

Quantifying climate risk

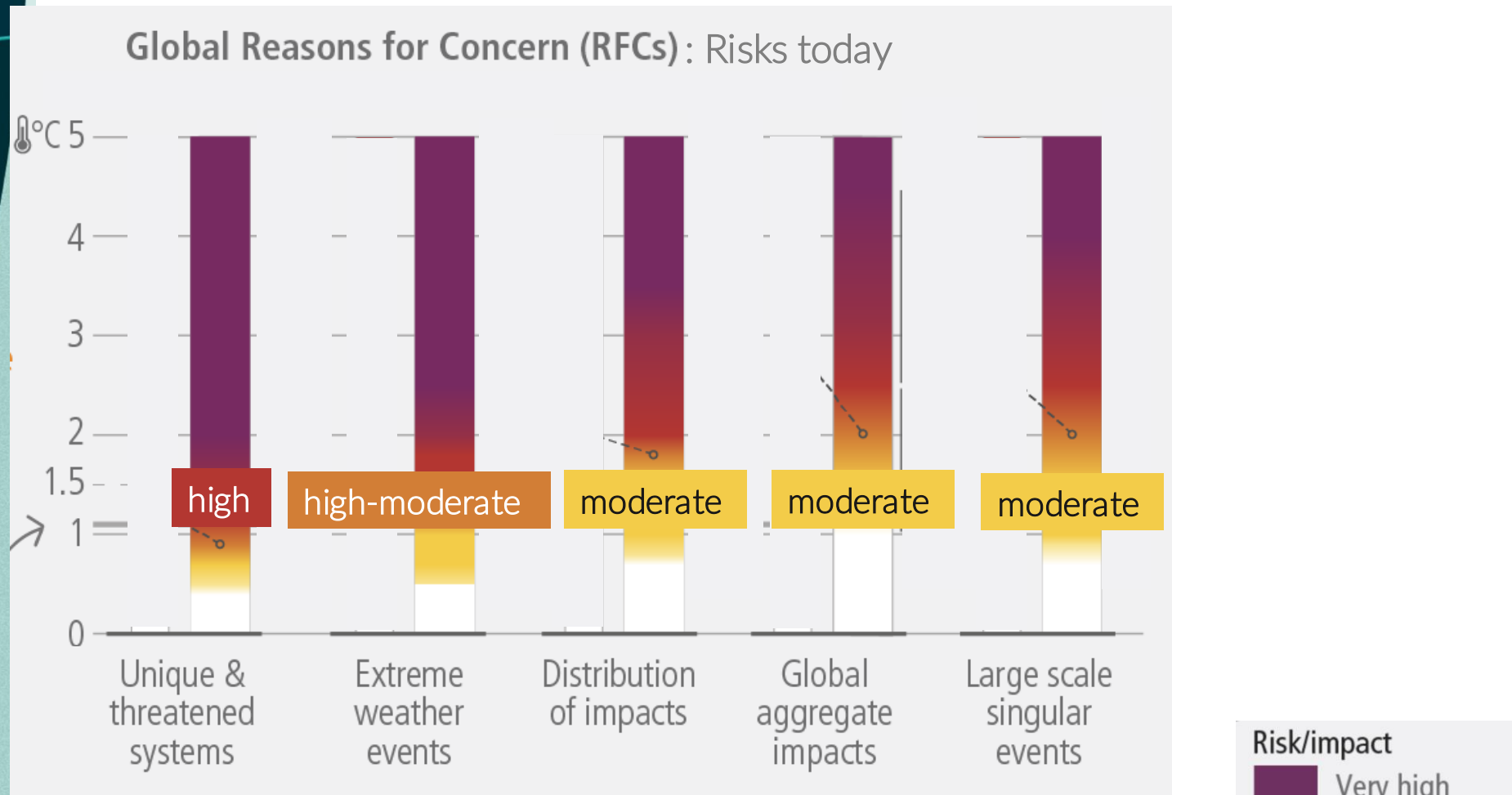
CAMBRIDGE
ZERO₂

Frog in a pot of boiling water

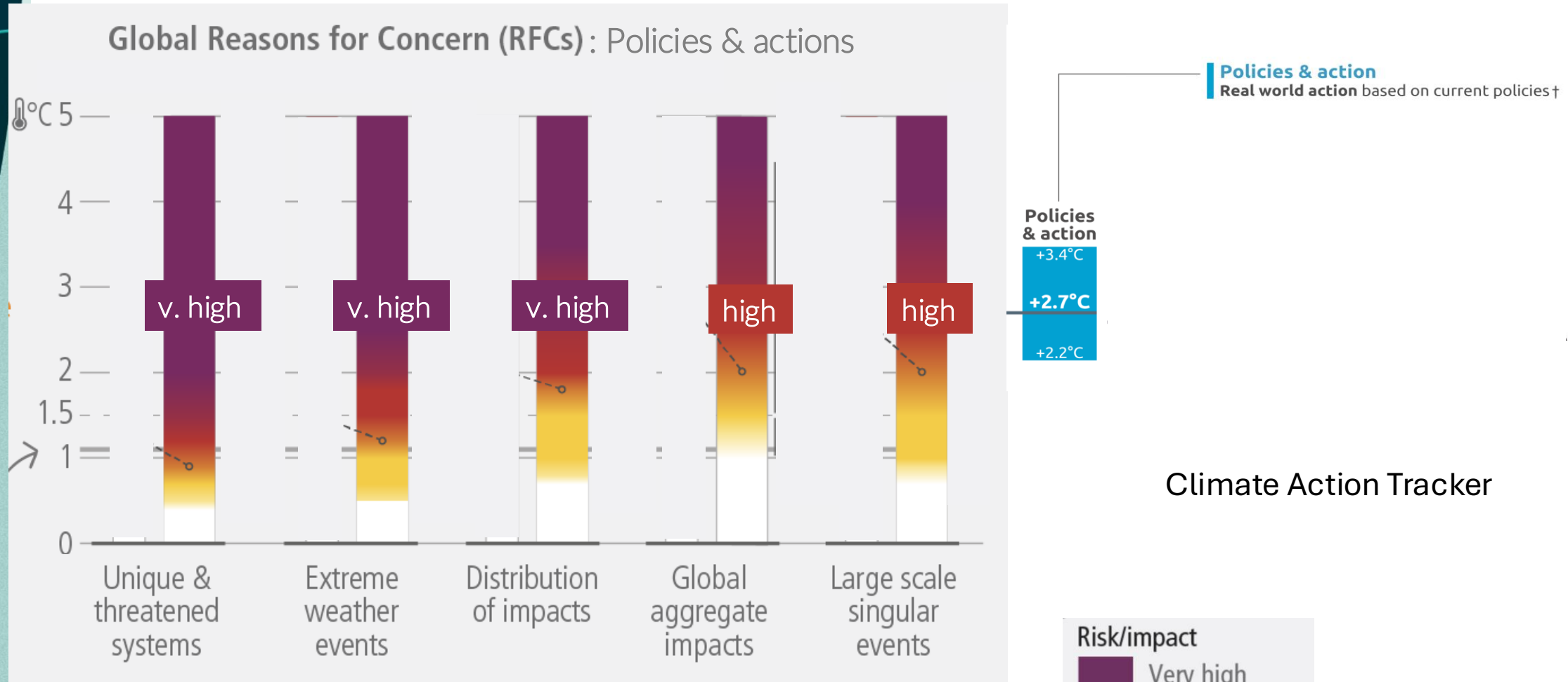


“I like to imagine the frog has a chief scientific advisor”, Simon Sharpe, Five Times Faster

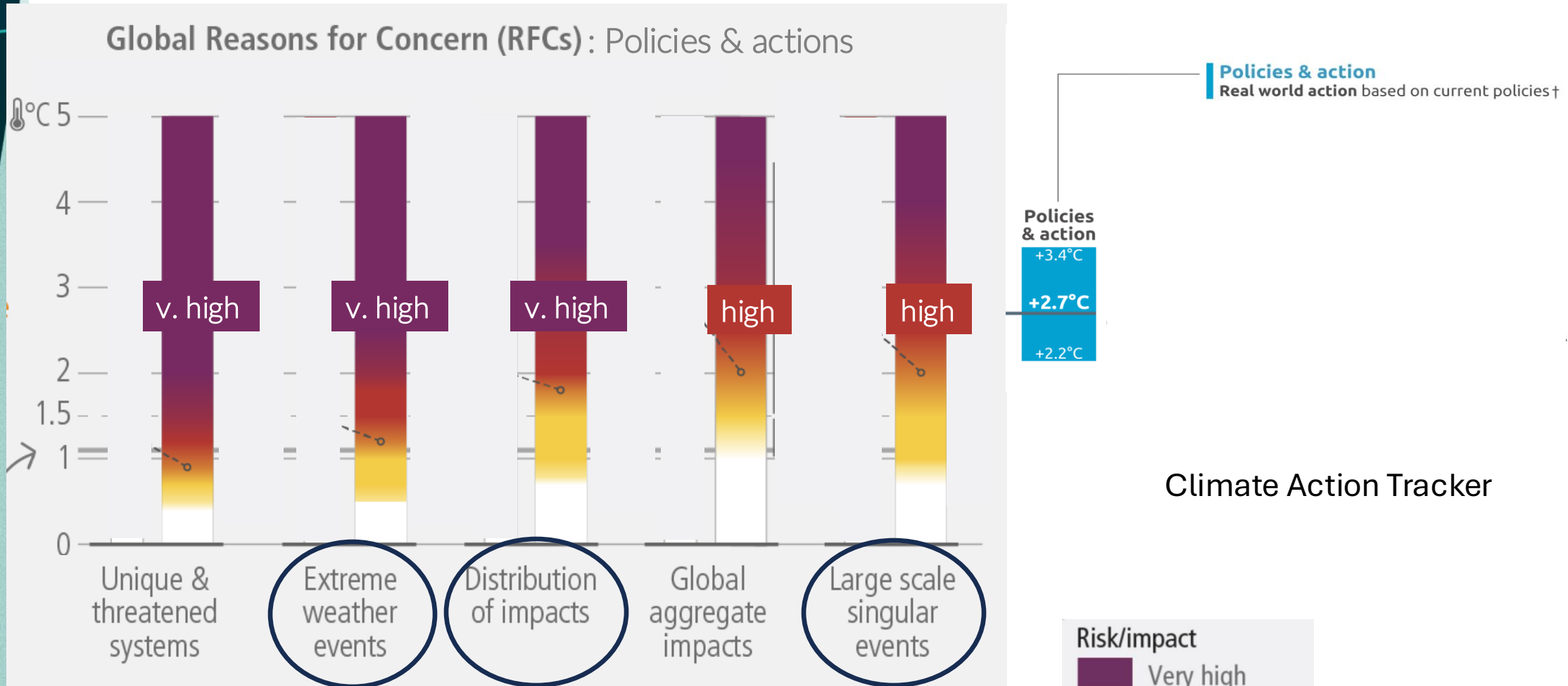
IPCC reasons for concern



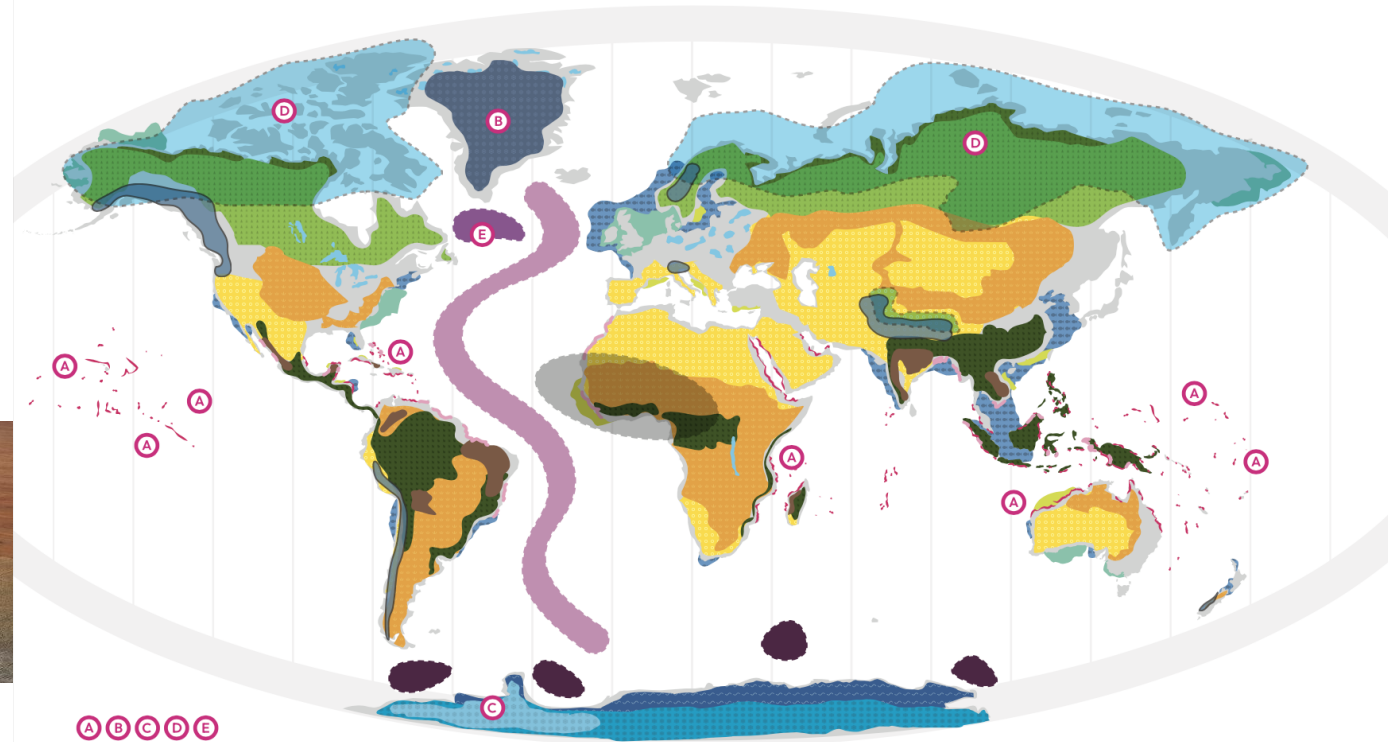
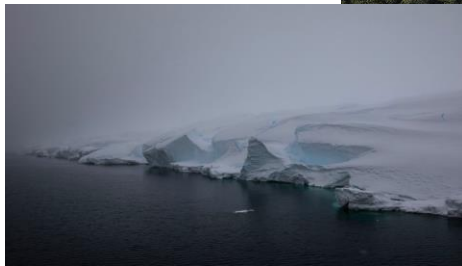
IPCC reasons for concern



IPCC reasons for concern



Tipping points



A B C D E

Closest to tipping - due to global warming

BIOSPHERE

- Tropical dry forest
- Tropical rainforest
- Boreal forest
- Tundra
- Savannas & grasslands
- Drylands

- Lakes
- Coral reefs A
- Mangroves
- Fisheries
- Seagrass
- Kelp forest

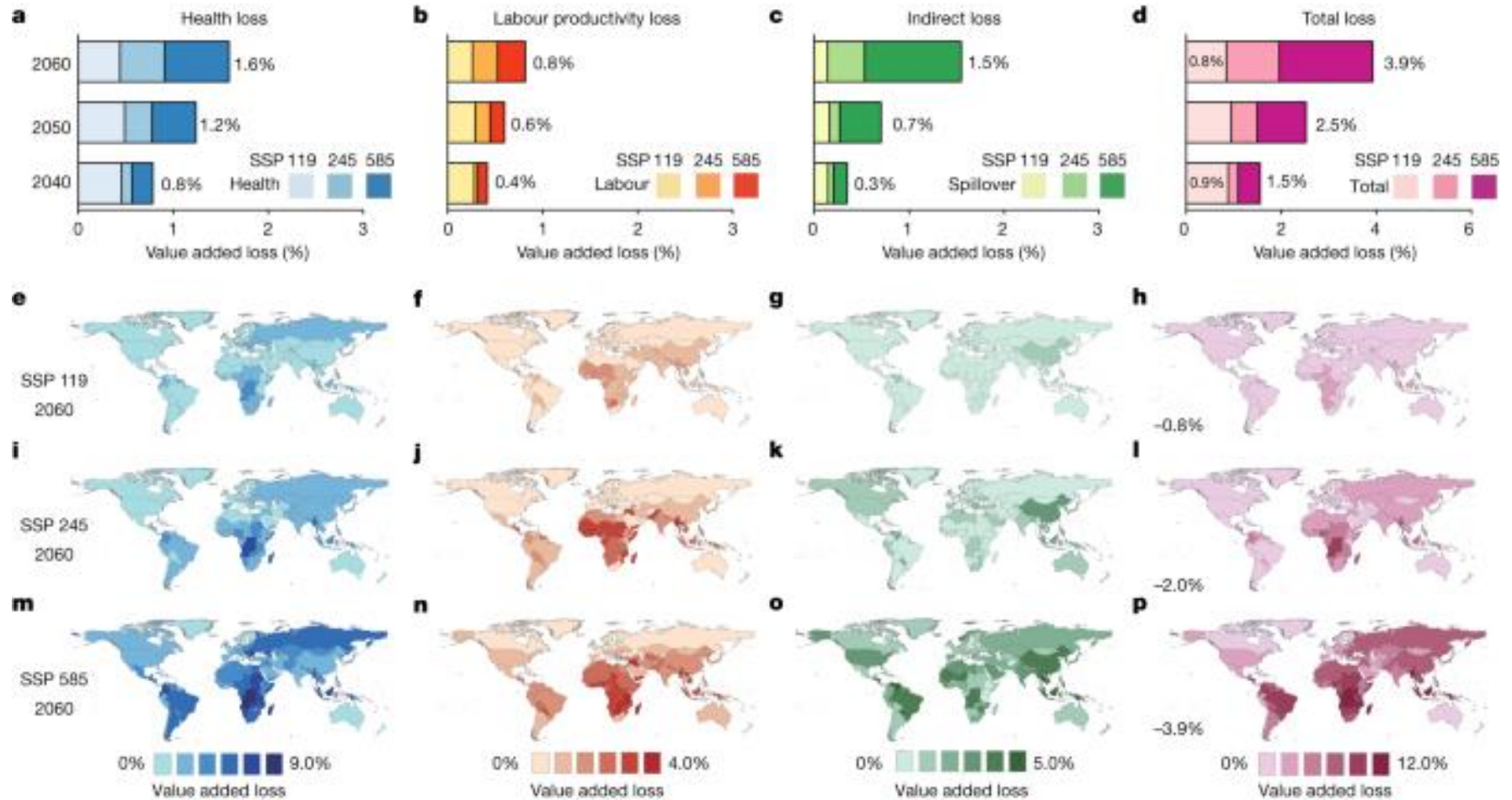
CRYOSPHERE

- Greenland Ice Sheet B
- West Antarctic Ice Sheet C
- Non-marine East Antarctica
- Marine basins East Antarctica
- Permafrost D
- Mountain glaciers

OCEAN & ATMOSPHERE CIRCULATIONS

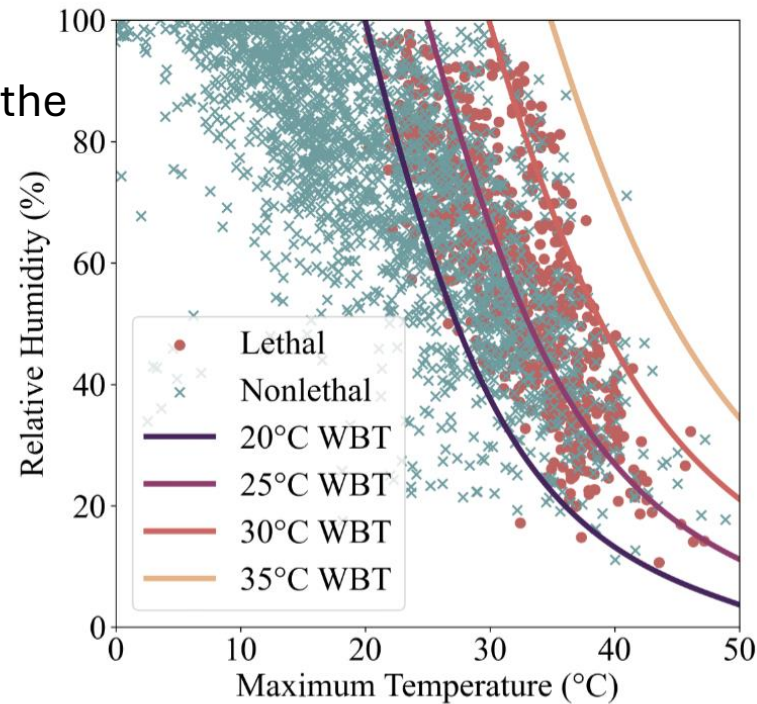
- Atlantic Meridional Overturning Circulation (AMOC) E
- Subpolar Gyre (SPG) E
- Southern Ocean Overturning
- West African monsoon

Distribution: e.g. supply chains



Extremes: e.g. lethal heatwaves

125,411 heatwave events
occurring in 140 cities around the
world; 979 lethal

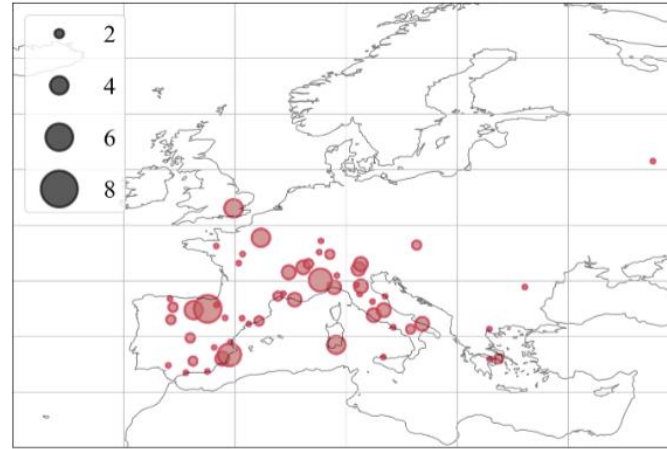


All these lethal heatwaves at WBT
below 35C

Fig. 1 All lethal and a subset of nonlethal heatwaves as a function of maximum temperature and mean humidity during the heatwave with 20°C, 25°C, 30°C, and 35°C wet bulb temperature threshold boundaries.

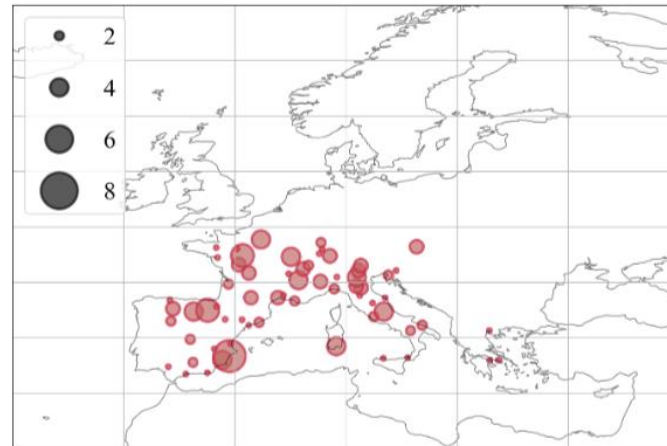
Rouse et al, 2025 (pre-print)

Extremes: e.g. lethal heatwaves



(a) Observed lethal heatwaves

Threshold heatwaves & shock heatwaves



(c) Predicted lethal heatwaves

- (i) population health
- (ii) antecedent climate conditions
- (iii) heatwave conditions

Rouse et al, 2025 (pre-print)

Implications for delivery across energy systems, finance flows, climate adaption and just transitions

Risk assessment approach is important for decision-making

New research approaches, especially AI/ML, are making new analysis possible

Requires transdisciplinary collaboration