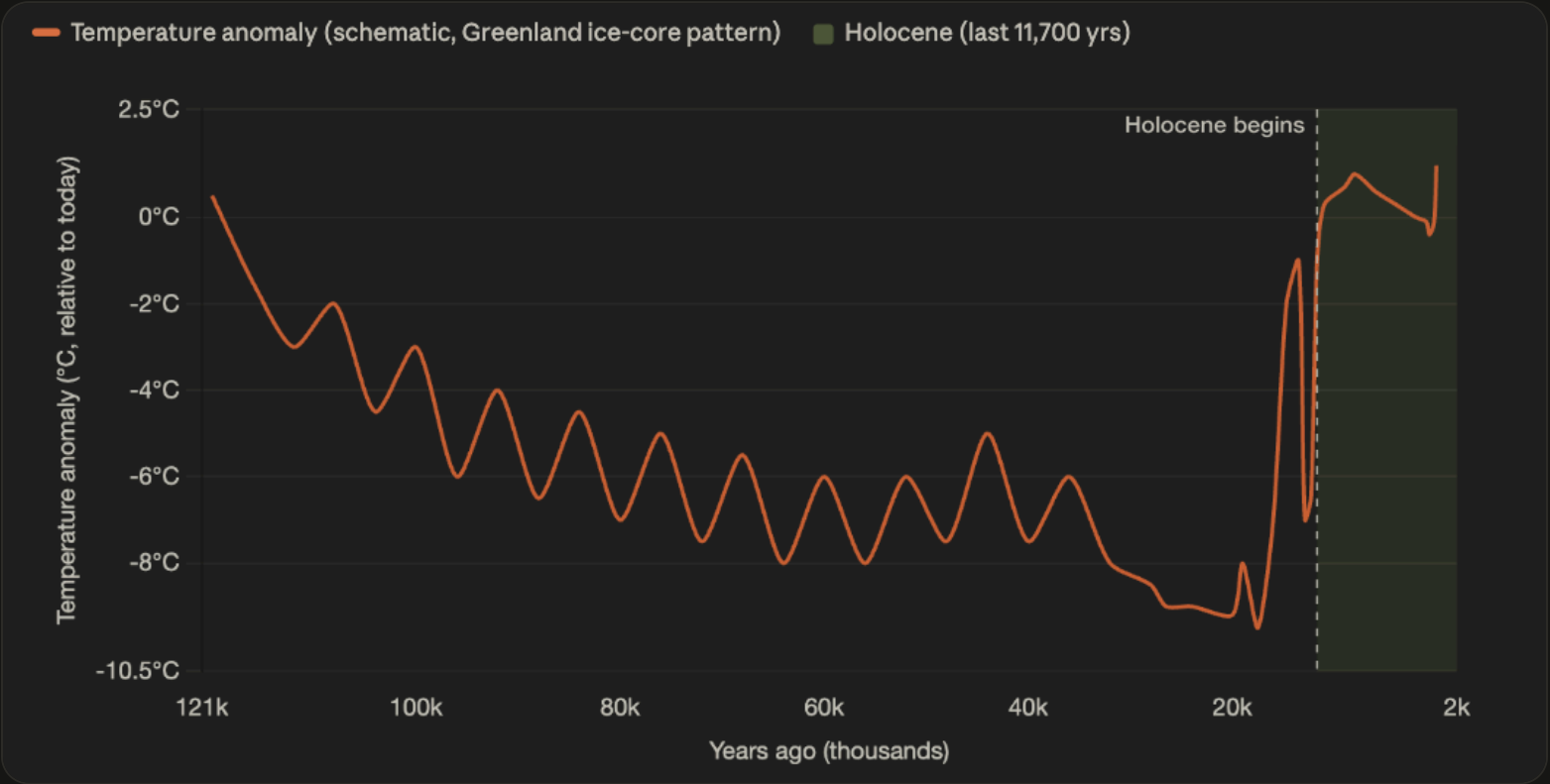


The importance of our climate in the history of human civilisation

For 11,700 years a stable climate let us farm, settle and build cities by the water. That stability is now ending.

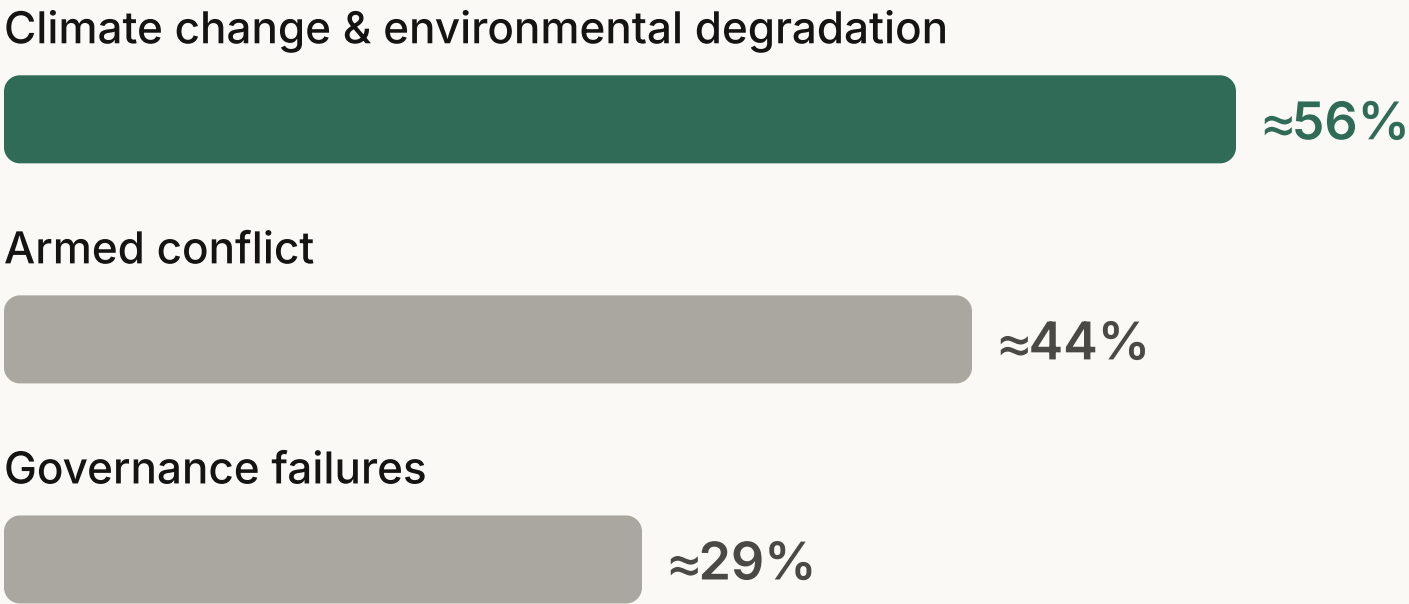


From a stable climate to a shifting map

PART 1 · SLIDES 3-5 History 03 Why climate matters 04 The Holocene's stability 05 Farming and population	PART 2 · SLIDE 6 Mechanisms 06 Five factors of climate	PART 3 · SLIDES 7-9 Atmosphere 07 Four atmospheres 08 Five jobs, five layers 09 The liquid-water zone
PART 4 · SLIDES 10-13 Warming 10 Greenhouse gases 11 Ocean heat and feedbacks 12 Five factors disturbed 13 Western Europe	PART 5 · SLIDES 14-15 Civilisation 14 The dominoes of civilisation 15 Cities at risk	

Young people rank climate as their biggest worry about the future.

TOP CONCERNS · WEF YOUTH PULSE SURVEY, DAVOS 2026



Nearly 4,600 people aged 18–30 across 144 countries.

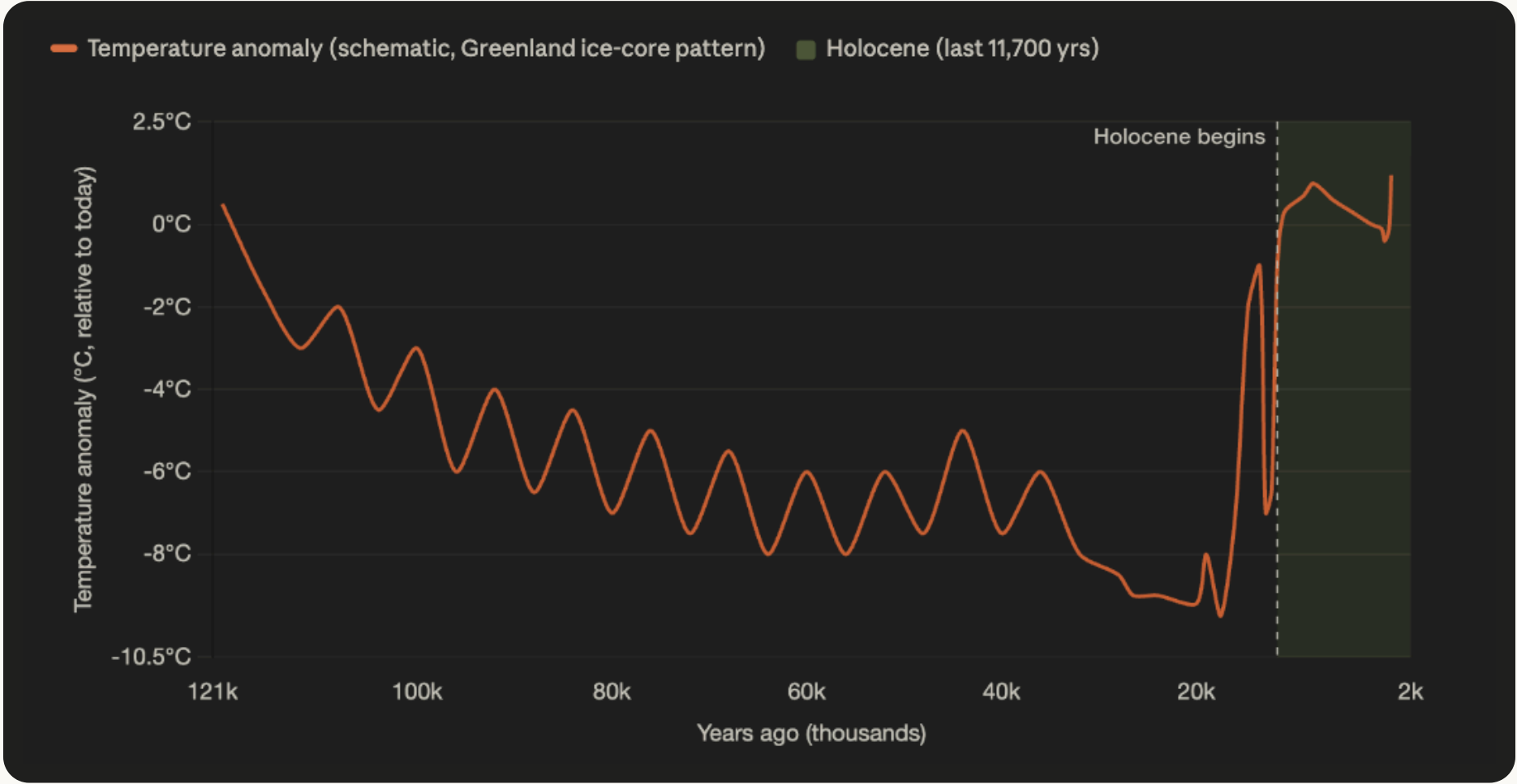
WHAT CLIMATE IS

The long-term average of weather

Measured over about 30 years: temperature, rain and snow, humidity, wind, sunshine.

Weather is what you get. Climate is what you expect.

11,700 years ago, the climate's wild swings stopped.



Temperature anomaly from a Greenland ice-core pattern. The shaded band is the Holocene.

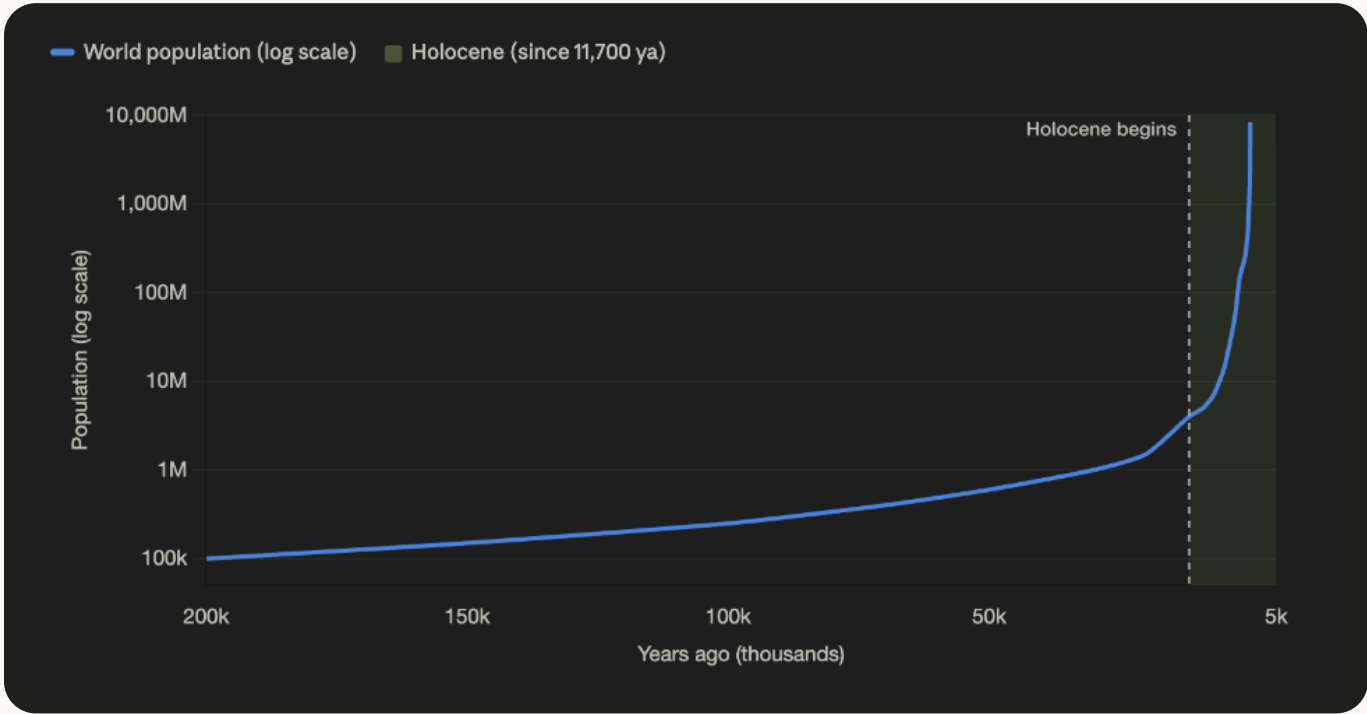
8–16 °C

swings during the last glacial period, over a few decades, as ice sheets dumped meltwater into the Atlantic

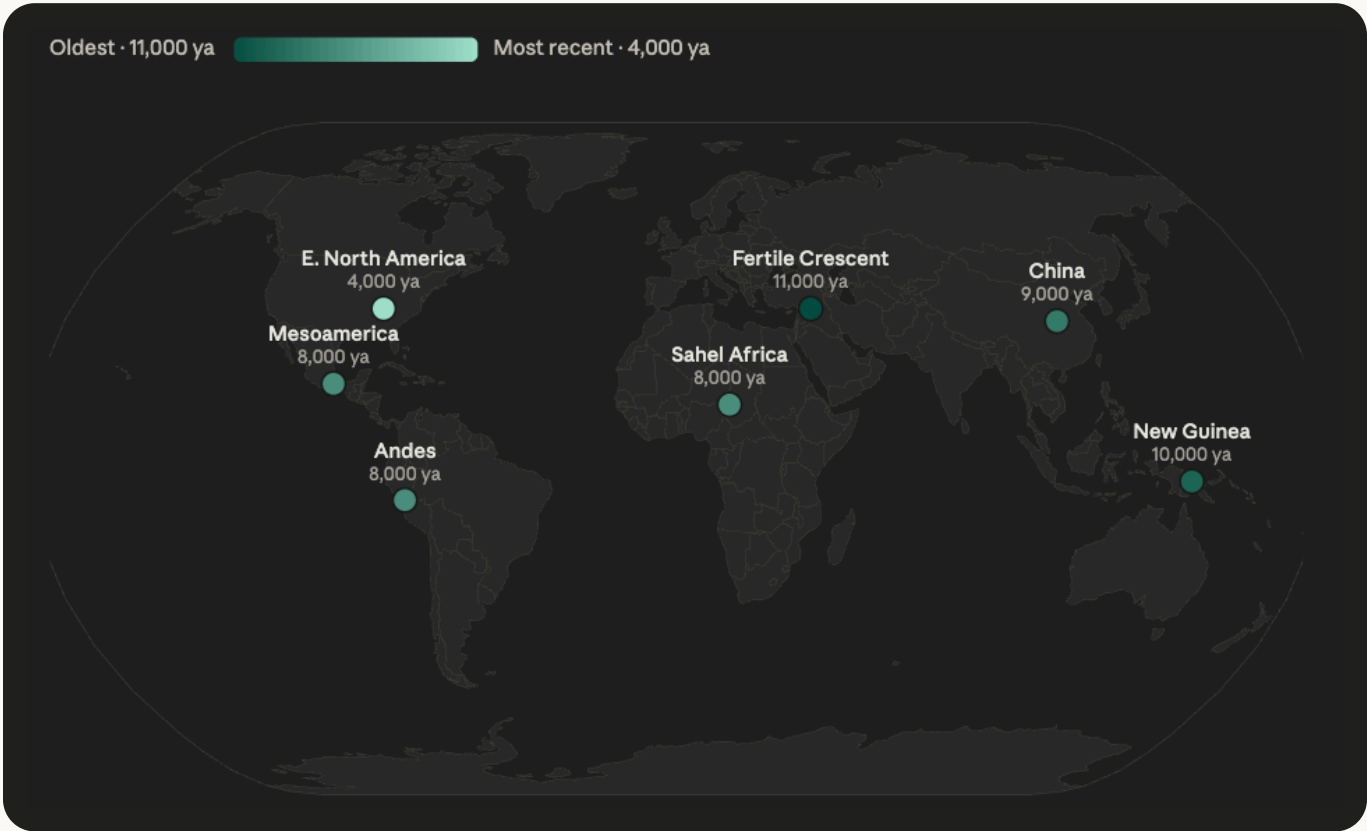
11,700 years

of unusual stability since: the Holocene, when every farm and city we know was built

Stability made farming possible, and population took off.



World population, log scale: flat for 200,000 years, near-vertical from the Holocene.

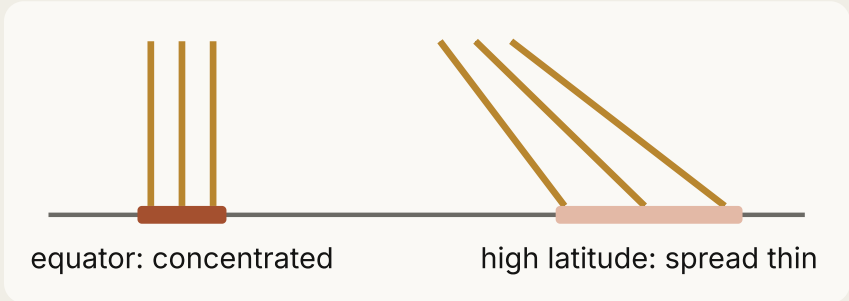


Farming was invented seven times, independently, and never before the Holocene.

Farming is a long-term bet: collect seed, plant, tend, wait, in one place, year after year. **A turbulent climate made that bet impossible; a stable one made it close to mandatory.**

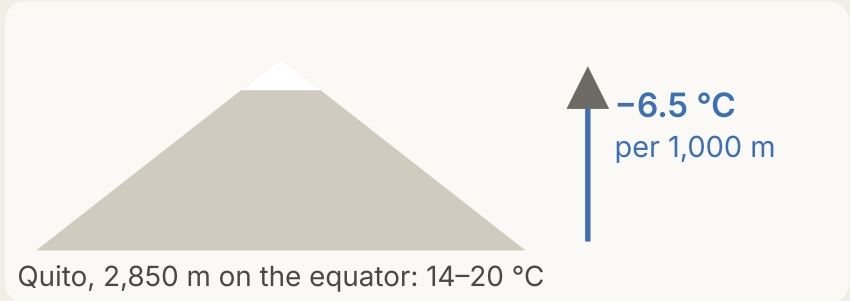
Five factors set the climate of any place.

1
Latitude



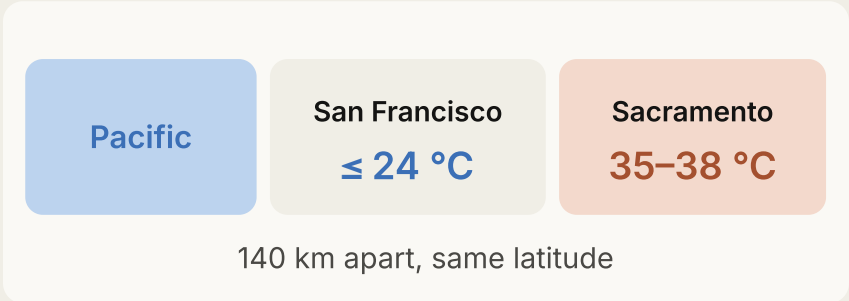
Same sun, different angle: Singapore stays 27–31 °C year round; Murmansk swings from polar night to midnight sun.

2
Elevation



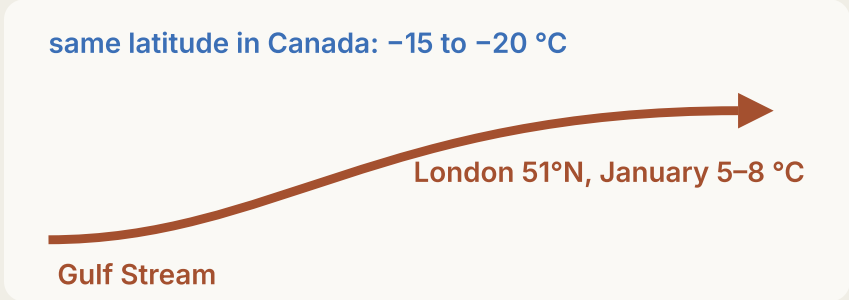
Rising air expands and cools, so a mountain is a shortcut to the pole.

3
Proximity to oceans



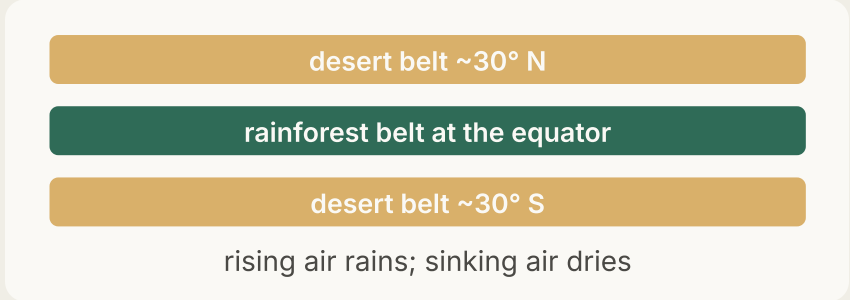
Water stores heat and releases it slowly: coasts are mild, interiors extreme.

4
Ocean currents and winds



Heat on a conveyor belt: about 20–25 °C of winter difference at one latitude.

5
Atmospheric circulation

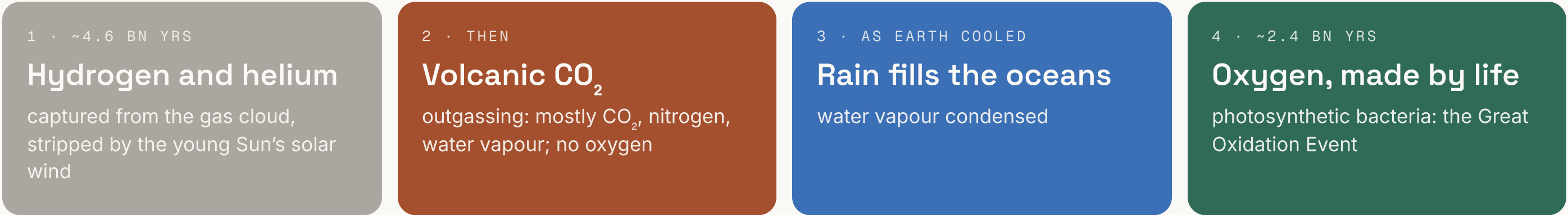


Air rises at the equator and sinks at ~30°, laying deserts and rainforests in bands.

They interact

A climate is a function of several variables: change one, and the others respond. That is why a warming world shows up differently in every region.

Earth’s air is its fourth atmosphere, and life made it.



TODAY’S COMPOSITION



argon just under 1% · CO₂ and other trace gases 0.04% and rising: the sliver doing most of the greenhouse work

A thin shell that warms, shields and moves heat.

FIVE JOBS IT DOES FOR US

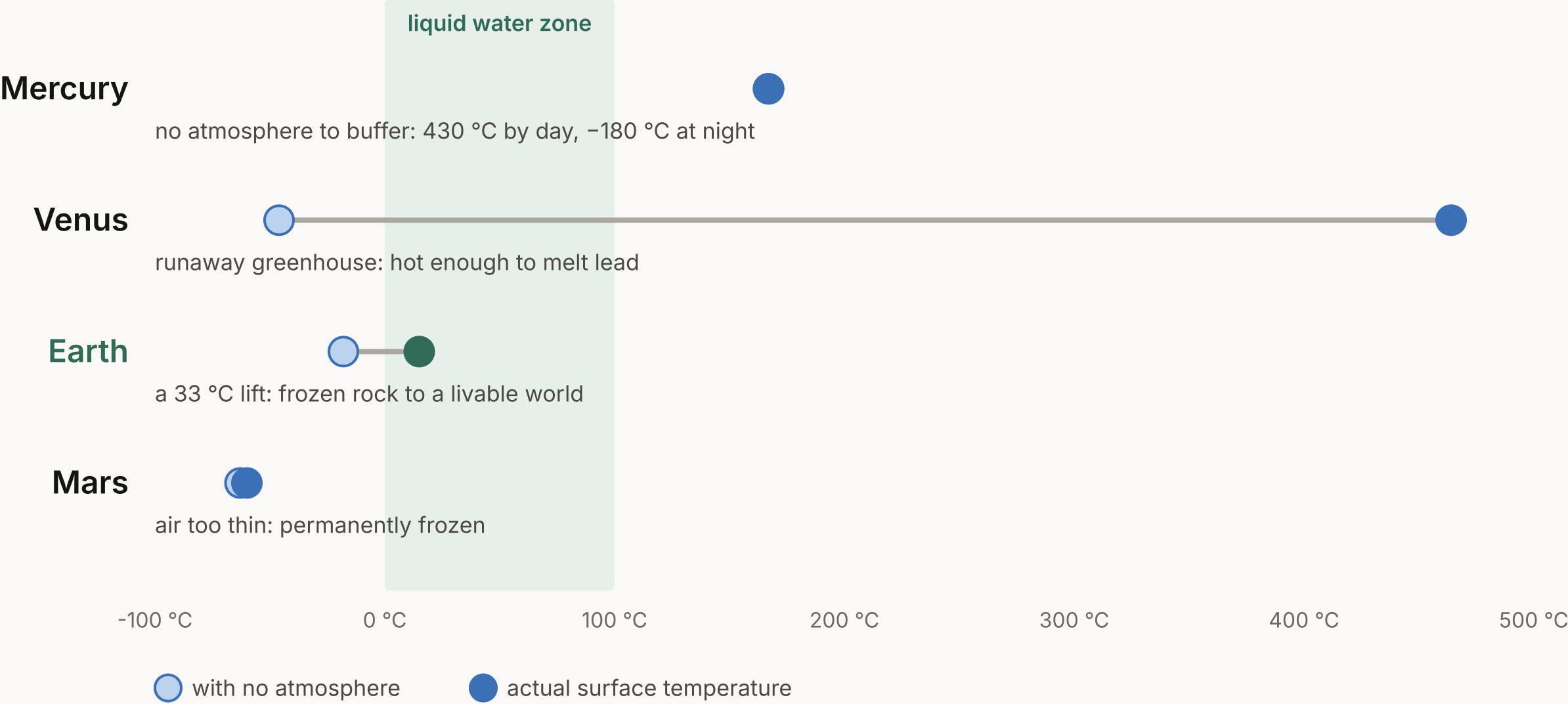
Insulation	+33 °C over a bare planet
Pressure	lets water stay liquid
Circulation	moves heat to the poles
Shielding	ozone absorbs most UV
Burning up debris	most meteors vaporise

78% nitrogen, 21% oxygen, held by gravity: every molecule is in free fall, moving sideways fast enough never to land.

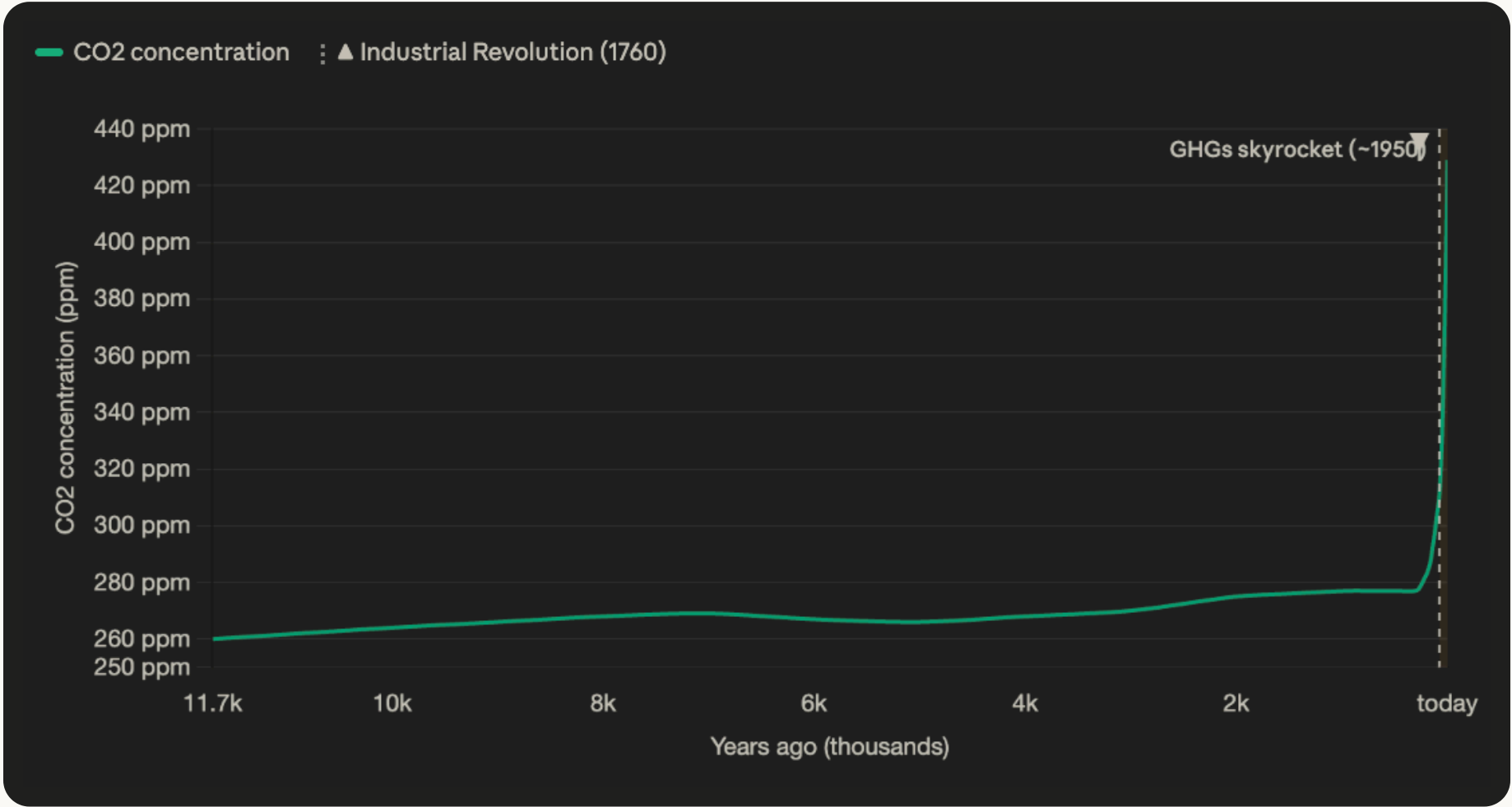
FIVE LAYERS (NOT TO SCALE)

Exosphere	600–10,000 km	fades into space
Thermosphere	80–600 km	auroras, ISS orbits
Mesosphere	50–80 km	the coldest layer
Stratosphere	12–50 km	ozone layer
Troposphere	0–12 km	all the weather

Only Earth's atmosphere lands it in the liquid-water zone.



A gas blanket: flat for 11,700 years, then near-vertical.



CO₂ concentration over the Holocene: 260–285 ppm, until coal from 1760.

429 ppm

CO₂ today, up 50% from ~280 before industry

+160%

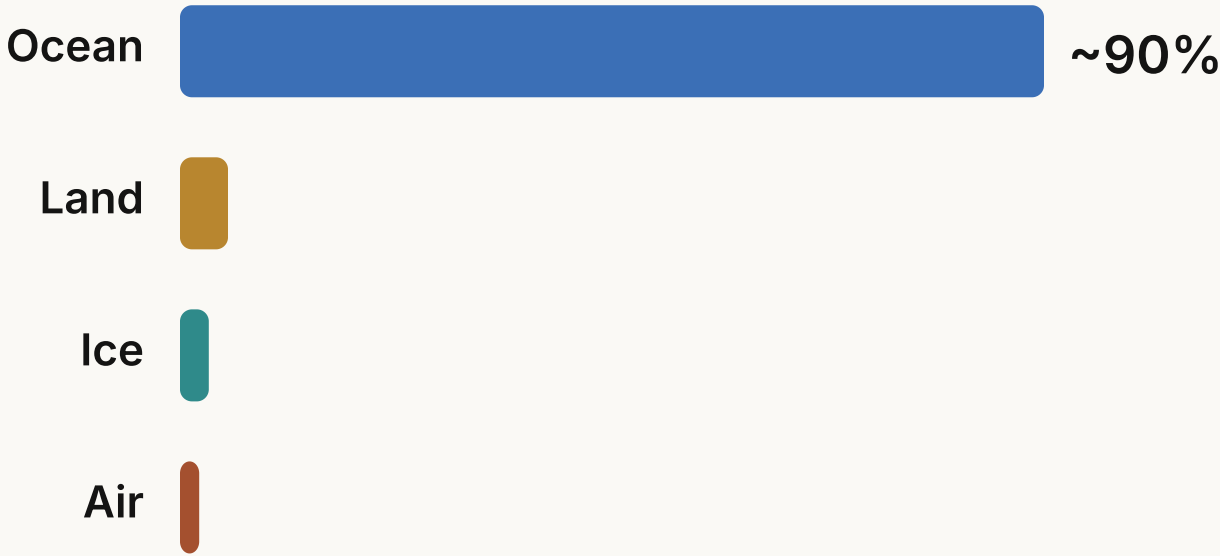
methane since 1750 (~722 → ~1,930 ppb); 28–80× more heat per molecule than CO₂

–18 °C

Earth with no greenhouse gases at all: some blanket is natural and needed

The extra heat sinks into the ocean, and feedbacks amplify it.

WHERE THE TRAPPED HEAT ENDS UP



ocean ~90%; land, ice and air share the rest (air the smallest)

The ocean acts like a sponge, which is why air warming feels delayed, and why coral bleaching and stronger storms follow.

THREE AMPLIFYING LOOPS

↻ **Ice–albedo**

less ice → darker surface → more heat absorbed

the Arctic warms 3–4× faster

↻ **Water vapour**

warmer air holds more vapour, itself a greenhouse gas

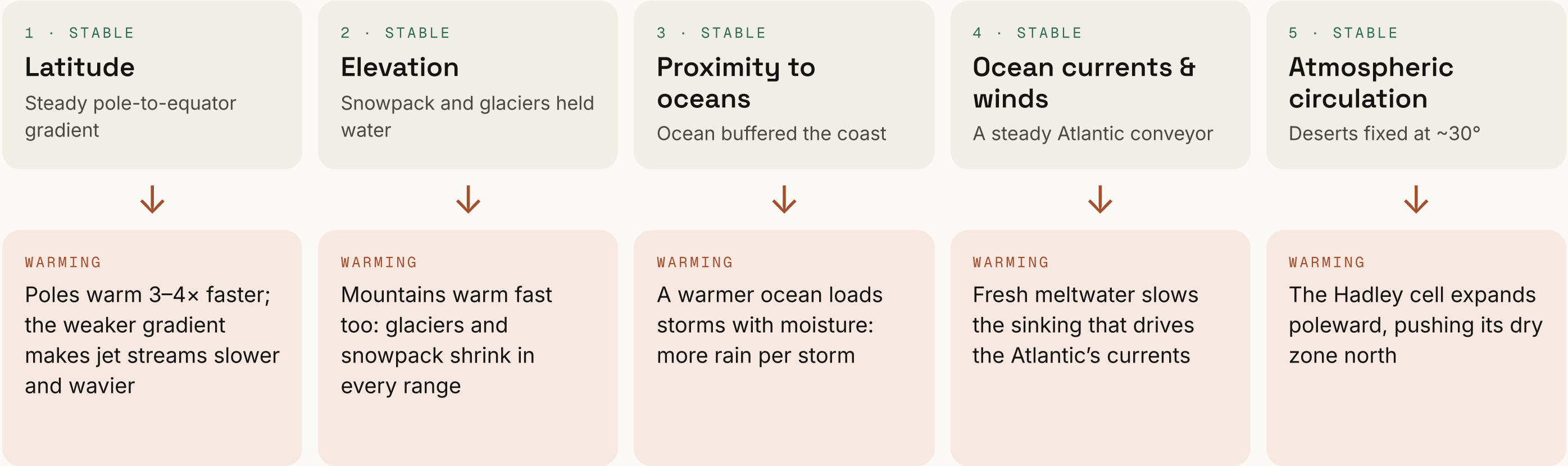
roughly doubles CO₂'s warming

↻ **Permafrost**

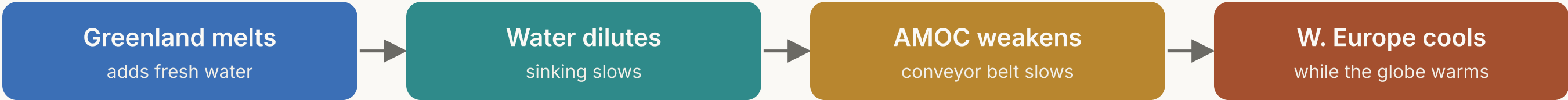
thawing ground releases CO₂ and methane

new emissions, outside any plan

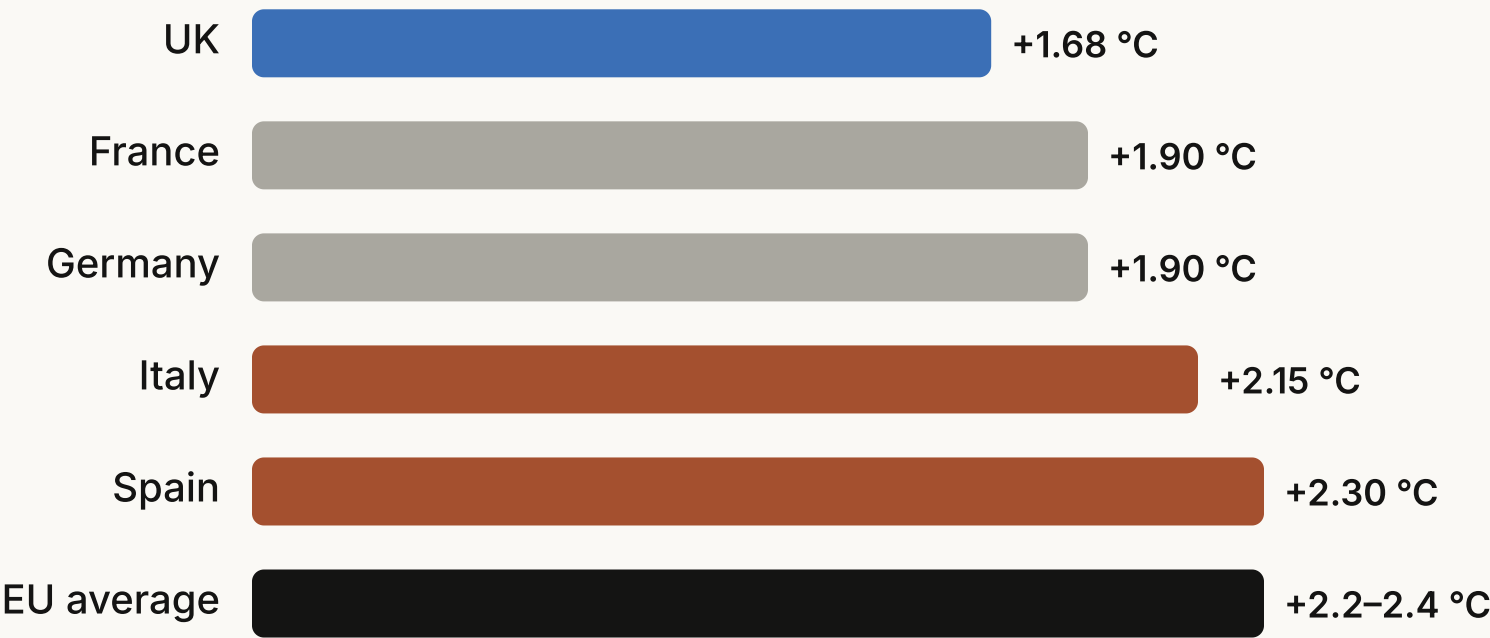
Warming disturbs all five factors at once.



Western Europe: one region, five disruptions.



WARMING ABOVE 1850-1900, BY COUNTRY



Stuck jet stream

Record heatwaves in 2003, 2019, 2022 and 2026.

Shrinking Alpine glaciers

They feed the Rhine, Rhône and Po in dry summers.

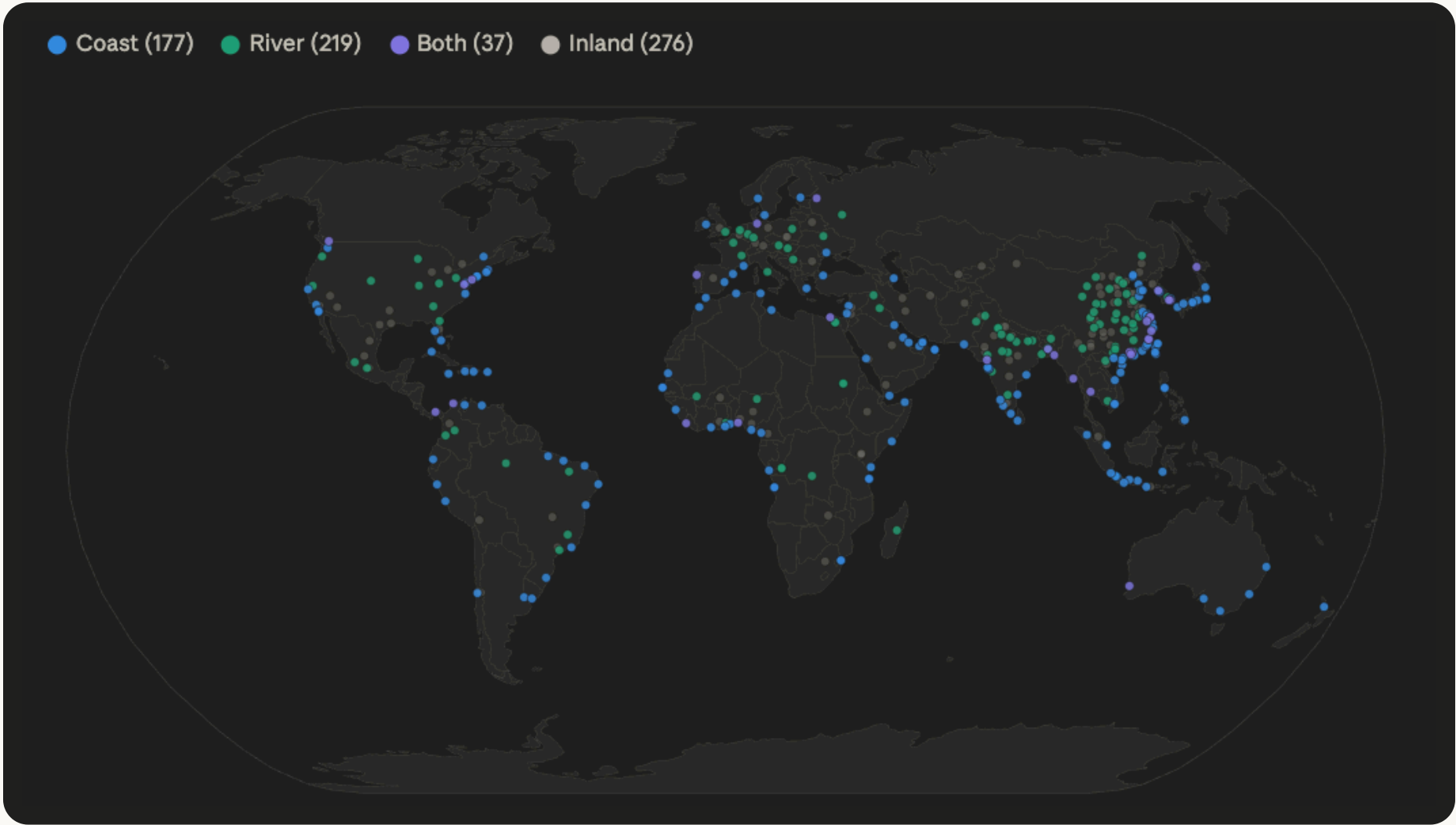
Mediterranean drying

Spain and Italy warm fastest: a small sea can't buffer heat.

Climate stability toppled the dominoes of civilisation.



Our urban future is being built where water is shifting.



The world's 709 cities over a million people: on a coast, a river, both, or inland.

61.1%

of million-plus cities sit on a coast, a river, or both

9.8–23.8%

face serious flood exposure, depending on the definition (elevation within 10–25 m of the water)

~80%

of people expected to live in cities by 2100

THE SHORT VERSION

Every city, farm and supply chain was sited for a climate that is ending. Judge climate risk by **where water will be** (coasts, rivers, rain and meltwater), **not by the global average.**

READ huyentran.tech/writings/climate-and-human-civilisation
