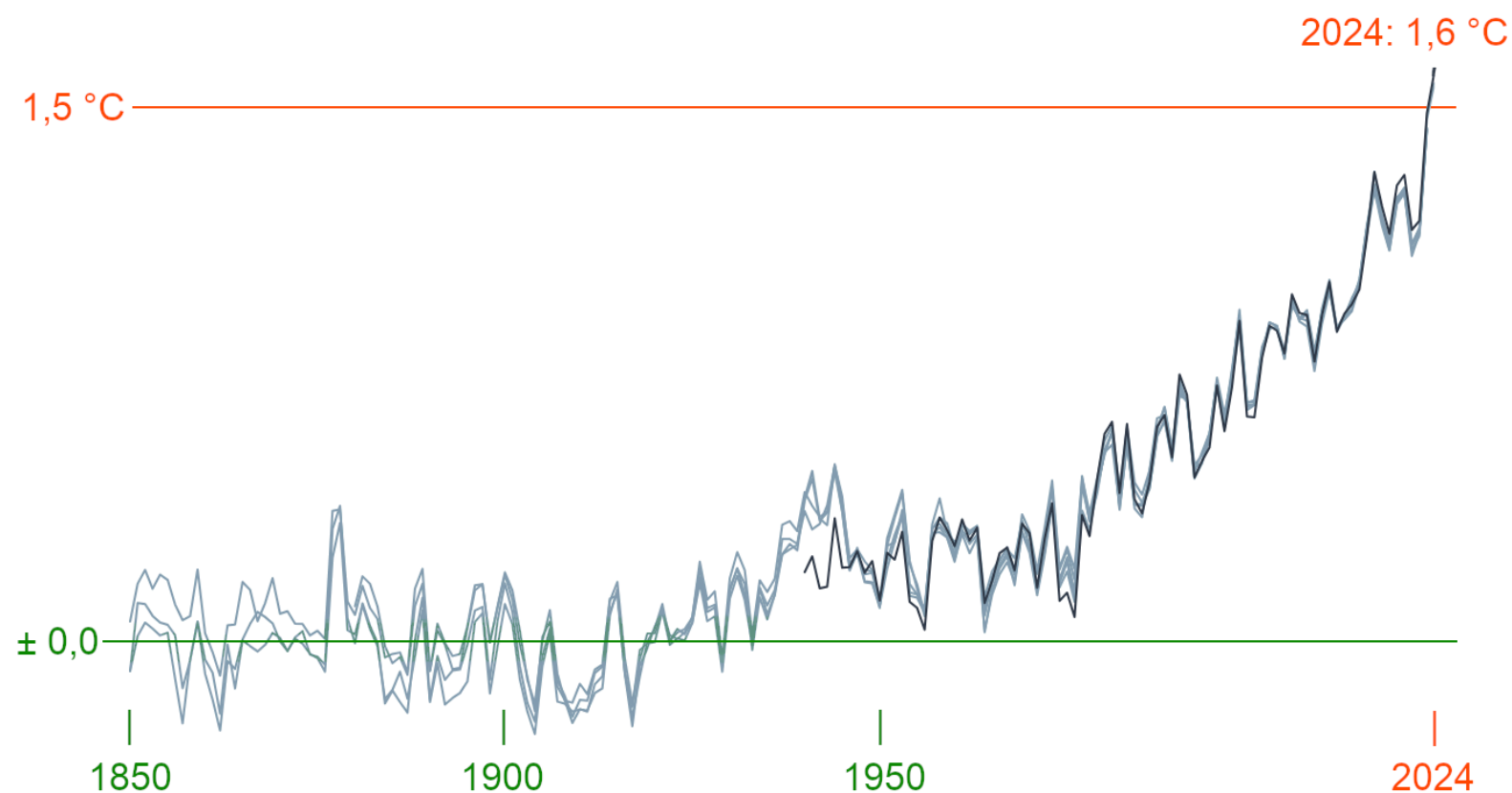




# "A year of records - CHALLENGES"



# It got a little warmer!



Annual deviation from the mean 1850-1900

Source: Copernicus Global Climate Highlights 2024

Data

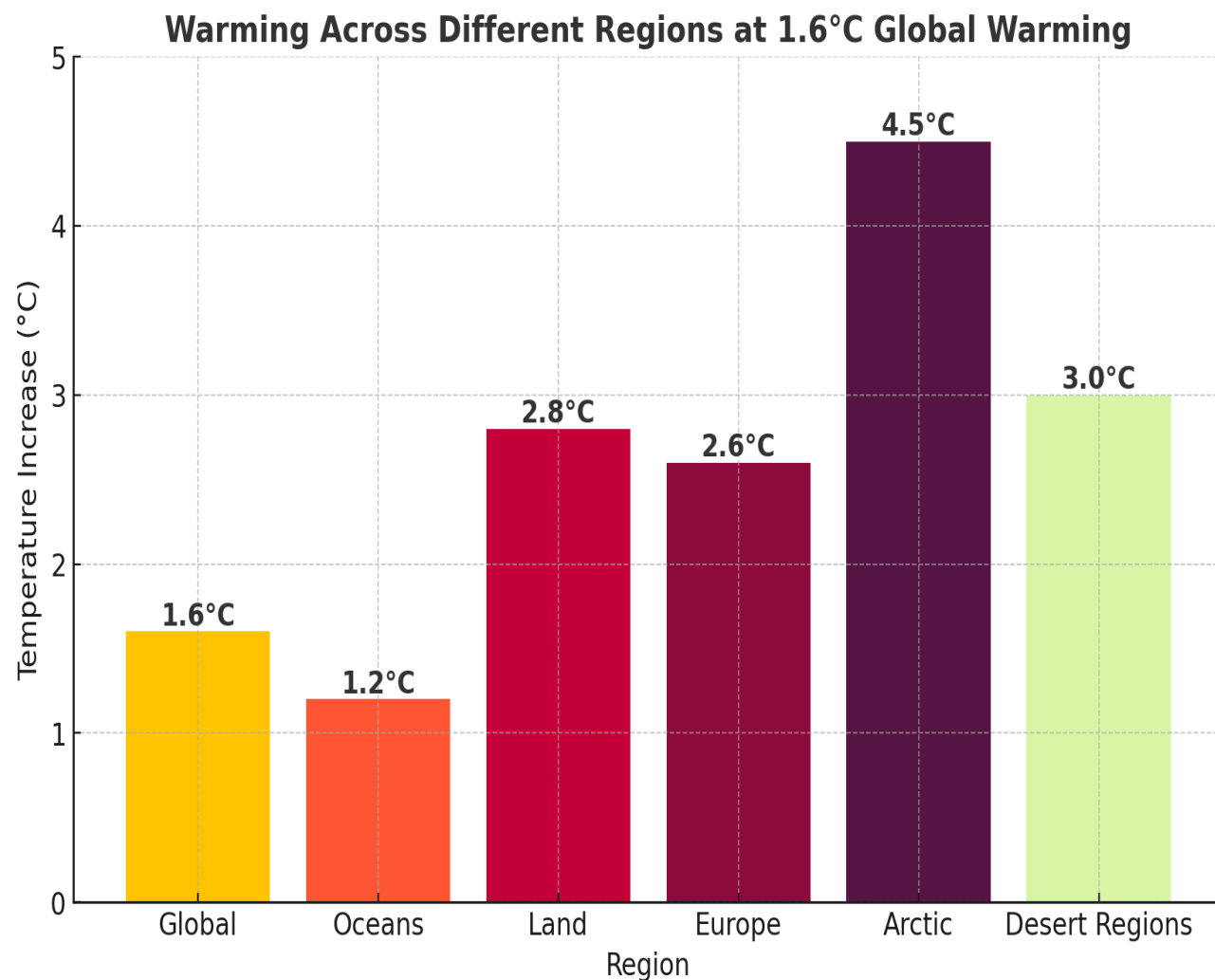
Dark: Copernicus ERA5

Bright: JRA-3Q, GISTEMPv4, NOAA GlobalTempv6, Berkeley Earth, HadCRUT5

**Source: Copernicus**

The Copernicus Climate Change Service (C3S) is part of the EU space and earth observation programme Copernicus, whose five other services deal with atmosphere, emergency, land, sea and security. It is operated primarily by the European Centre for Medium-Range Weather Forecasts (ECMWF) and supported by the European Space Agency (ESA), among others.

# Everywhere ?



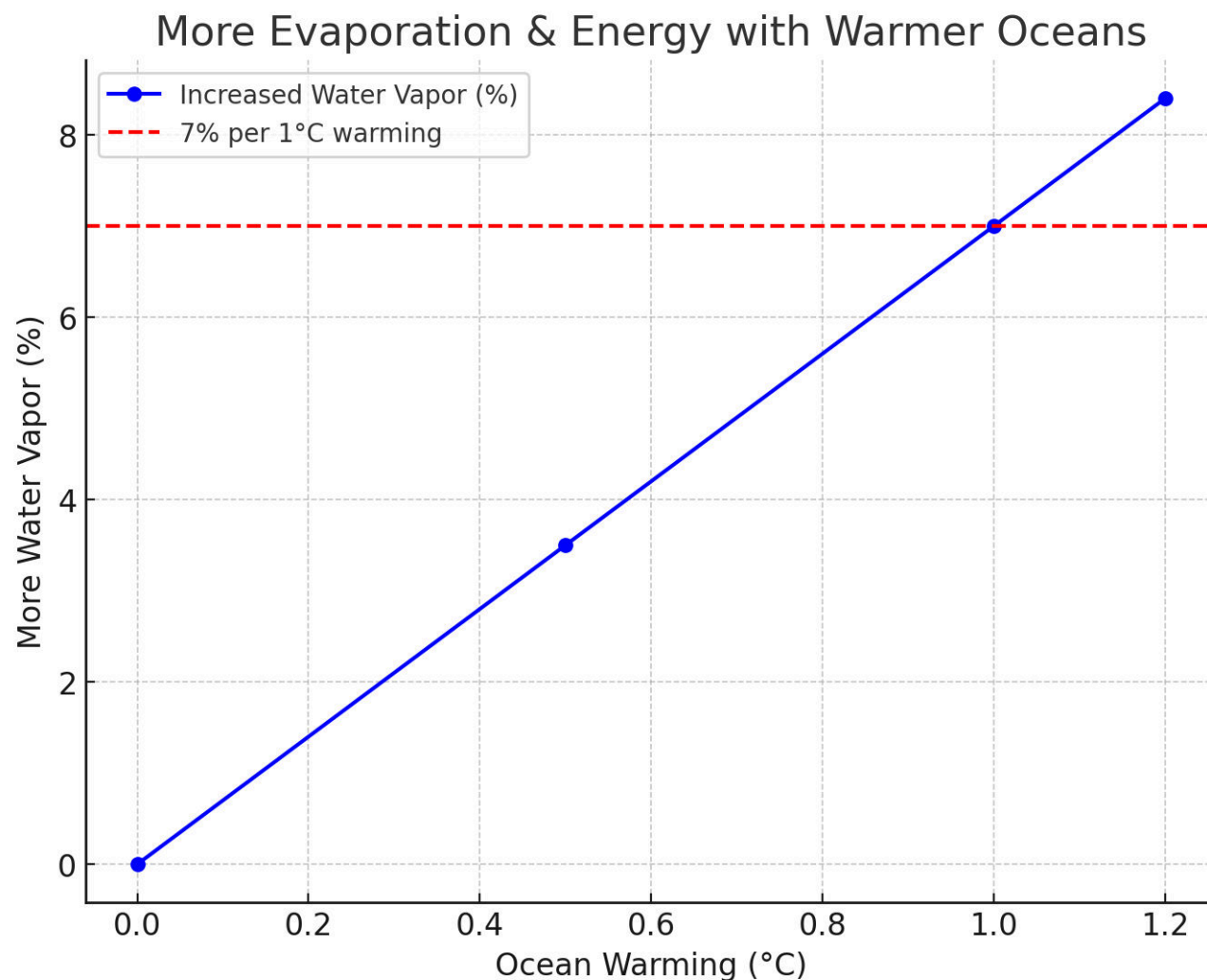
## Meaning

Oceans are heat reservoirs → The global average temperature is dampened.

Lower heat capacity of the soil → Land surfaces do not store heat as well as water and release it more quickly.

Feedback effects (e.g. due to ice melting, reduced vegetation) → Dry areas warm up more than humid regions.

# Ocean warming and evaporation



## Meaning

Current global evaporation  
approx. 505,000 km<sup>3</sup> of water per year  
in the ocean and on land

+ 1°C means + 7% water vapour

corresponds to + 35,350 km<sup>3</sup> of water  
in the atmosphere

is equivalent to 14 billion Olympic  
swimming pools full of water or  
5x the total amount of water in Lake  
Constance!



# Oops, something's coming!

☞ More moisture

→ More extreme precipitation

☞ More energy

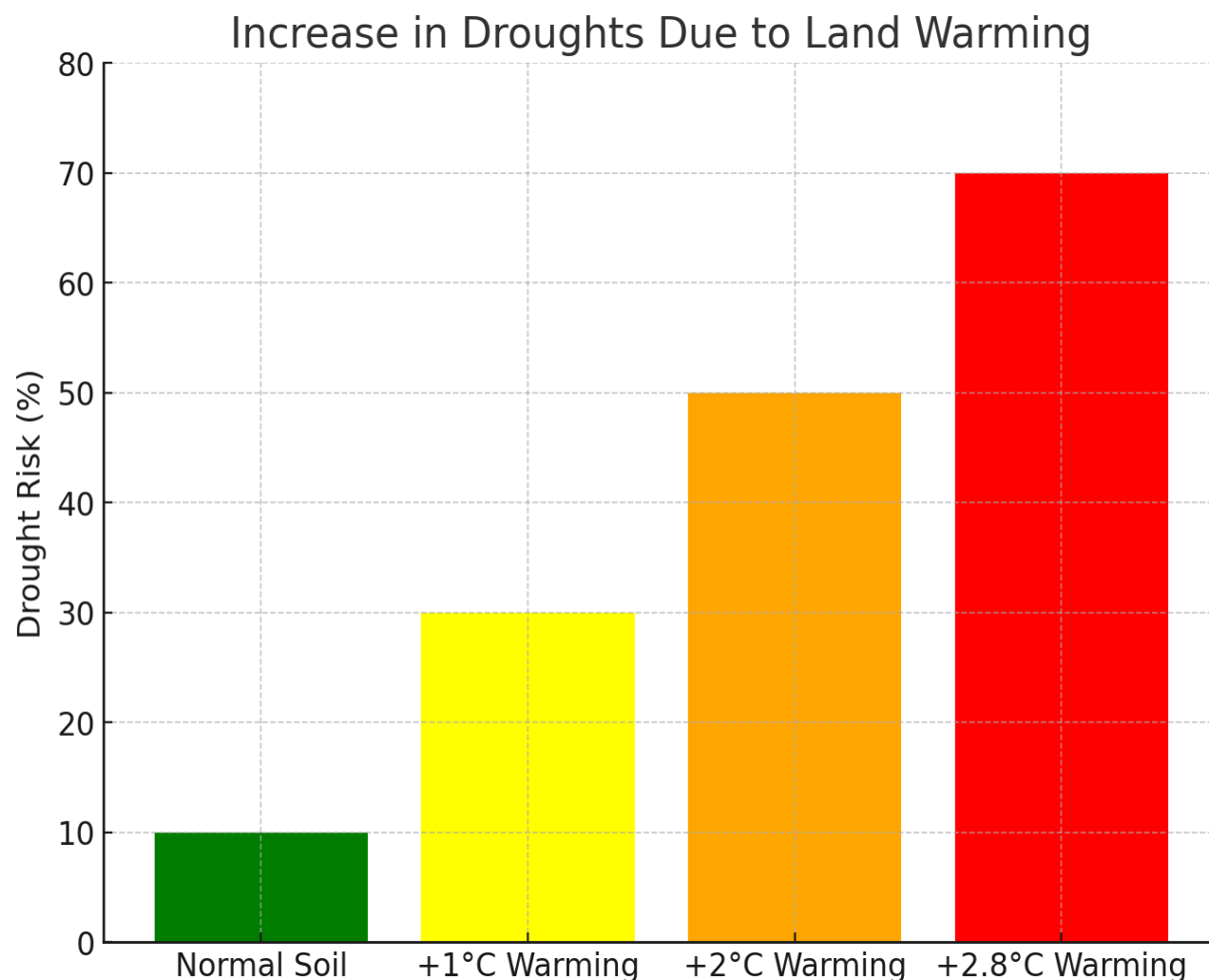
→ More and stronger storms

✓ Result: weather extremes

→ Heavy rain, floods, droughts



# Land warming and consequences



## Meaning

A hot day  $>35^{\circ}\text{C}$  evaporates approx. 4 mm of water per day.

With  $+2.8^{\circ}\text{C}$  warming,  $\sim 12\%$  more water evaporates  $\rightarrow$  4.5 mm per day or 135 mm per month

corresponds to 15 mm less soil moisture

$\rightarrow$  Soils dry out faster, plants wither, periods of drought are extended by 20-40%

$\rightarrow$  Crop losses and water shortages



# Oops, something's coming!

☞ More heatwaves and extreme temperatures

☞ Desertification is spreading

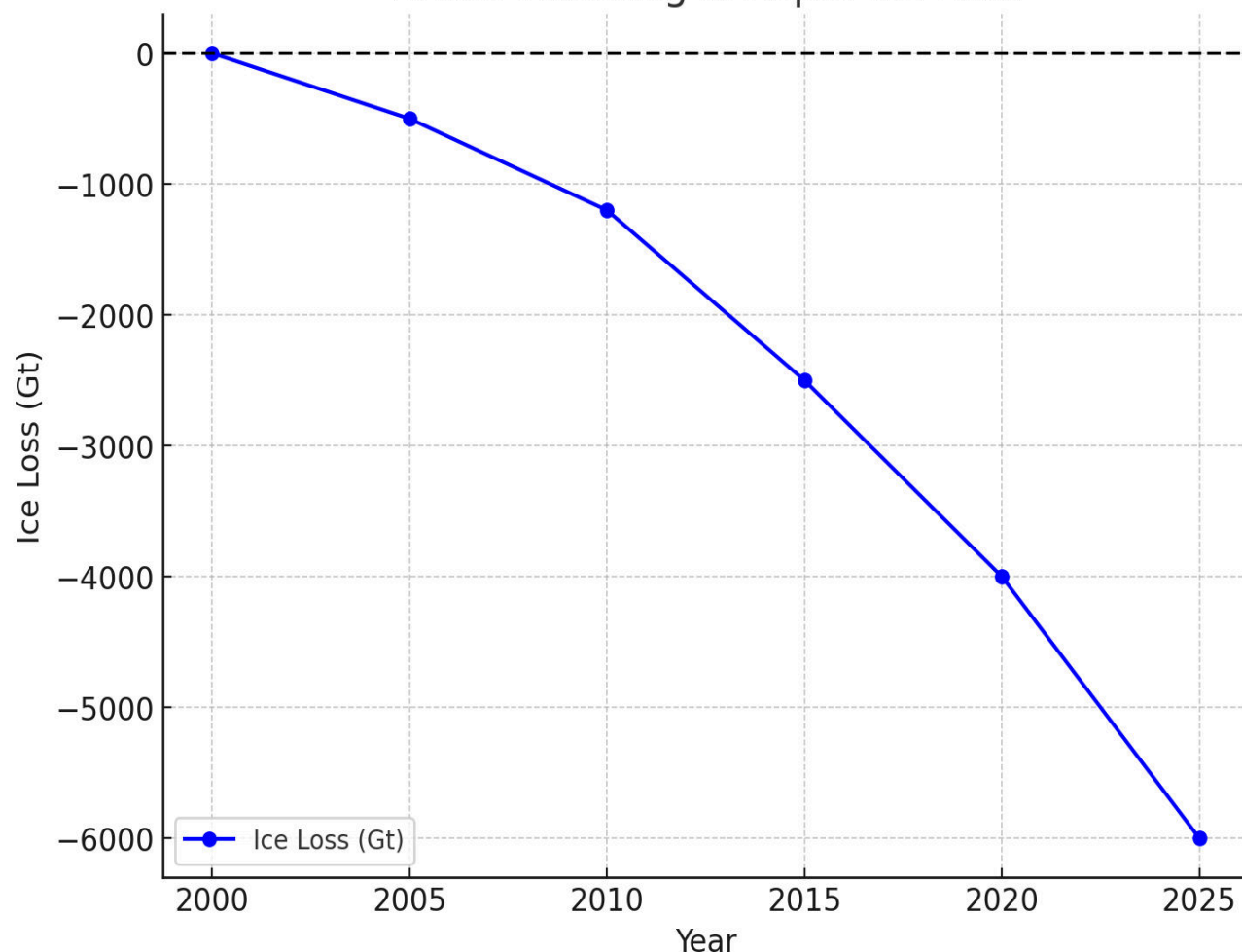
☞ Harvests dry out more quickly

☞ Water scarcity on the rise



# Arktische Erwärmung und Eisschmelze

Arctic Warming & Rapid Ice Loss



## Meaning

Arctic ice is currently losing around 150 billion tonnes per year.

Warming by  $+4.5^{\circ}\text{C}$  accelerates ice loss by a factor of 3-4  $\rightarrow$  450-600 billion tonnes per year.

That's enough to put Germany about 2 metres under water!

Darker ocean surfaces (because ice is melting) absorb more solar heat, which further accelerates warming.



# Oops, something's coming!

☞ Rising sea level

→ Coastal towns under threat

☞ Stronger storms due to changing air currents

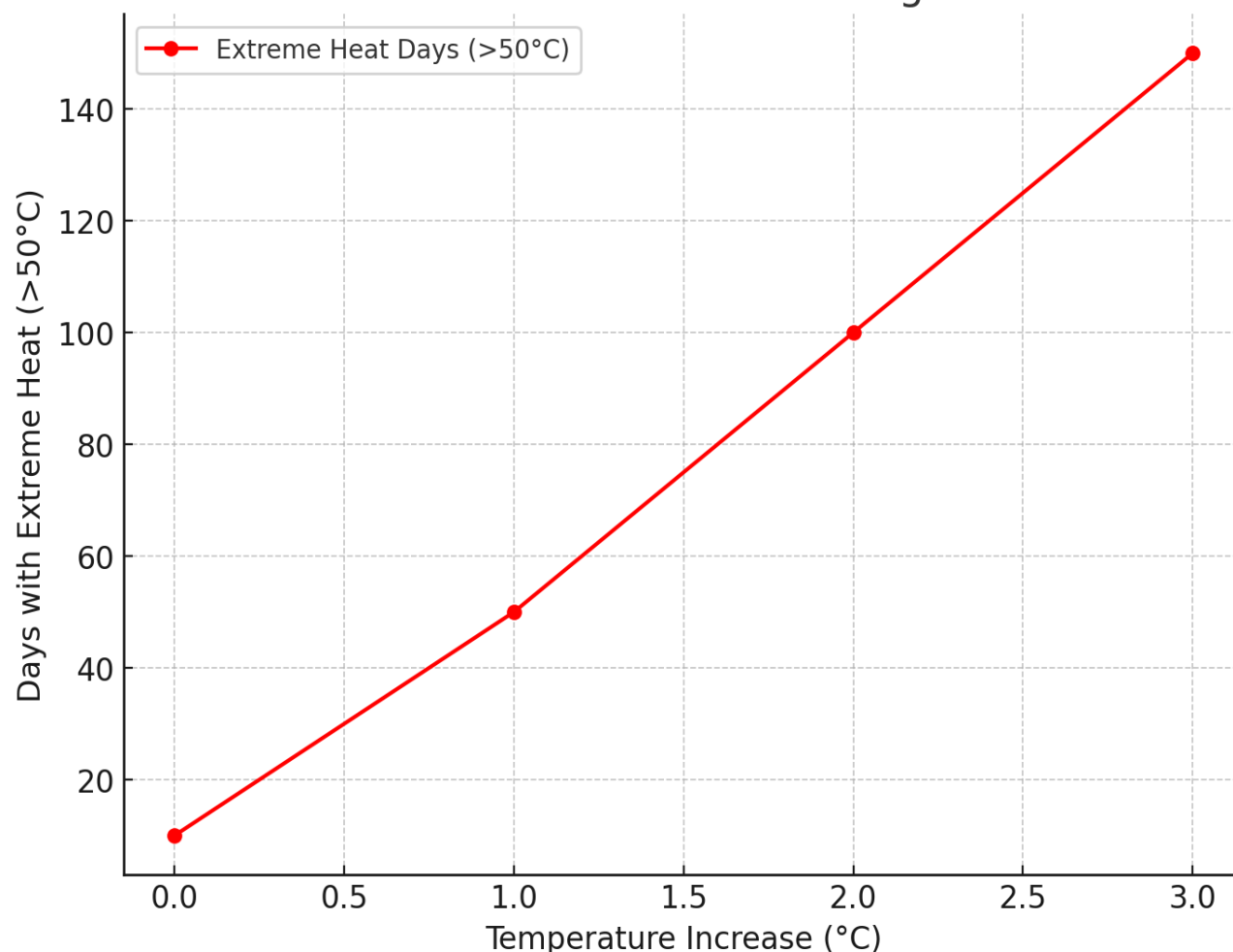
☞ Release of methane from permafrost

⇒ Rising temperatures



# Desert regions and extreme heat

Extreme Heat in Desert Regions



## Meaning

The Sahara currently experiences 40-50 extreme heat days (>45°C) per year.

With +3.0°C warming, the number rises to 100-150 days per year!

Temperatures of over 55°C are regularly reached in North Africa and the Middle East, for example.

More than 1 billion people in these and other regions will suffer from water shortages.



# Oops, something's coming!

☞ Extreme heatwaves  
→ Uninhabitable regions

☞ Crop failures  
→ Hunger crises & migration

☞ Water shortage  
→ Growing social tensions, war



# Thank you for sticking with it!



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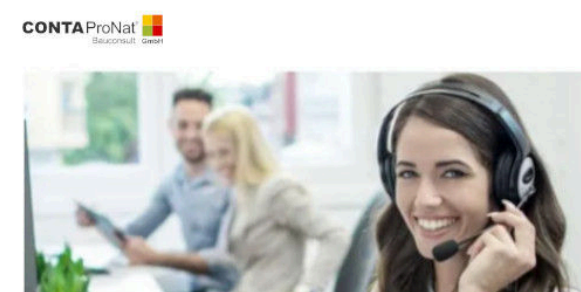
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