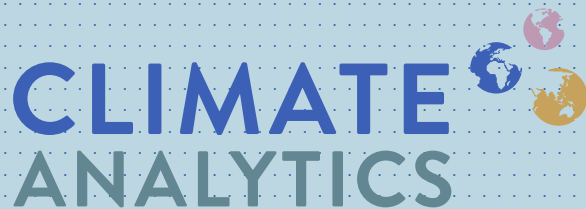


Climate risks and vulnerabilities in the less than 2°C world—

Olivia Serdeczny, Climate Analytics

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July 14



CLIMATE ACTION TRACKER



The "Climate Action Tracker" is an independent science-based assessment, which tracks the emission commitments and actions of countries. The website provides an up-to-date assessment of individual

Differential climate impacts for policy-relevant limits to global warming: the case of 1.5 °C and 2 °C

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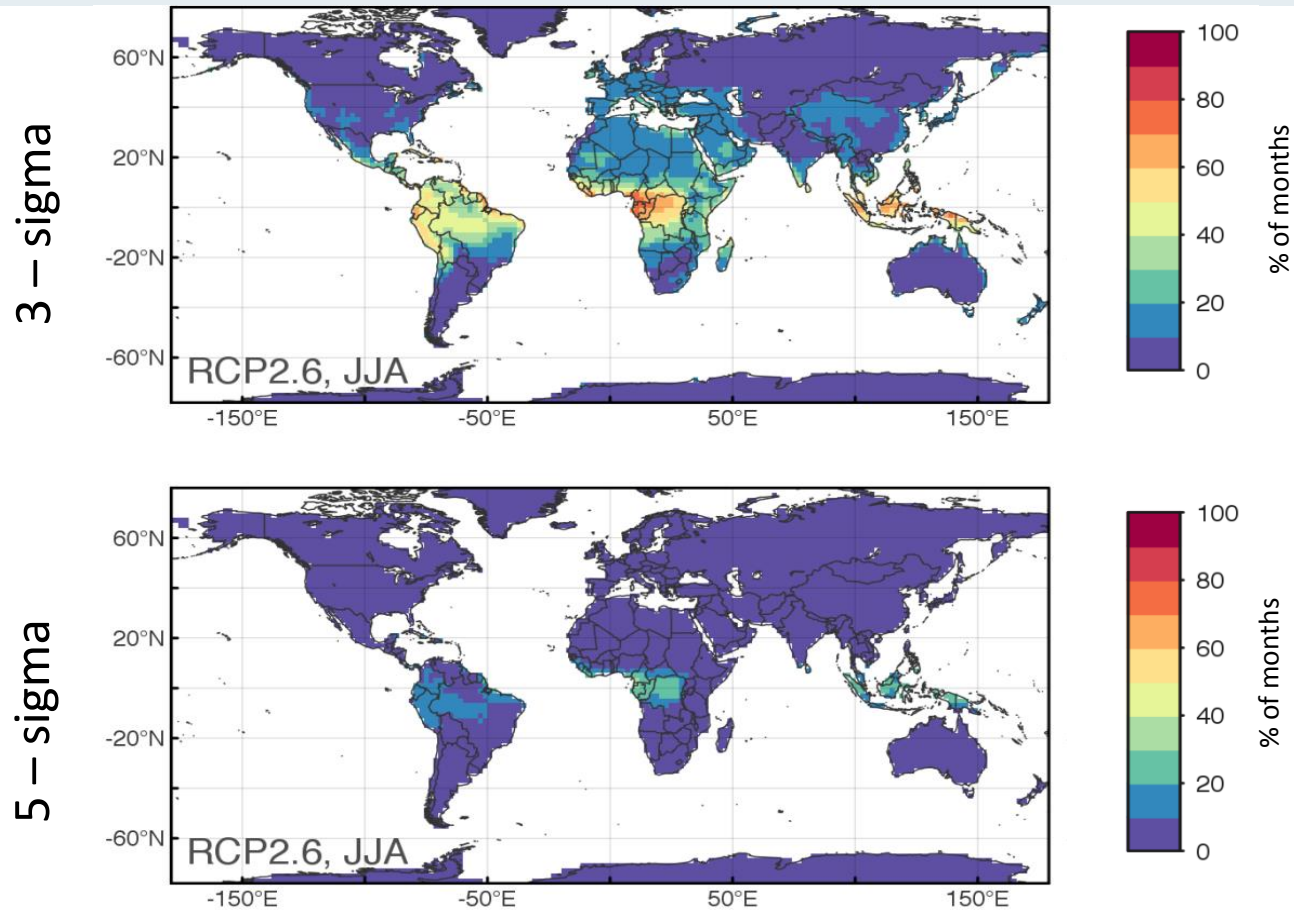
Overview

- I. NDCs and timeline for 1.5°C and 2°C warming
- II. Sectoral impacts under 1.5°C and 2°C warming
 - Heat extremes
 - Extreme precipitation and droughts
 - Water availability
 - Crop yields
 - Sea Level Rise
 - Coral Reef Loss
- III. Risky known unknowns
- IV. Selected sources of information

NDCs and timeline for 1.5°C and 2°C warming

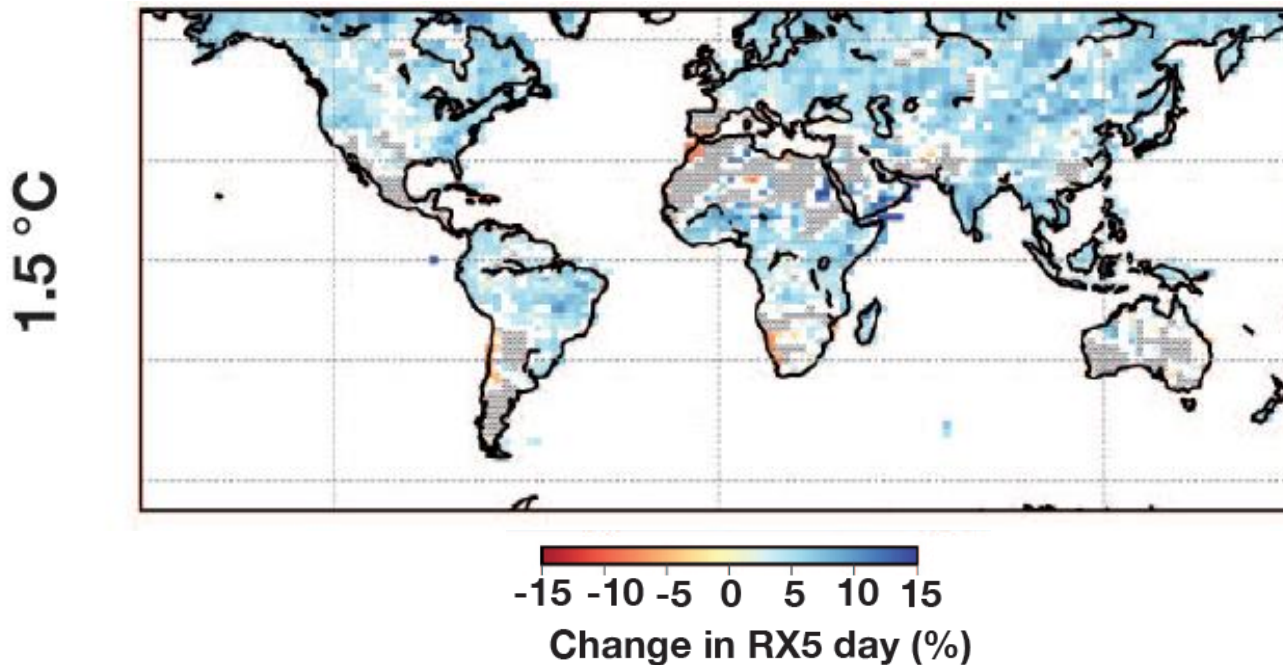
- Under current mitigation policies, we are heading to a warming of 3.6°C
- If all NDC pledges are met, this puts us on a trajectory of 2.7°C
- Under NDC trajectories, warming is projected to cross **1.5°C by 2030–2045** and **2°C by 2045–2075** (Rogelj et al. 2016, Nature)

Heat extremes in a 2°C world



Standard deviation (sigma) shows how far a variable tends to deviate from its mean value. → 3-sigma events are extremely rare, 5-sigma events are absent today

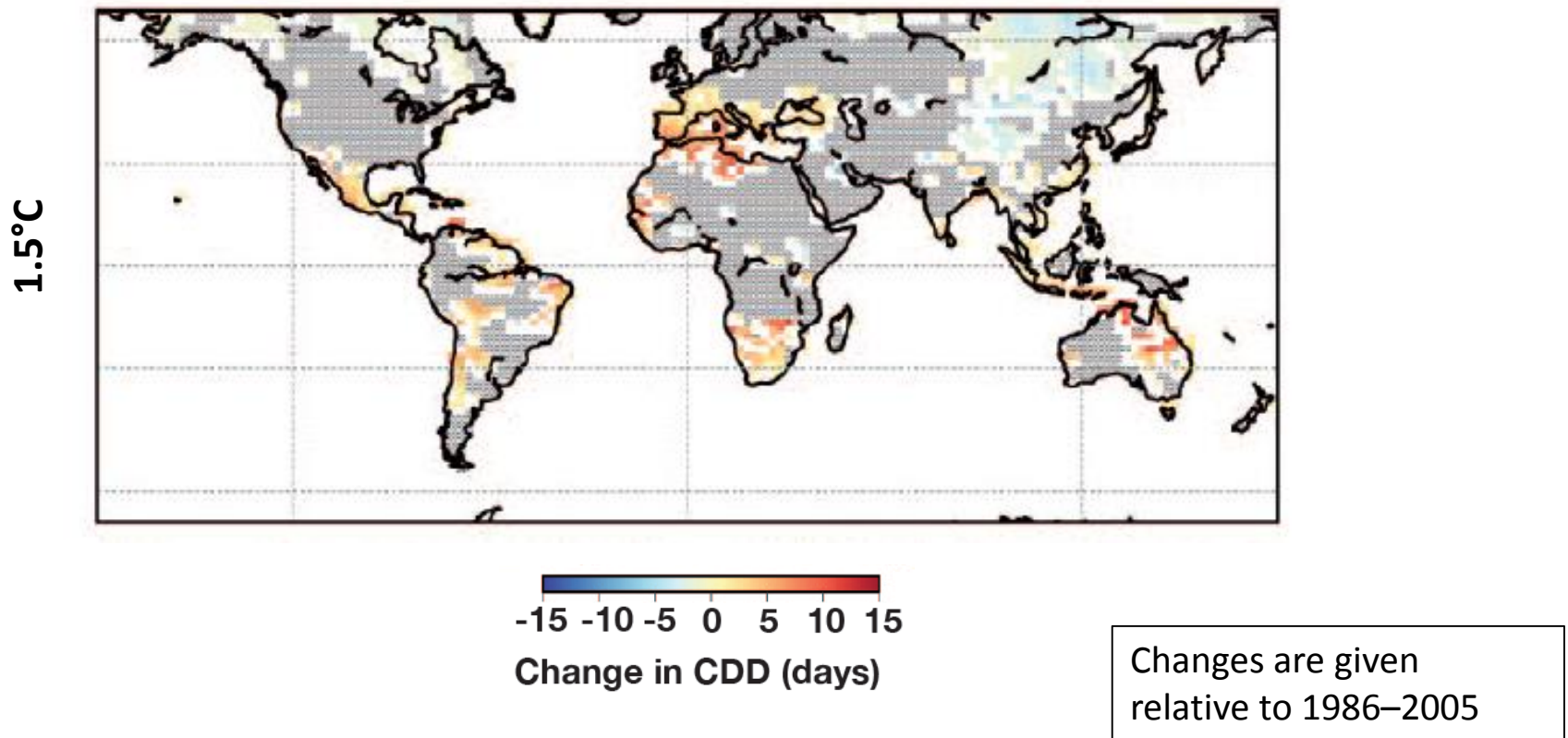
Extreme precipitation



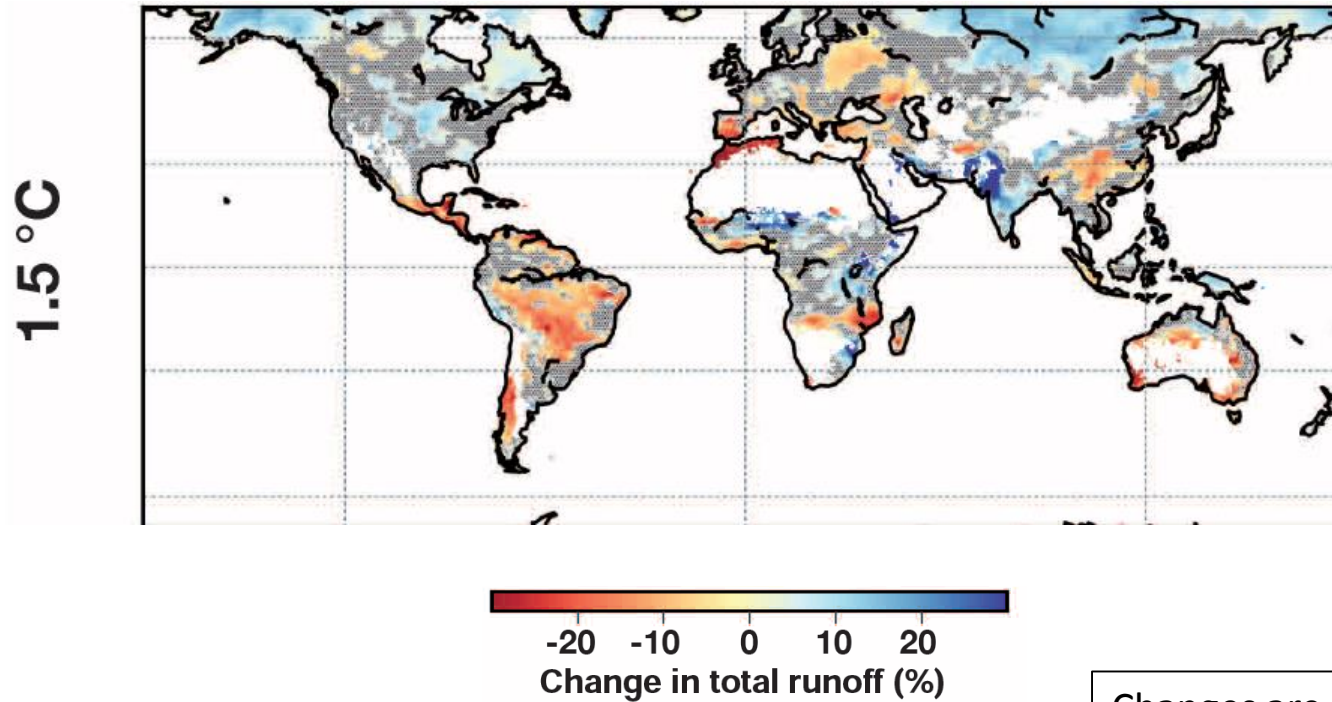
RX5day: absolute annual maximum of consecutive 5-day precipitation.

Changes are given relative to 1986–2005

Droughts



Water availability



Changes are given
relative to 1986–2005

Crop yields

1.5°C

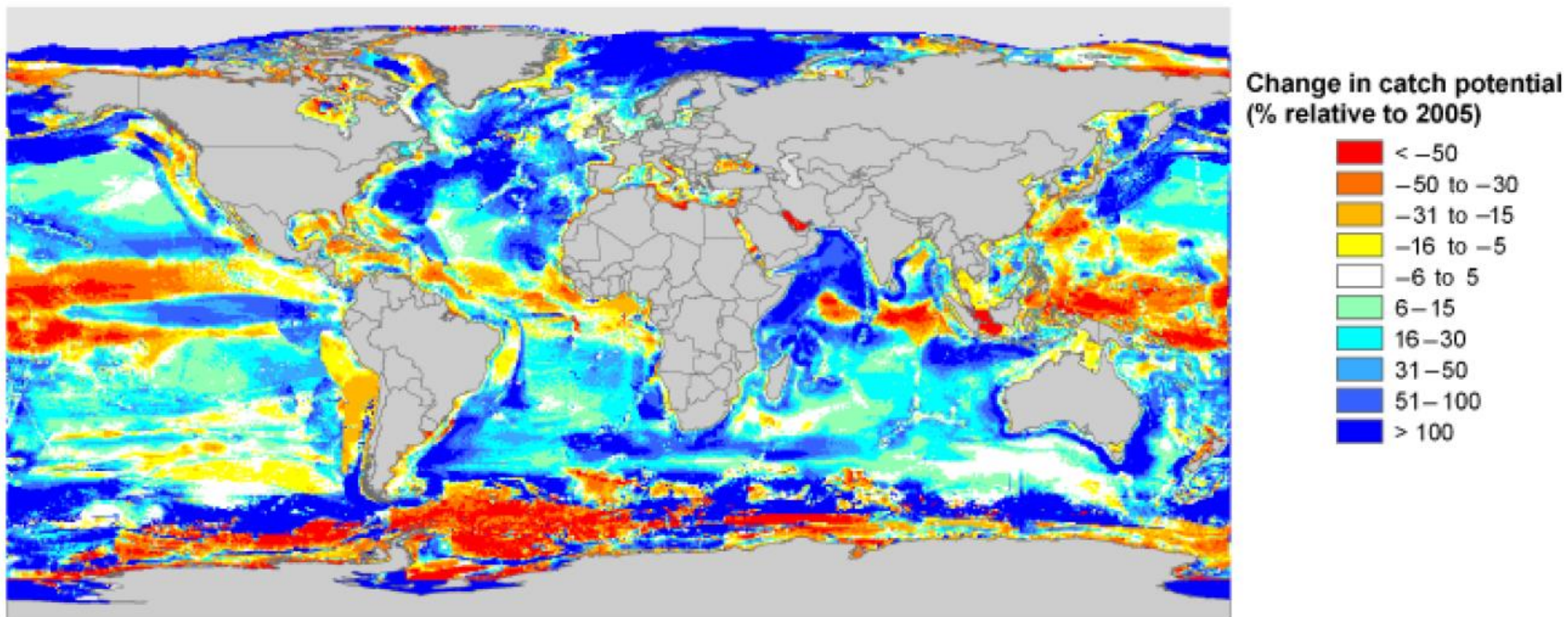
2°C

Wheat	Global	2 [-6;17]	0 [-8;21]	<p>Projected yield reductions are largest for tropical regions, while high-latitude regions may see an increase. Projections not including highly uncertain positive effects of CO₂-fertilization project reductions for all crop types of about 10% globally already at 1.5°C and further reductions at 2°C.</p>
	Tropics	-9 [-25;12]	-16 [-42;14]	
Maize	Global	-1 [-26;8]	-6 [-38;2]	
	Tropics	-3 [-16;2]	-6 [-19;2]	
Soy	Global	7 [-3;28]	1 [-12;34]	
	Tropics	6 [-3;23]	7 [-5;27]	
Rice	Global	7 [-17;24]	7 [-14;27]	
	Tropics	6 [0;20]	6 [0;24]	

Estimates do typically not include effects of extreme droughts, heat extremes, saltwater intrusion or pests.

Fisheries

2°C



Coral Reef Loss

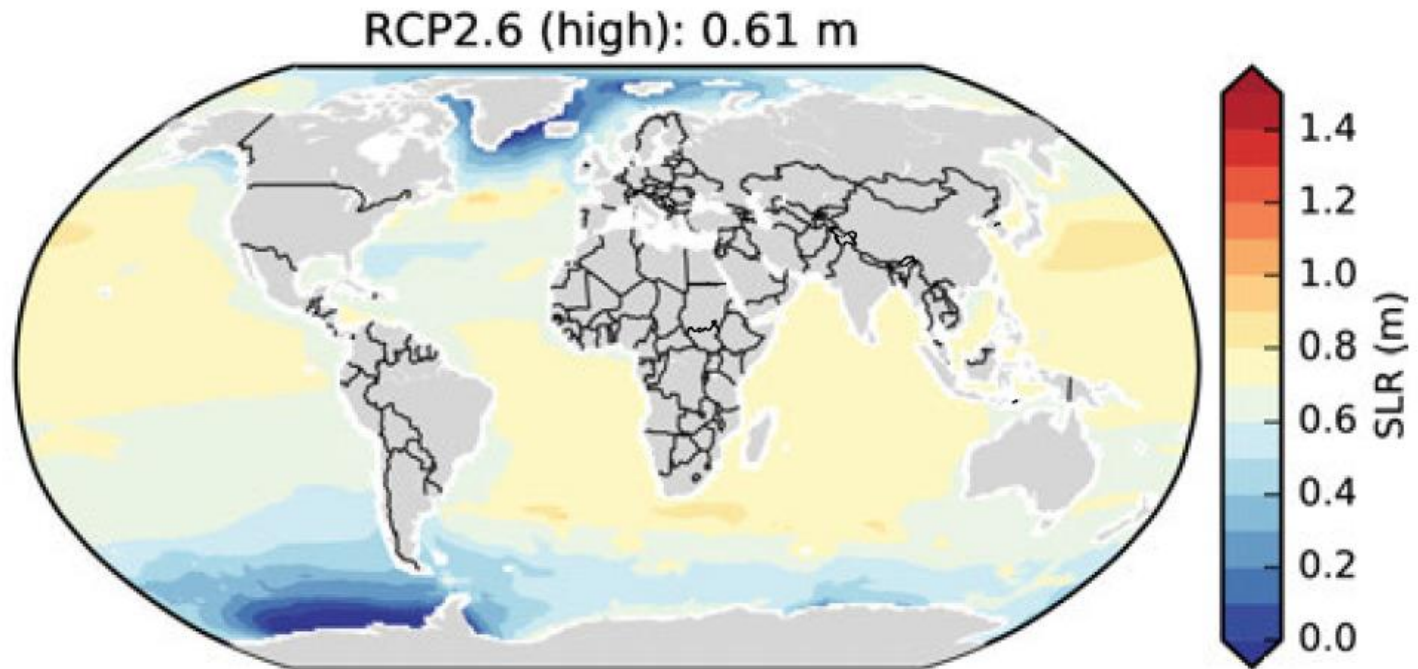


It is estimated that only 5% of Kiribati's reefs will survive the current bleaching thermal stress event. (NOAA Coral Reef Watch)

	1.5°C	2°C
2050	90 [50;99]	98 [86;100]
2100	70 [14;98]	99 [85;100]

Only limiting warming to 1.5°C may leave window open for some ecosystem adaptation.

Sea Level Rise – Upper range projections



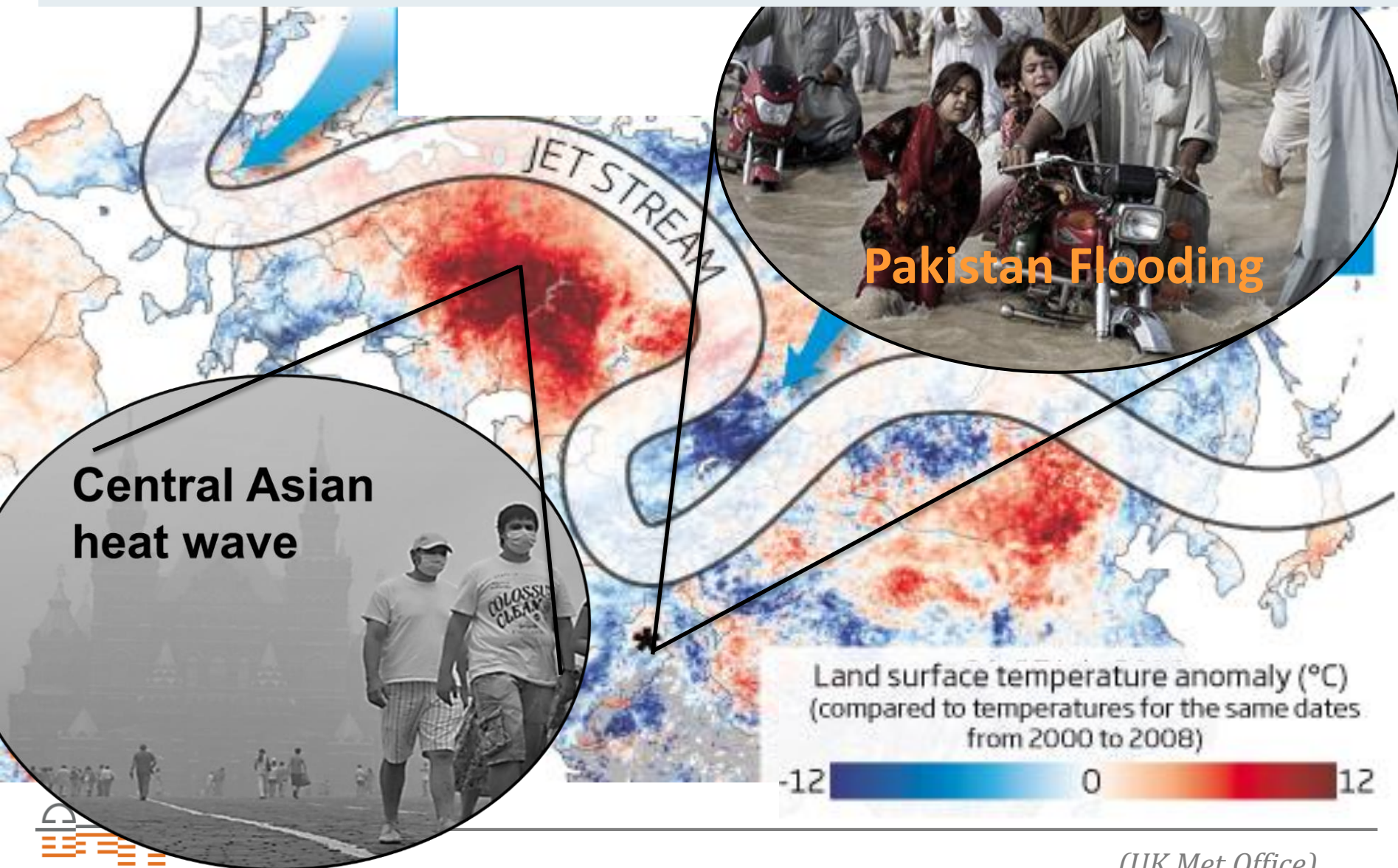
Sea Level Rise projections (upper range) in a 1.5°C world. Increases are given for the period 2081–2100 relative to 1986–2005

Risky know unknowns

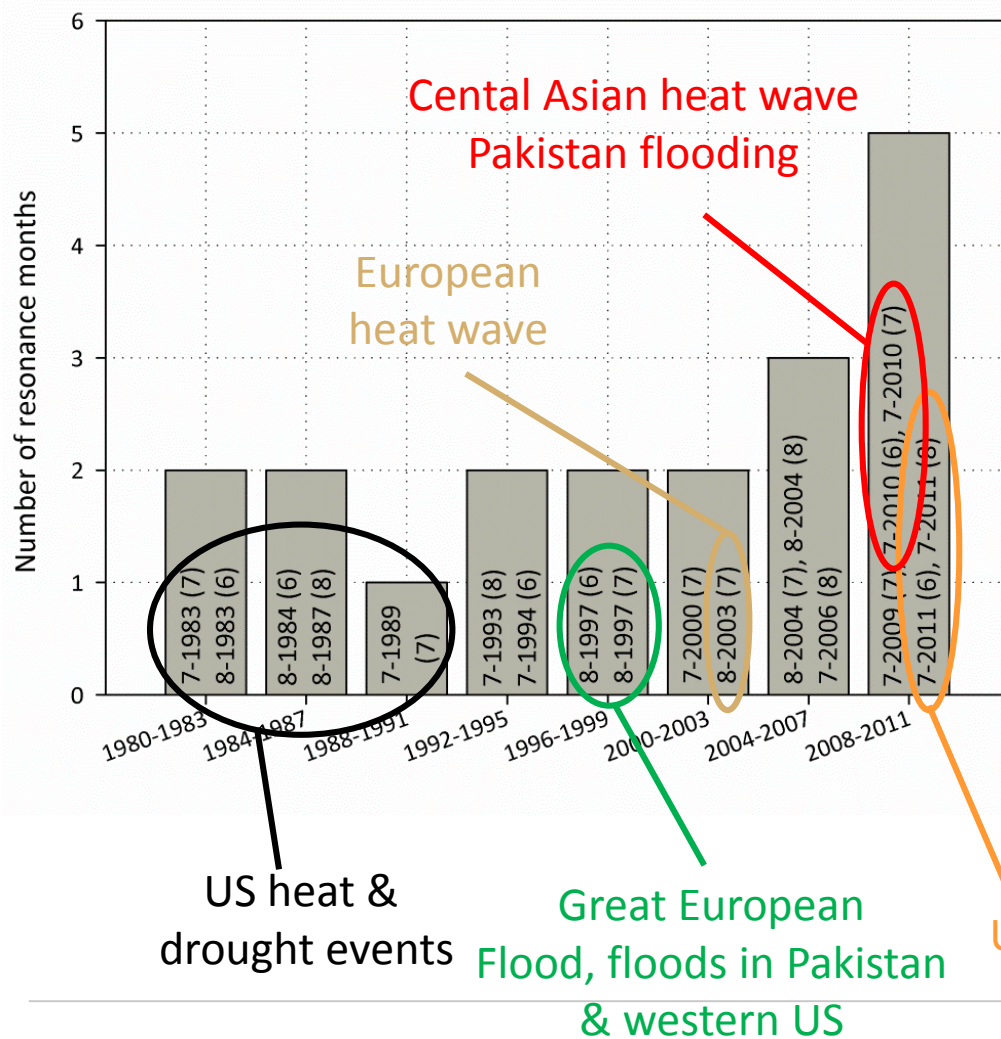
Some large-scale processes in the Earth system are not well reflected in current climate models, but could have significant consequences for natural and human systems, e.g.

- Atmospheric blocking events
- “Tipping points”

Atmospheric blocking events



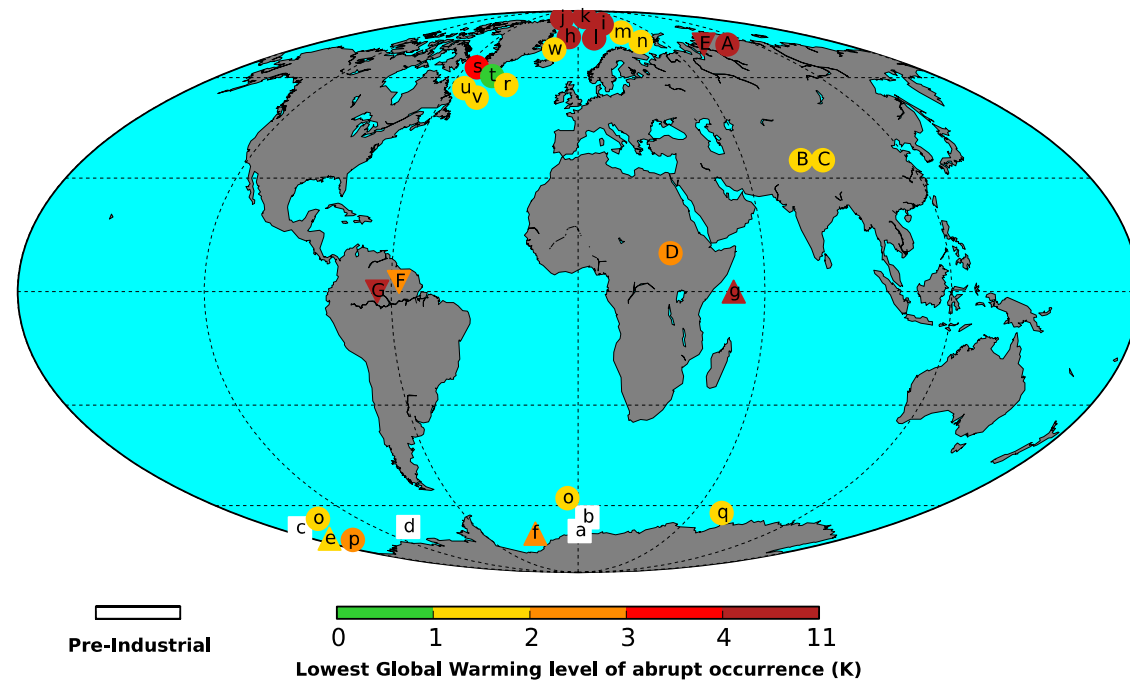
Increase in blocking events (July & August)



- Since 1980: 19 periods with anomalous jetstream patterns identified
- Recent cluster since 2003 → Doubling in Frequency
- Many associated with high-impact extremes

Petoukhov et al, PNAS (2013)
Coumou et al, PNAS (2014)

Tipping points in the Earth System



- 37 abrupt shifts in climate system identified in CMIP5 models
- Including biome changes, permafrost loss, ocean circulation changes, sea-ice snow and glacier loss
- Steep increase between 1.5°C and 2°C
- Tipping risks increase rapidly for West Antarctic and Greenland ice sheets

Selected sources of information

World Bank's Turn Down the Heat report series

- Temperature levels assessed: 1.5, 2, 4°C (where possible)
- WB regions: Latin America and the Caribbean; South East Asia; South Asia; Europe and Central Asia; Sub-Saharan Africa; Middle East and North Africa
- Regional and executive summaries translated into English, Arabic, Chinese, French, Portuguese, Russian, Spanish
- Available at
<http://www.worldbank.org/en/topic/climatechange/publication/turn-down-the-heat>

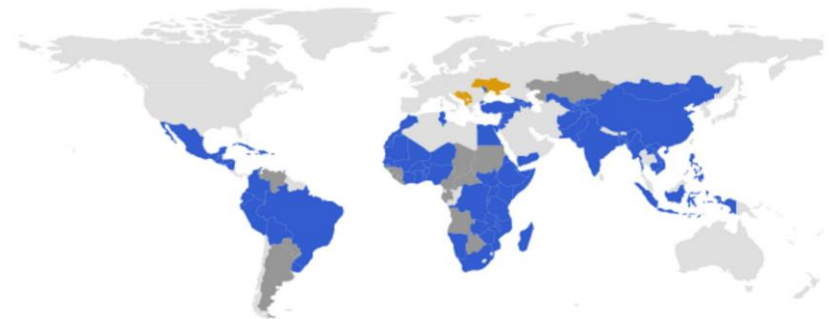


Selected sources of information

“Climate-Fact-Sheets” (KfW Development Bank and the Climate Service Center Germany)

- Country-level projections of climate variables
- Based on primary data (e.g. projections from global and regional climate models as well as global observational datasets) and literature review for variables including
 - Temperature (annual mean, minimum and maximum temperatures)
 - Precipitation
 - Wind speeds
 - Heat waves and cold spells
 - Dry spells
- More information and order form at

Currently the following climate-fact-sheets are available and can be requested:



blue – global CFS; orange – regional CFS – grey – planned CFS

http://www.climate-service-center.de/036238/index_0036238.html.en

Selected sources of information

Inter-sectoral impact model intercomparison (ISIMIP) data archive and publications

- Coherent climate impact simulations in 11 sectors, including:
 - Agriculture
 - Water
 - Vector-borne diseases
 - Coastal infrastructure
 - Biomes
 - Fisheries (in progress)
 - Energy (in progress)
 - Forests (in progress)
 - Heat-related mortality & labour productivity
- Raw impact data available for RCP2.6 (1.5/2°C) and RCP8.5 (4°C)
- Data archive publicly accessible
- More information on data and results at www.isimip.org



Thank you!

For comments/questions please get in touch

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