



Differences in climate impacts between 1.5°C and 2°C

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1.5°C in the Paris Agreement

Paris Agreement included the aim to hold the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, noting that the latter would *“significantly reduce the risks and impacts of climate change”*

New science further outlines how the risks and impacts of climate change increase between 1.5°C and 2°C including for slow-onset events as well as extreme events and abrupt shifts.

Steep increase in abrupt shifts between 1.5°C and 2°C

- A recent publication presented a “Catalogue of abrupt shifts in Intergovernmental Panel on Climate Change climate models” by Drijfhout et al. (2015)
- Their research revealed evidence of 37 forced regional abrupt changes with temperature increase in the ocean, sea ice, snow cover, permafrost, and terrestrial biosphere

	1.5°C	2°C
Number of crossed thresholds of abrupt shifts in earth system models	~ 20%	~ 50%

Drijfhout, S. *et al.* Catalogue of abrupt shifts in Intergovernmental Panel on Climate Change climate models. *Proc. Natl. Acad. Sci.* 201511451 (2015). doi:10.1073/pnas.1511451112

Regional assessment of differences between 1.5°C and 2°C

- **New systematic assessment** of differences in climate impacts between 1.5°C and 2°C warming for 11 key impact indicators
- **Regional perspective** shows significant differences between 1.5°C and 2°C at the regional level for all indicators that were considered
- **Regional hot-spots of change emerge** with **tropical regions bearing the brunt** of the impacts of an additional 0.5°C warming

		1.5°C	2°C	
	Global	1.1 [1;1.3]	1.5 [1.4;1.8]	Tropical regions up to 2 months at 1.5°C or up to 3 months at 2°C
	Mediterranean	9 [5;16]	17 [8;28]	Other dry subtropical regions like Central America and South Africa also at risk
	Global	5 [4;6]	7 [5;7]	Global increase in intensity due to warming; high latitudes (>45°N) and monsoon regions affected most.
	South Asia	7 [4;8]	10 [7;14]	
	in 2100 [cm]	40 [30;55]	50 [35;65]	1.5°C end-of-century rate about 30% lower than for 2°C reducing long-term SLR commitment.
	2081-2100 rate [mm/yr]	4 [3;5.5]	5.5 [4;8]	
	2050	90 [50;99]	98 [86;100]	Only limiting warming to 1.5°C may leave window open for some ecosystem adaptation.
	2100	70 [14;98]	99 [85;100]	
W heat	Global	2 [-6;17]	0 [-8;21]	Projected yield reductions are largest for tropical regions, while high-latitude regions may see an increase. Projections not including highly uncertain positive effects of CO ₂ -fertilization project reductions for all crop types of about 10% globally already at 1.5°C and further reductions at 2°C.
	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]	

Schleussner et al.: Differential climate impacts for policy-relevant limits to global warming: the case of 1.5°C and 2 °C Earth Syst. Dynam., 7, 1–25, 2016 doi:10.5194/esd-7-1-2016

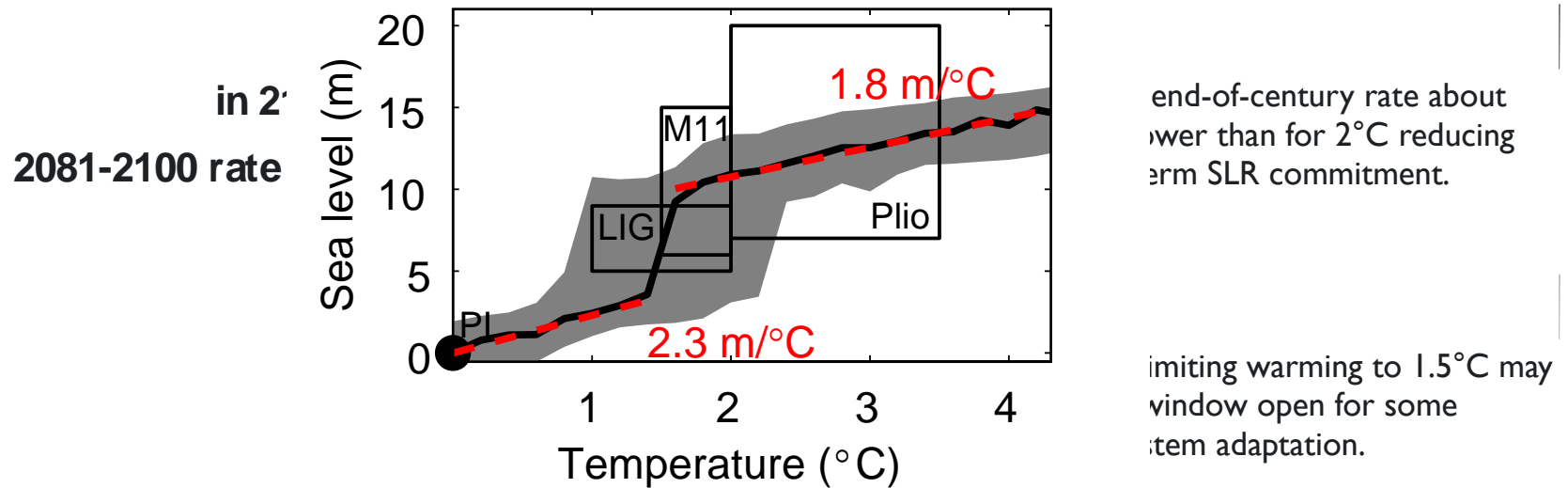
Global sea-level rise and risk of coral reef loss

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Global sea-level rise and risk of coral reef loss

Long-term Sea-level rise



Levermann, A. et al. PNAS (2013).

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Implications for future scientific assessments

- Scoping of the 1.5°C special report should include assessments of slow-onset events
- Next IPCC should aim to include comprehensive information on lowest levels of slow-onset impacts, irreversible changes and tipping points as well as avoidable increases in severity of extreme climate-related events
- To provide this information, WCRP should ensure that 1.5°C scenarios are included in the upcoming Coupled Model Intercomparison Project 6 (CMIP6) as a Tier 1 scenario