Climate Change 2013: The Physical Science Basis Working Group I contribution to the IPCC Fifth Assessment Report

Highlights of the new IPCC report

Thomas Stocker & Qin Dahe 259 Authors from 39 Countries WGI TSU Team





Key SPM Messages

19 Headlines

on less than 2 Pages

Summary for Policymakers ca. 14,000 Words

14 Chapters, >1 Mio. Words Atlas of Regional Projections

54,677 Review Comments by 1089 Experts

2010: 259 Authors Selected

2009: WGI Outline Approved

INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

CLIMATE CHANGE 2013

The Physical Science Basis

WORKING GROUP I CONTRIBUTION TO THE FIFTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

WGI



Observation

Understanding

Future

INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

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WORKING GROUP I CONTRIBUTION TO THE FIFTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

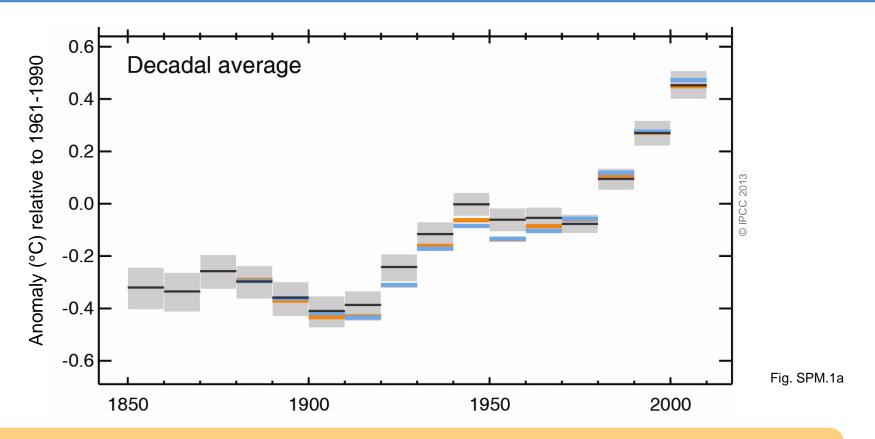
WGI



Observation

What has changed?

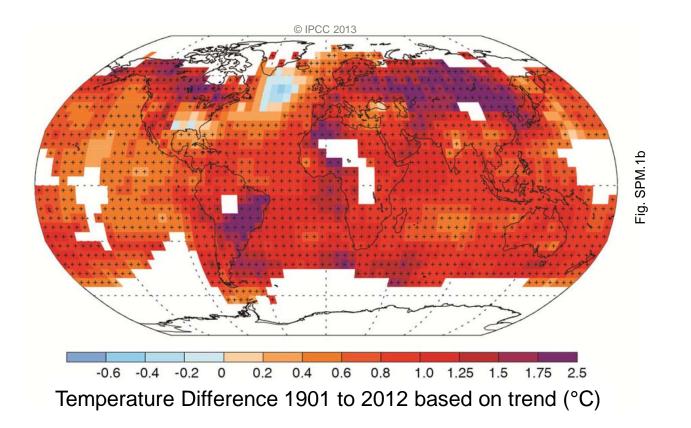




Each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850.

In the Northern Hemisphere, 1983–2012 was *likely* the warmest 30-year period of the last 1400 years (*medium confidence*).

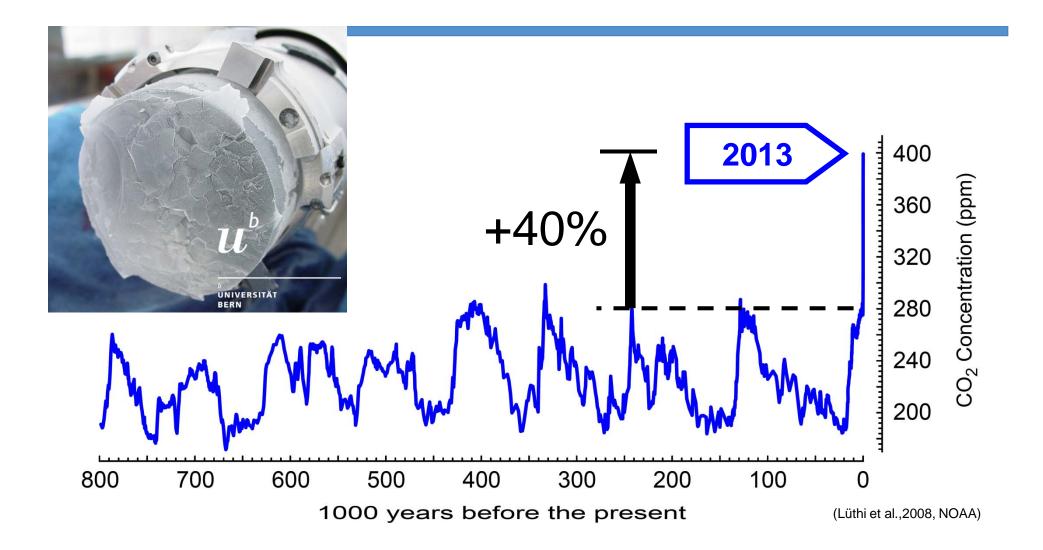




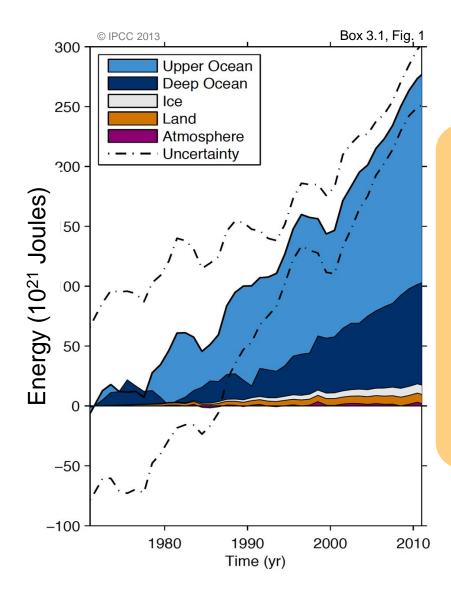
Warming of the climate system is unequivocal, [...]







The atmospheric concentrations of carbon dioxide, methane, and nitrous oxide have increased to levels unprecedented in at least the last 800,000 years.



Ocean warming dominates the increase in energy stored in the climate system, accounting for more than 90% of the energy accumulated between 1971 and 2010 (*high confidence*).



Understanding

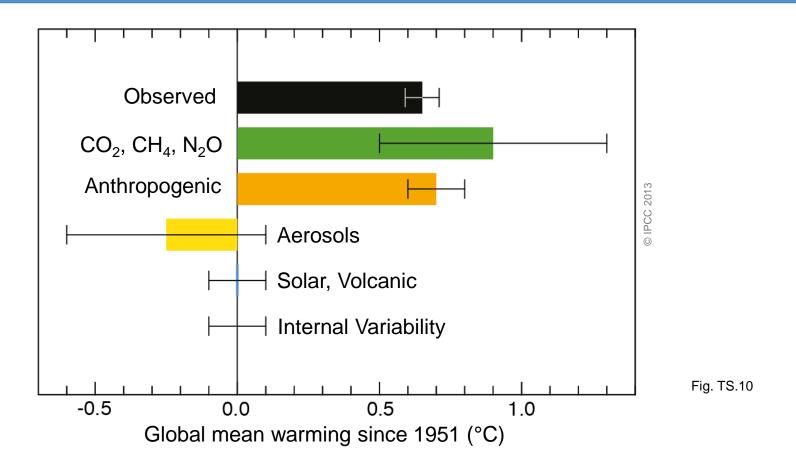
Why has it changed?



O ₂ pro larges	Jviue			onfide
larges			1.68 [1.33 to 2.03]	VH
		$CO H_2O^{str} O_3 CH_4$	0.97 [0.74 to 1.20]	н
nixed greer	Halo- carbons	O ₃ CFCs HCFCs	0.18 [0.01 to 0.35]	Н
Well-mixed	N ₂ O	N ₂ O	0.17 [0.13 to 0.21]	VH
genic	со	CO ₂ CH ₄ O ₃	0.23 [0.16 to 0.30]	М
Anthropogenic and aerosols	NMVOC	CO_2 CH_4 O_3	0.10 [0.05 to 0.15]	М
gases and	NO _x	Nitrate CH ₄ O ₃	-0.15 [-0.34 to 0.03]	М
A et live	erosols and precursors Mineral dust,	Mineral dust Sulphate Nitrate Organic carbon Black carbon	-0.27 [-0.77 to 0.23]	н
O	SO ₂ , NH ₃ , Organic carbon and Black carbon)	Cloud adjustments due to aerosols	-0.55 [-1.33 to -0.06]	L
		Albedo change due to land use	+→ -0.15 [-0.25 to -0.05]	М
Natural		Changes in solar irradiance	● 0.05 [0.00 to 0.10]	М
	エ ・ 」 ・	•	2011 2.29 [1.13 to 3.33]	н
		hropogenic ve to 1750	1980 1.25 [0.64 to 1.86]	н
			1950 0.57 [0.29 to 0.85]	М
			-1 0 1 2 3	







Human influence on the climate system is clear.

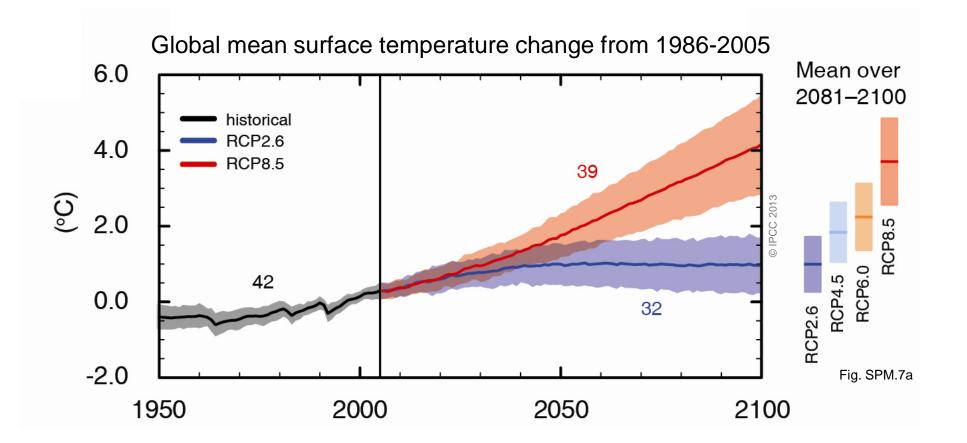




Future

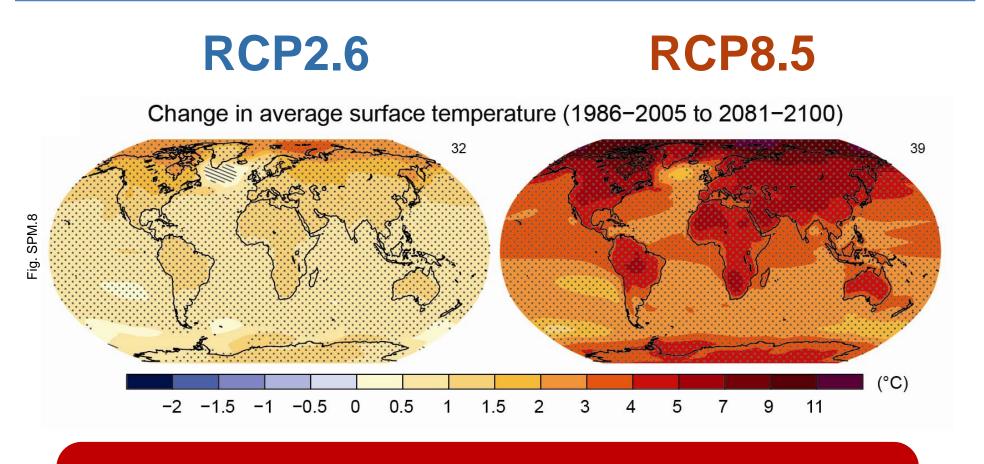
How will it change?





Global surface temperature change for the end of the 21st century is *likely* to exceed 1.5°C relative to 1850–1900 for all scenarios except RCP2.6.



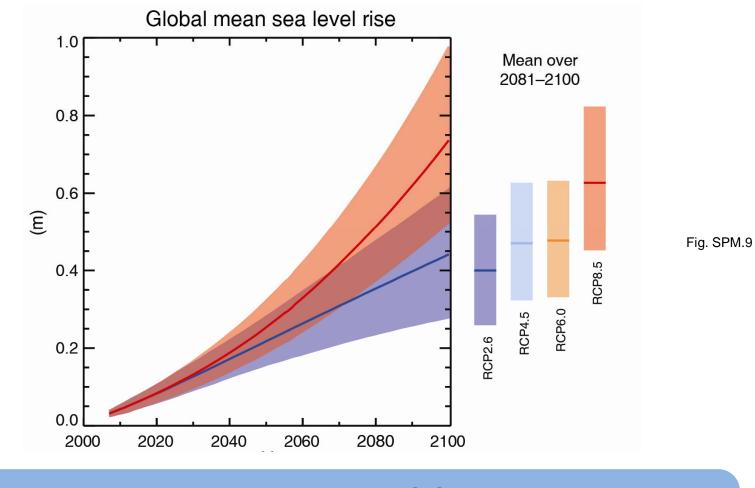


We have a choice.

IPCC AR5 Working Group I Climate Change 2013: The Physical Science Basis



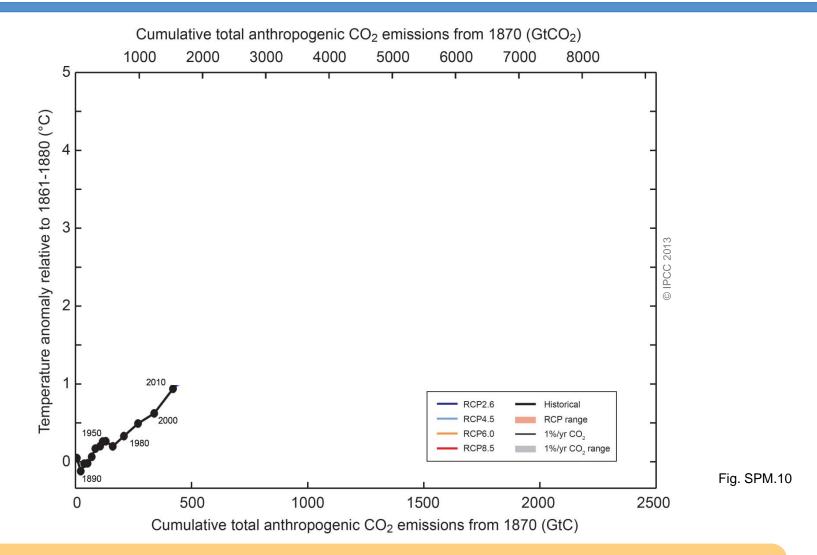
UNEF



 RCP2.6 (2081-2100), *likely* range:
 26 to 55 cm

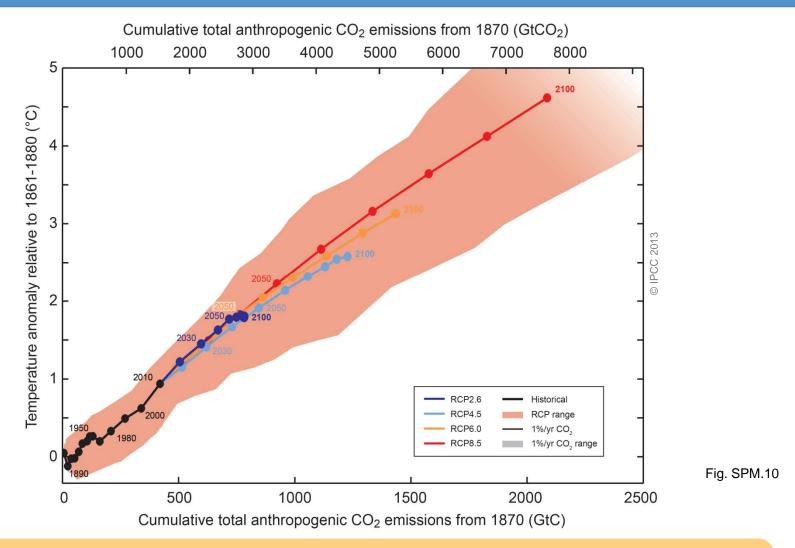
 RCP8.5 (in 2100), *likely* range:
 52 to 98 cm





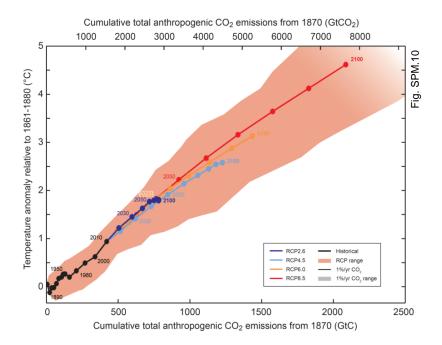
Cumulative emissions of CO_2 largely determine global mean surface warming by the late 21st century and beyond.





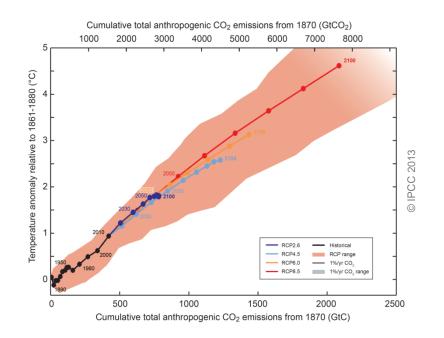
Limiting climate change will require substantial and sustained reductions of greenhouse gas emissions.





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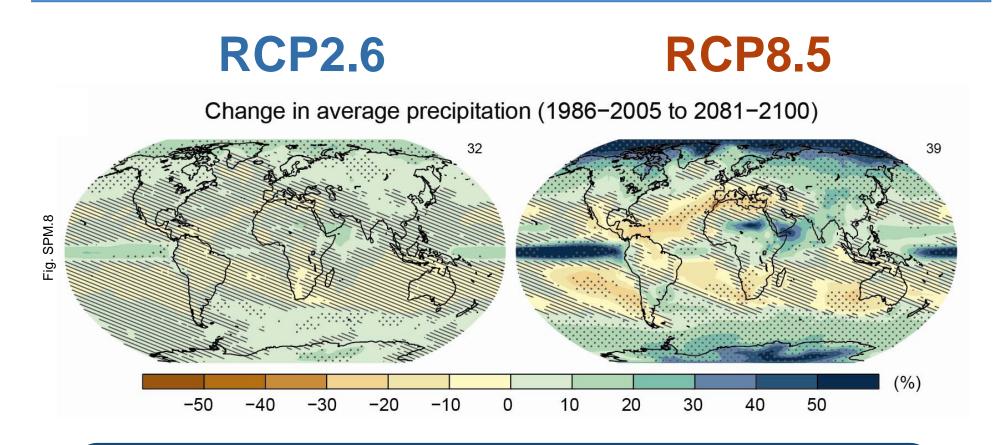
Δ T _(1850-1900 to 2100)	Likelihood	Scenarios	
> 1.5°C	likely	RCP4.5, RCP6.0, RCP8.5	
> 2°C	likely	RCP6.0, RCP8.5	
> 2°C	more likely than not	RCP4.5	



Limiting warming to *likely* less than 2° C since 1861-1880 requires cumulative CO₂ emissions to stay below 1000 GtC. Until 2011, over 50% of this amount has been emitted.

Accounting for other forcings, the upper amount of cumulative CO_2 emissions is 800 GtC; over 60% have been emitted by 2011.





We have a choice.



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Further Information www.climatechange2013.org

