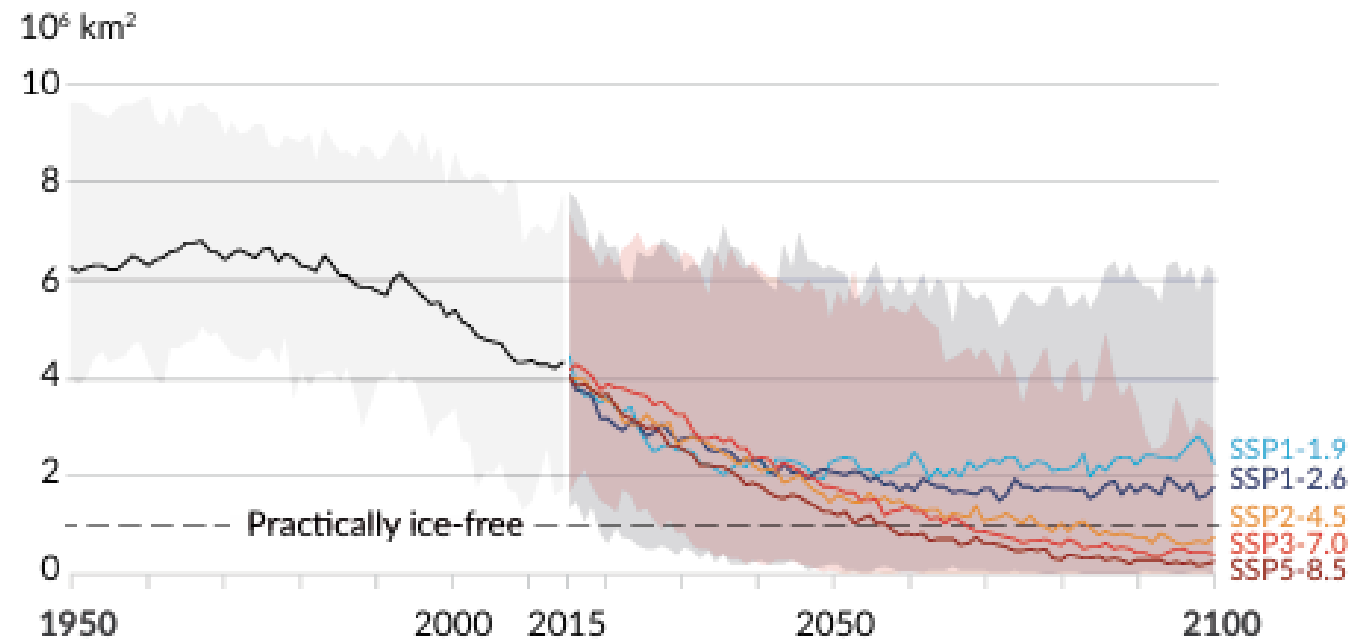
Total cumulative CO₂ emissions taken up by land and ocean (colours) and remaining in the atmosphere (grey) under the five illustrative scenarios from 1850 to 2100



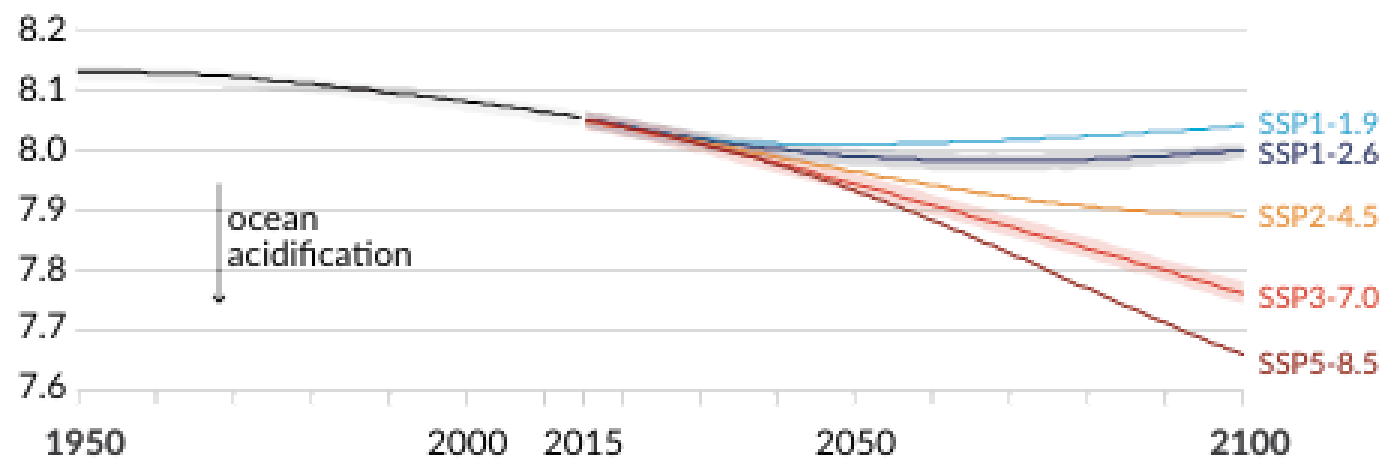
(a) Global surface temperature change relative to 1850-1900



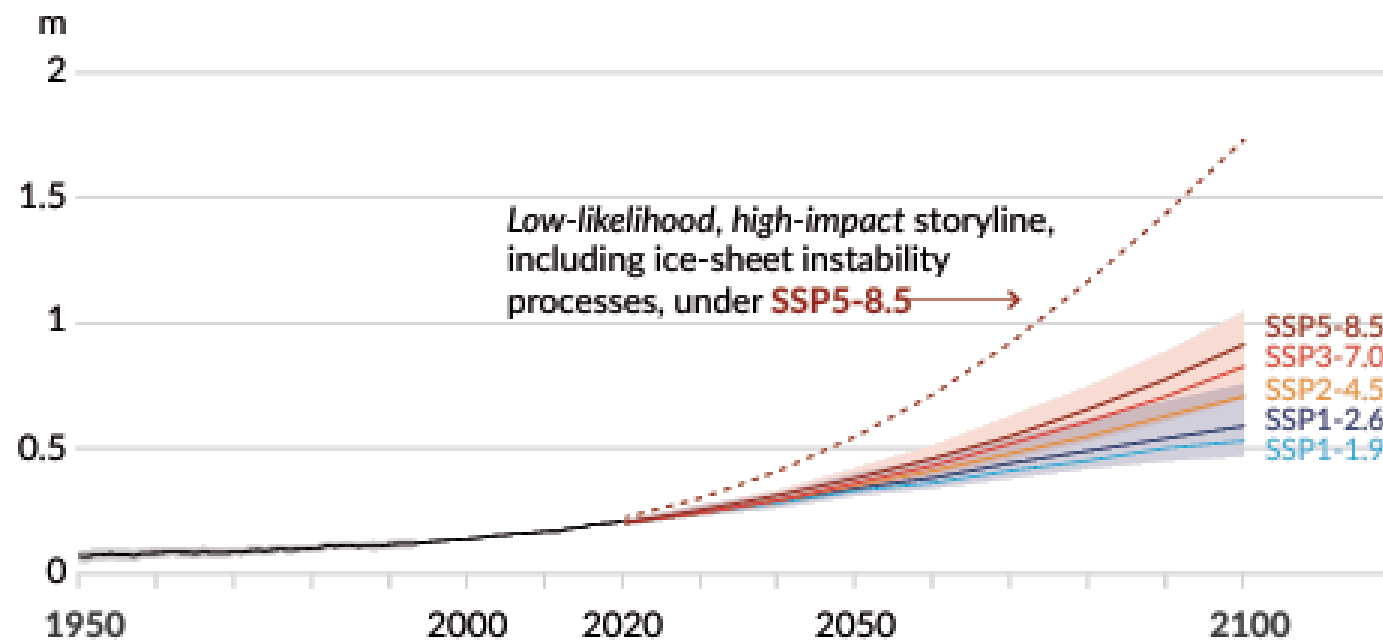
(b) September Arctic sea ice area



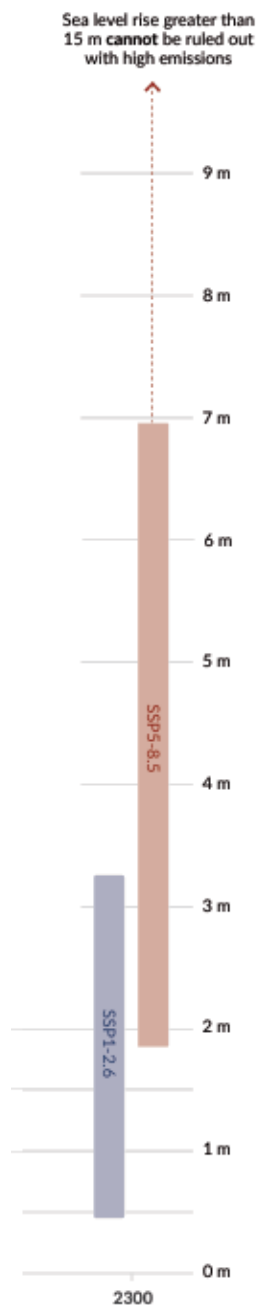
(c) Global ocean surface pH (a measure of acidity)



(d) Global mean sea level change relative to 1900



(e) Global mean sea level change in 2300 relative to 1900



ipcc

INTERGOVERNMENTAL PANEL ON climate change

Děkujeme za pozornost

Zdroje

IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. In Press.