ipcc
INTERGOVERNMENTAL PANEL ON climate change
WMO UNEP

12 October 2021

KEY INSIGHTS OF THE LATEST IPCC PHYSICAL SCIENCE ASSESSMENT

Dr. Joeri Rogelj
Lead Author IPCC AR6 WG1

Grantham Institute Climate Change and Environment
Centre for Environmental Policy - Imperial College London
International Institute for Applied Systems Analysis

#ClimateReport #IPCC

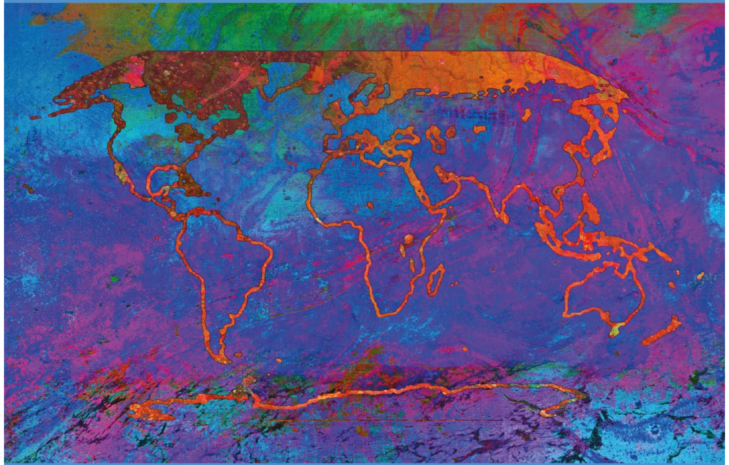
'Can we have two golds?'
Our writers' best moments of Tokyo 2020
The Guardian
For 200 years
Global climate crisis: inevitable, unprecedented and irreversible
Devastating report is 'code red' warning for
Leader comment
The science is unequivocal. The verdict is clear. There is no more
WARNS OF CHANGE...
Can UK lead world back from brink?
SEE PAGES 6-9
foreign breaks
CODE RED FOR HUMANITY
EXTREME WEATHER DOWN TO GLOBAL WARMING, SAYS DOOMSDAY REPORT FROM UN
WORLD WILL HEAT UP AT LEAST 1.5C BY 2040...A DECADE EARLIER THAN WAS FORECAST
DAILY EXPRESS
CAMPAIGNING NEWSPAPER OF THE YEAR
FREE Brilliant puzzles pullout
David Cameron denies £7m Greensill pay packet
QUEEN'S BREAK WITH TRADITION
Next decade 'pivotal' to secure planet's future after alarming scientific report
PM: WAKE UP TO RED ALERT ON CLIMATE CRISIS
WELCOME HOME
Let the party begin for our Olympic heroes
CODE RED
FINANCIAL TIMES
NEWS PROVIDER OF THE YEAR
Inside Kim's regime
Why sanctions against North Korea are failing
Silencing staff
NDAs are damaging in the workplace
In China's debt
African nations' risks in borrowing from Beijing
World likely to be 1.5C warmer by 2040, UN's science panel warns
'Code red for humanity'
More extreme weather expected
TUESDAY AUGUST 2021

ipcc
INTERGOVERNMENTAL PANEL ON climate change

Climate Change 2021

The Physical Science Basis

Summary for Policymakers



WGI

Working Group I contribution to the
Sixth Assessment Report of the
Intergovernmental Panel on Climate Change

WMO UNEP


Canada
IPCC SIXTH
ASSESSMENT REPORT
SIXIÈME RAPPORT
D'ÉVALUATION DU GIEC
7-11 JAN 2019
Vancouver | Canada
PAVILION BALLROOM
BALLROOMS
NORTH TOWER
CAFE ONE
PAVILION
HEALTH CLUB


CLIMATE CHANGE 2014
Mitigation of Climate Change
IPCC WORKING GROUP III
12th SESSION
IPCC PLENARY
39th SESSION
Berlin, 7 – 12 April 2014

Co-design of IPCC reports

Governments decide on IPCC products for current cycle

Scoping

The outline is drafted and developed by experts nominated by governments and observer organizations

Approval of Outline

The Panel then approves the outline

Nomination of authors

Governments and observer organizations nominate experts as authors

Selection of authors

Bureaux select authors

Expert Review - 1st Order Draft

Authors prepare a 1st draft which is reviewed by experts

Government and Expert Review - 2nd Order Draft

The 2nd draft of the report and 1st draft of the Summary for Policymakers (SPM) is reviewed by governments and experts

Final draft report and SPM

Authors prepare final drafts of the report and SPM which are sent to governments

Government review of final draft SPM

Governments review the final draft SPM in preparation for its approval

Approval & acceptance of report

Working Group/Panel approves SPMs and accepts reports

Publication of report

http://

ipcc INTERGOVERNMENTAL PANEL ON climate change

IPCC AR6 Working Group I by the numbers

Author Team

234 authors from **65** countries

28% women, **72%** men

30% new to IPCC
63% new leading authors

Review Process

14,000 scientific publications assessed

78,000+ review comments

46 countries commented on Final Government Distribution

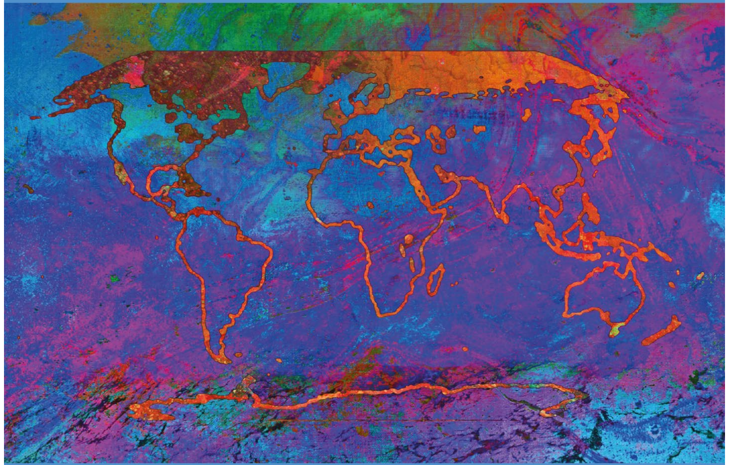
ipcc

INTERGOVERNMENTAL PANEL ON climate change

Climate Change 2021

The Physical Science Basis

Summary for Policymakers



WGI

Working Group I contribution to the
Sixth Assessment Report of the
Intergovernmental Panel on Climate Change

WMO UNEP

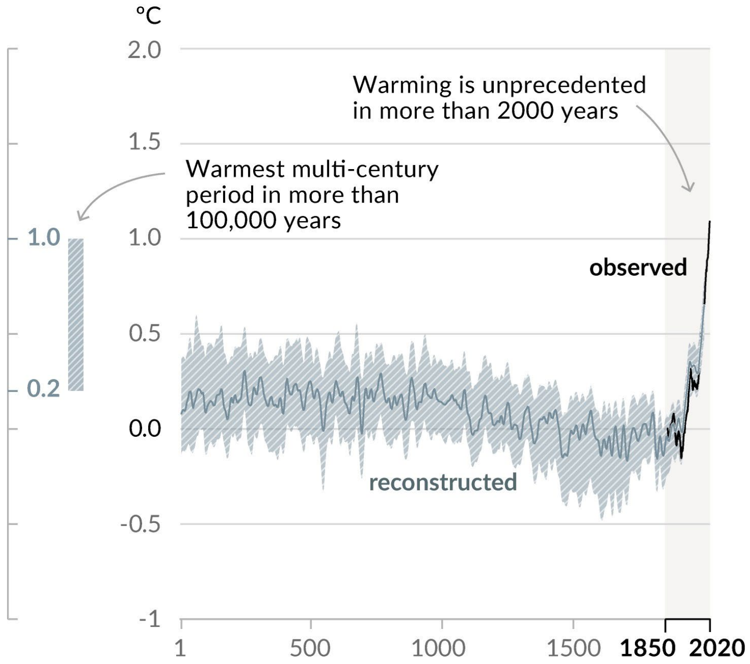
[Credit: NASA]

"Recent changes in the climate are widespread, rapid, and intensifying, and unprecedented in thousands of years.

Figure SPM.1

Human influence has warmed the climate at a rate that is unprecedented in at least the last 2000 years

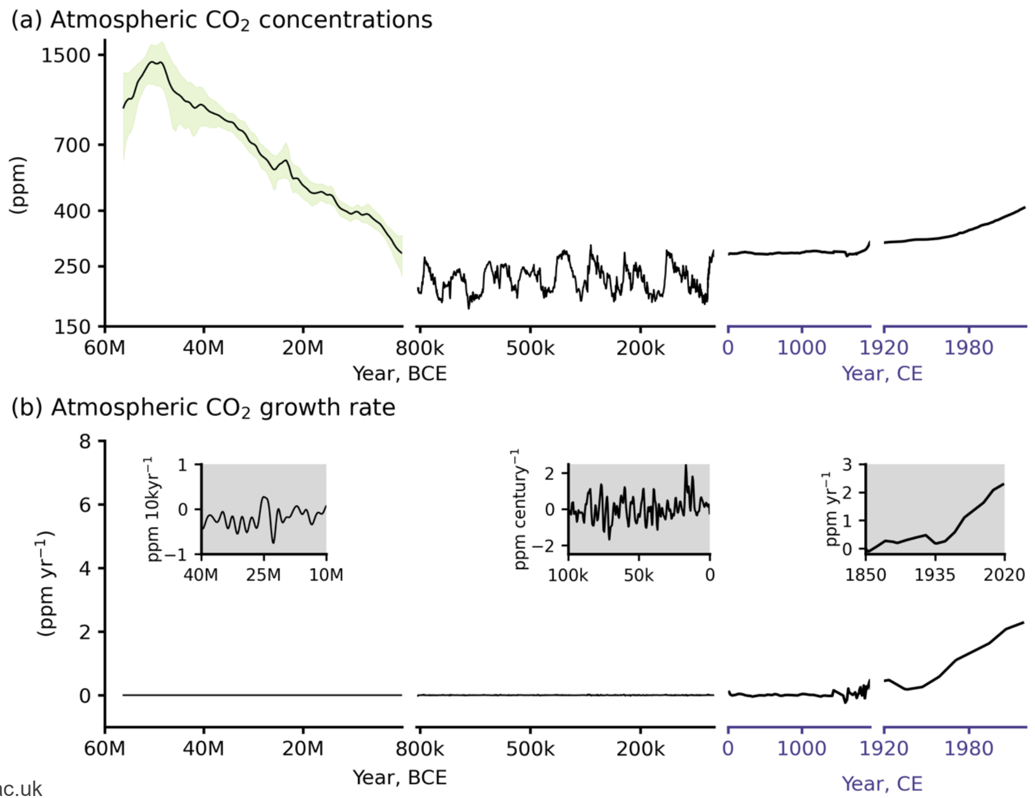
a) Change in global surface temperature (decadal average) as reconstructed (1-2000) and observed (1850-2020)



Joeri ROGELJ – j.rogelj@imperial.ac.uk

Figure 5.3

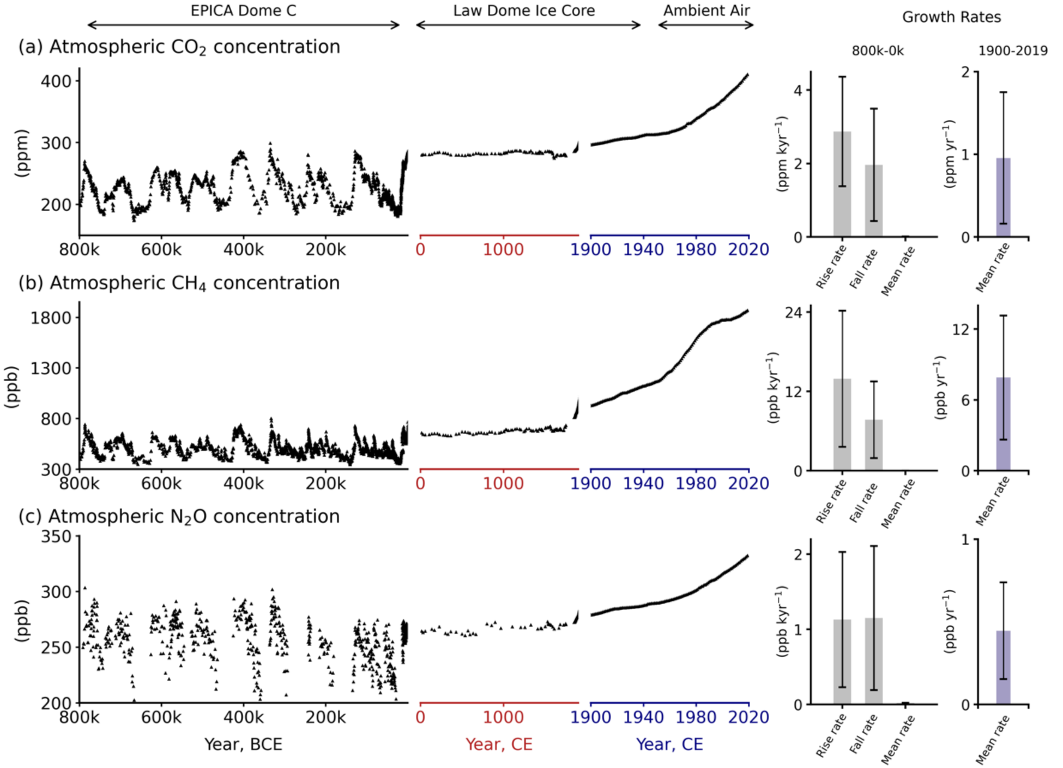
Unprecedented perturbation of biogeochemical cycles



Joeri ROGELJ – j.rogelj@imperial.ac.uk

Figure 5.4

Unprecedented perturbation of biogeochemical cycles

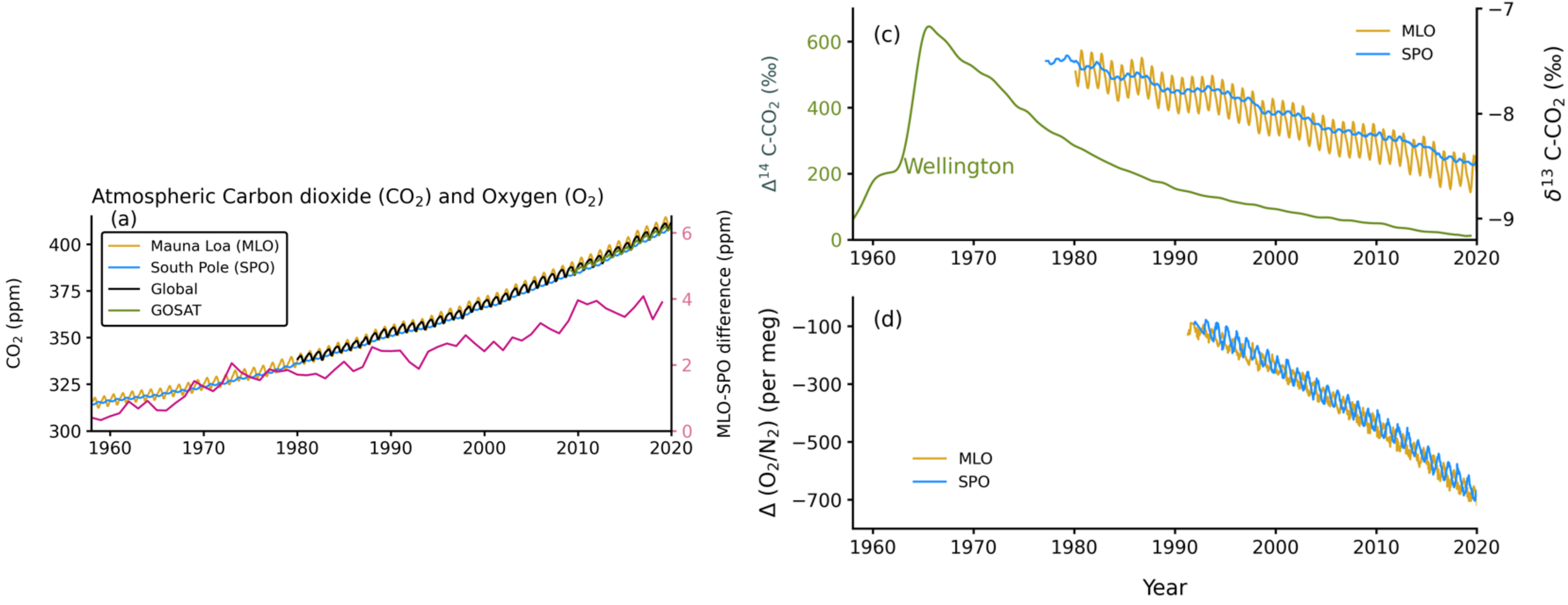


Joeri ROGELJ – j.rogelj@imperial.ac.uk

[Credit: Yoda Adaman | Unsplash]

"It is indisputable that human activities are causing climate change, making extreme climate events, including heat waves, heavy rainfall, and droughts, more frequent and severe.

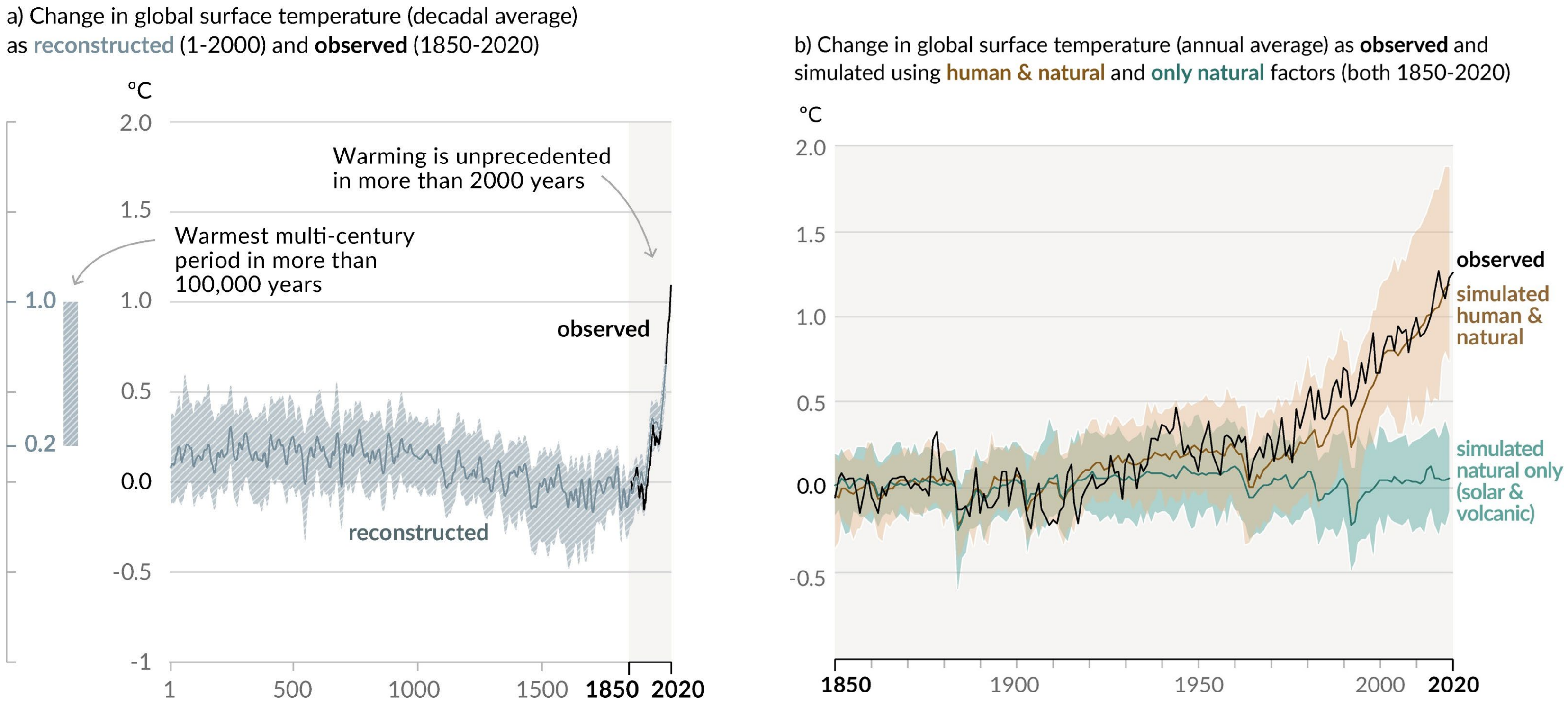
Human activities have caused an increase in atmospheric CO_2 concentrations



Joeri ROGELJ – j.rogelj@imperial.ac.uk

Human-caused concentration increase causes warming

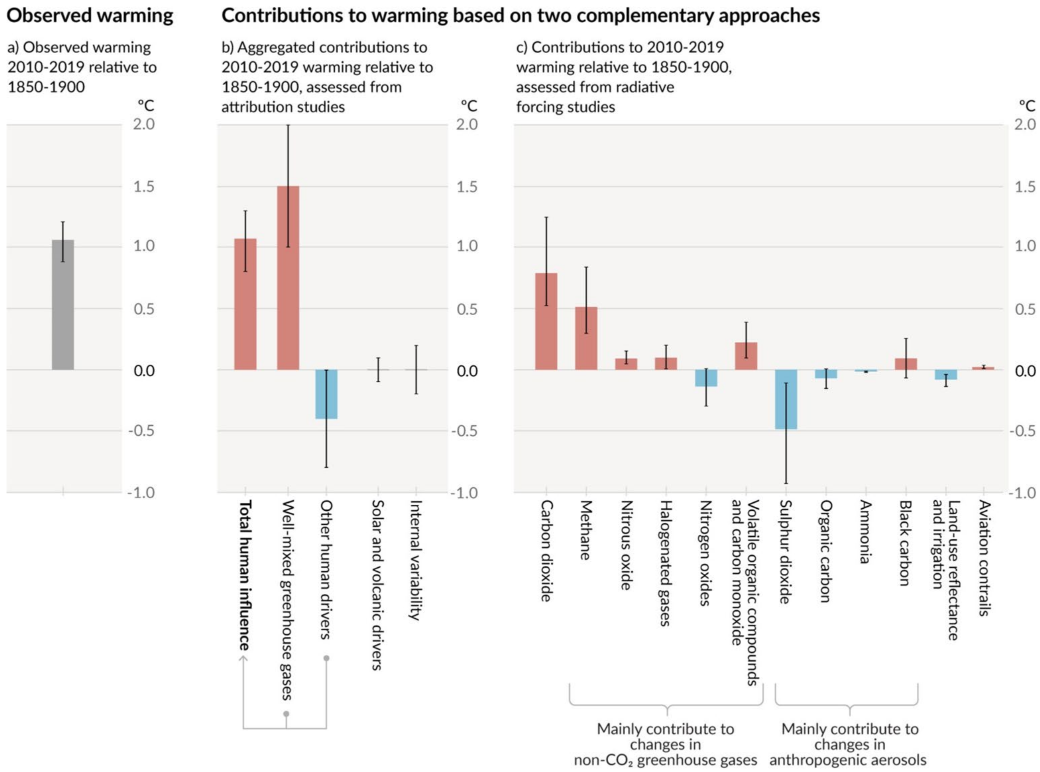
Figure SPM.1



Joeri ROGELJ – j.rogelj@imperial.ac.uk

Figure SPM.2

Observed warming is driven by emissions from human activities, with greenhouse gas warming partly masked by aerosol cooling



Joeri ROGELJ – j.rogelj@imperial.ac.uk

[Credit: Hong Nguyen | Unsplash]

"Climate change is already affecting every region on Earth, in multiple ways.

The changes we experience will increase with further warming.

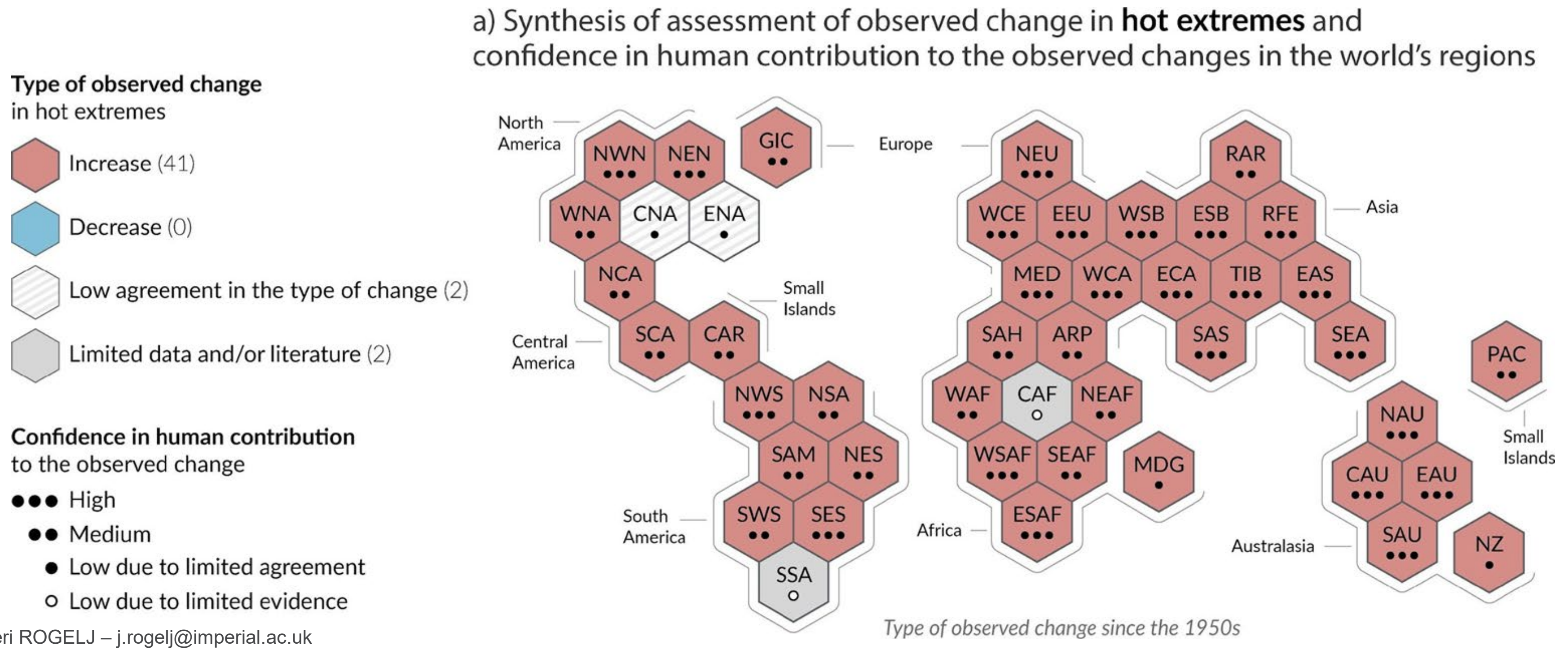
ipcc

INTERGOVERNMENTAL PANEL ON climate change

WMO UNEP

Figure SPM.3

Climate change is already affecting every inhabited region across the globe, with human influence contributing to many observed changes in weather and climate extremes

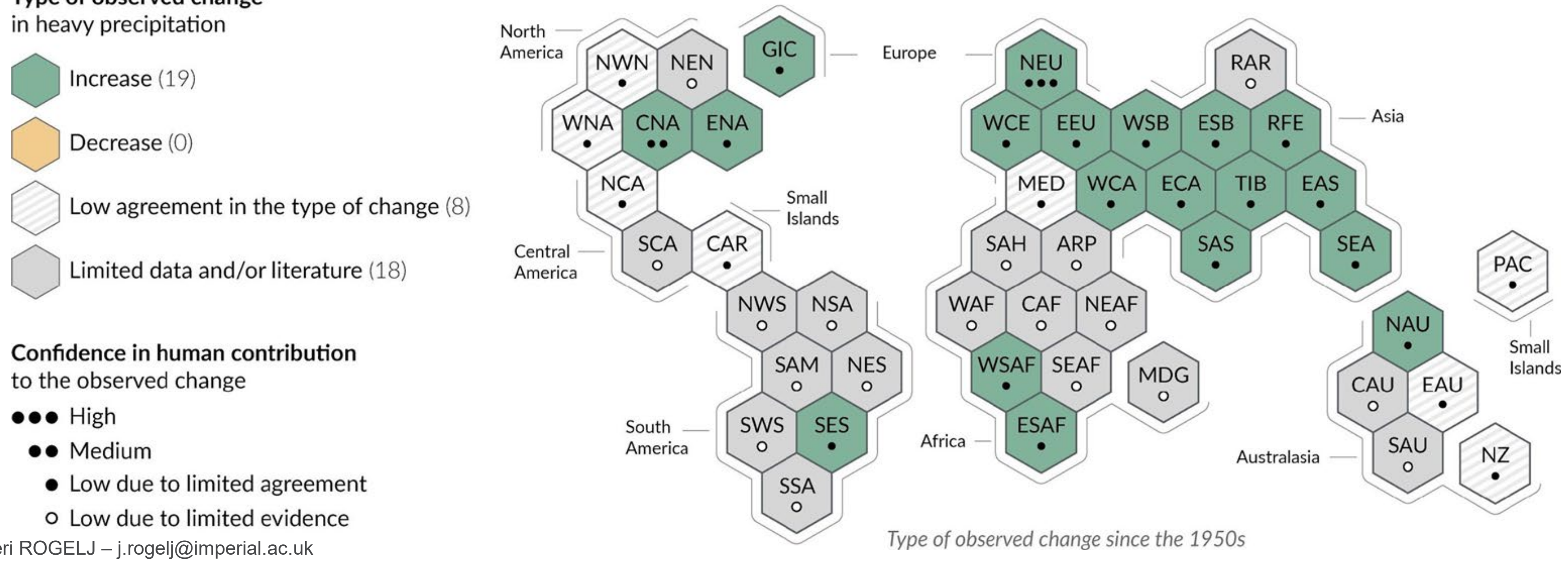


Joeri ROGELJ – j.rogelj@imperial.ac.uk

Figure SPM.3

Climate change is already affecting every inhabited region across the globe, with human influence contributing to many observed changes in weather and climate extremes

b) Synthesis of assessment of observed change in **heavy precipitation** and confidence in human contribution to the observed changes in the world's regions

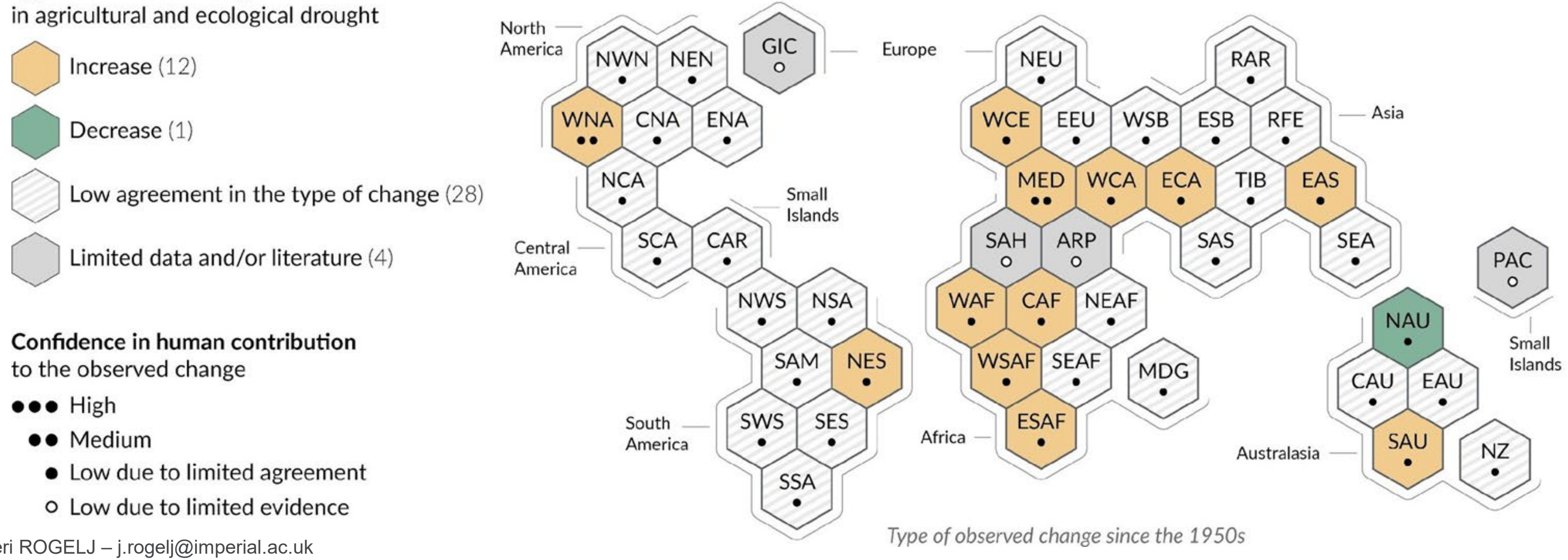


Joeri ROGELJ – j.rogelj@imperial.ac.uk

Climate change is already affecting every inhabited region across the globe, with human influence contributing to many observed changes in weather and climate extremes

Figure SPM.3

c) Synthesis of assessment of observed change in **agricultural and ecological drought** and confidence in human contribution to the observed changes in the world's regions

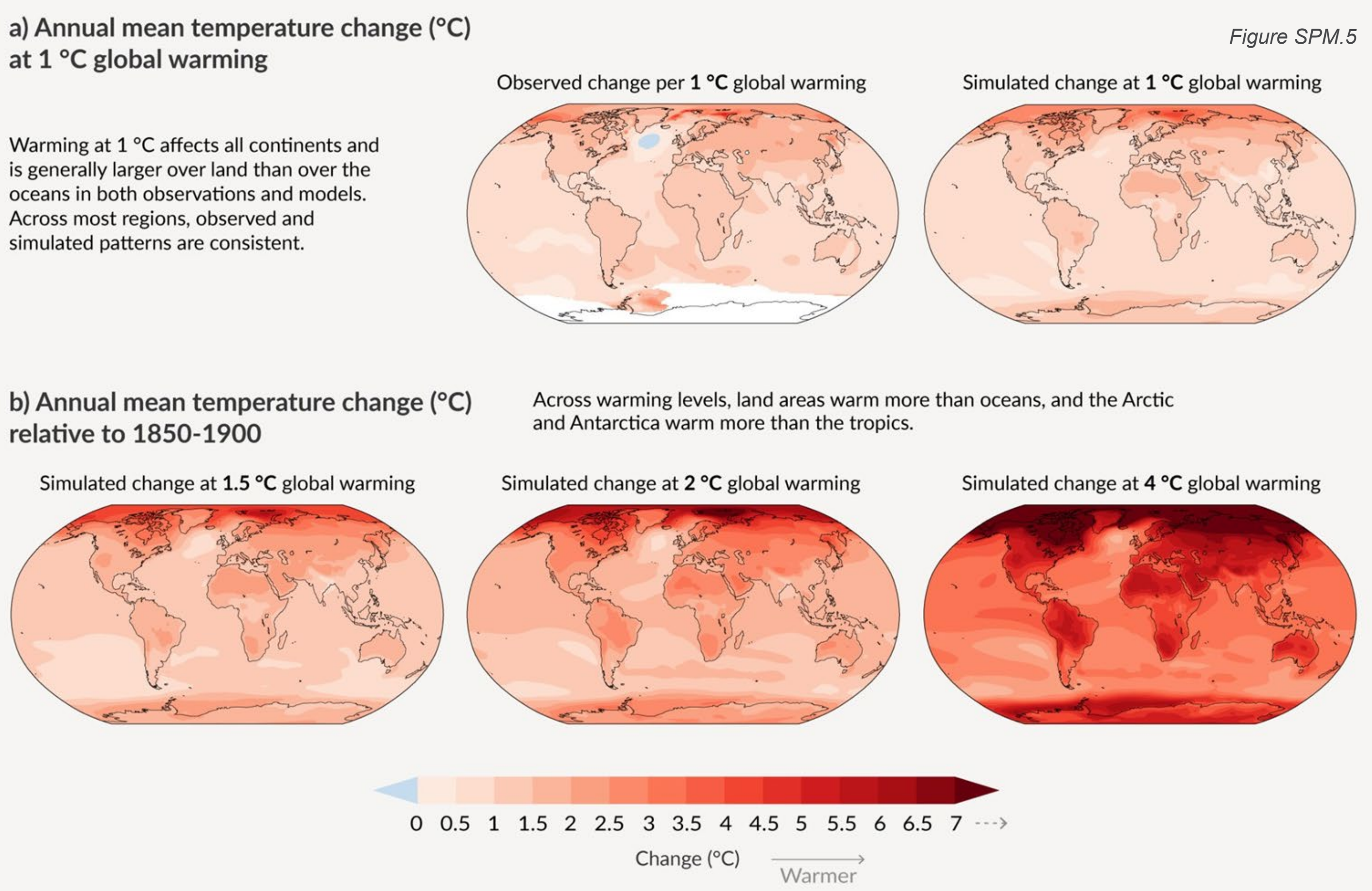


Joeri ROGELJ – j.rogelj@imperial.ac.uk

Also other impacts and compound events have increased as a result of human activities

Image source: NASA, NYTimes

With every increment of global warming, changes get larger in regional mean temperature, precipitation and soil moisture



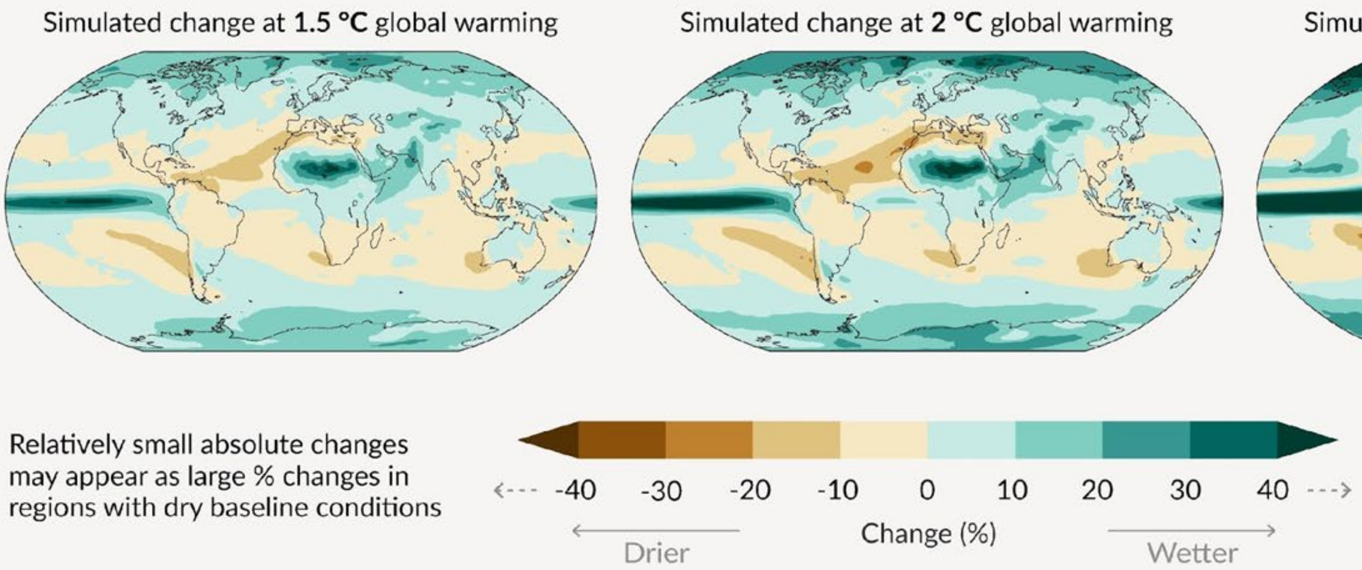
Joeri ROGELJ – j.rogelj@imperial.ac.uk

With every increment of global warming, changes get larger in regional mean temperature, precipitation and soil moisture

Figure SPM.5

c) Annual mean precipitation change (%) relative to 1850-1900

Precipitation is projected to increase over high latitudes, the equatorial Pacific and parts of the monsoon regions, but decrease over parts of the subtropics and in limited areas of the tropics.

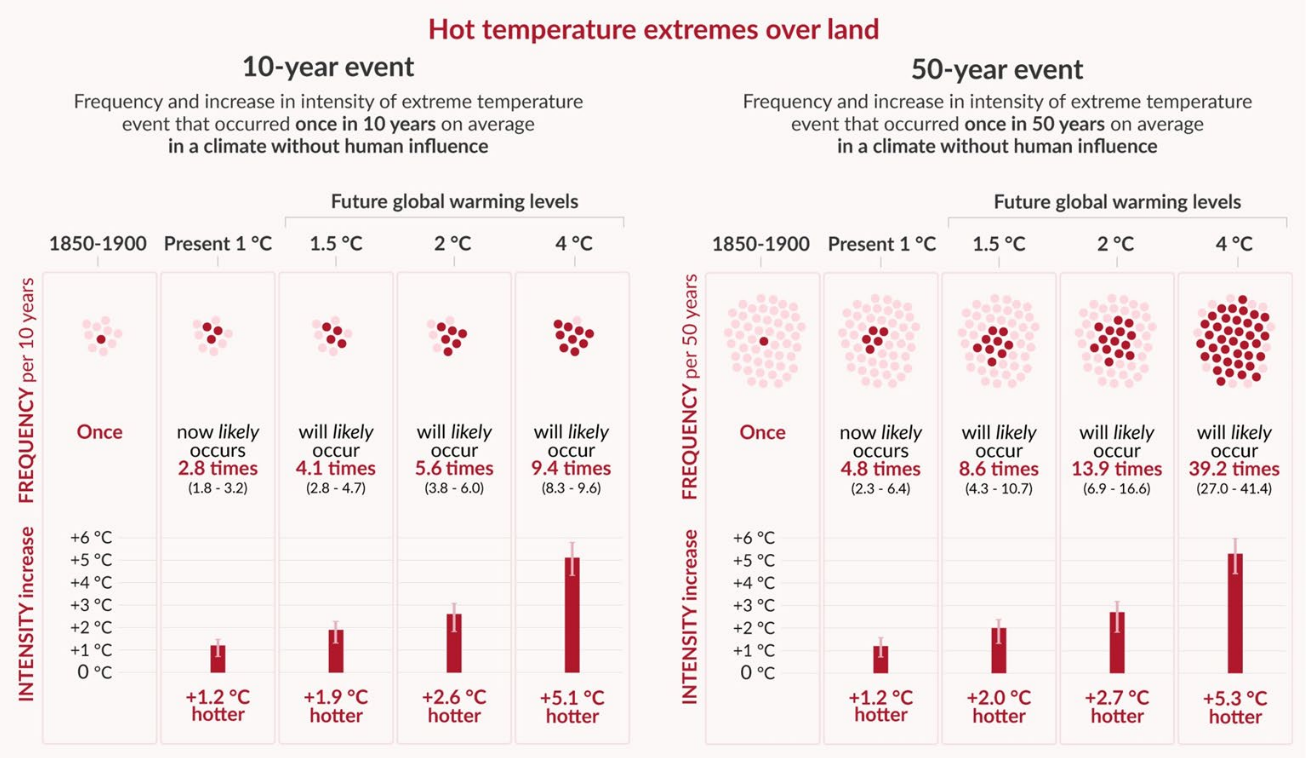


Relatively small absolute changes may appear as large % changes in regions with dry baseline conditions

Joeri ROGELJ – j.rogelj@imperial.ac.uk

Projected changes in extremes are larger in frequency and intensity with every additional increment of global warming

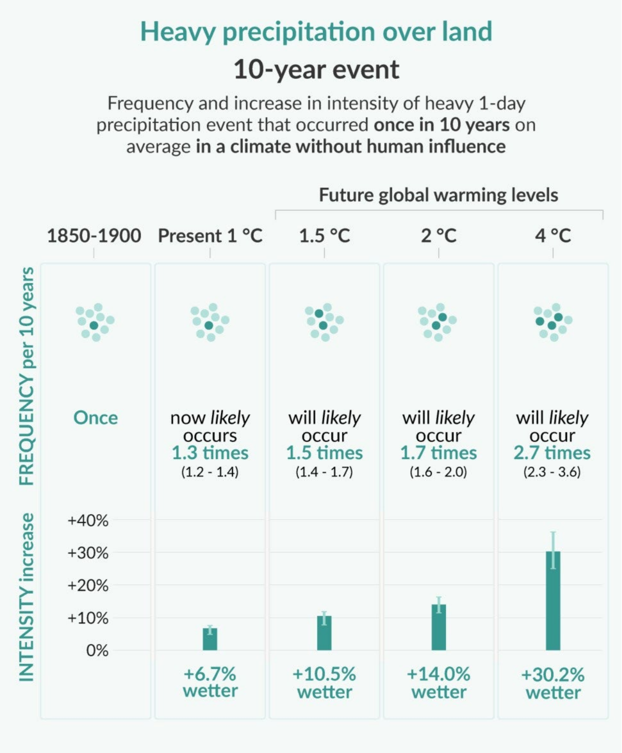
Figure SPM.6

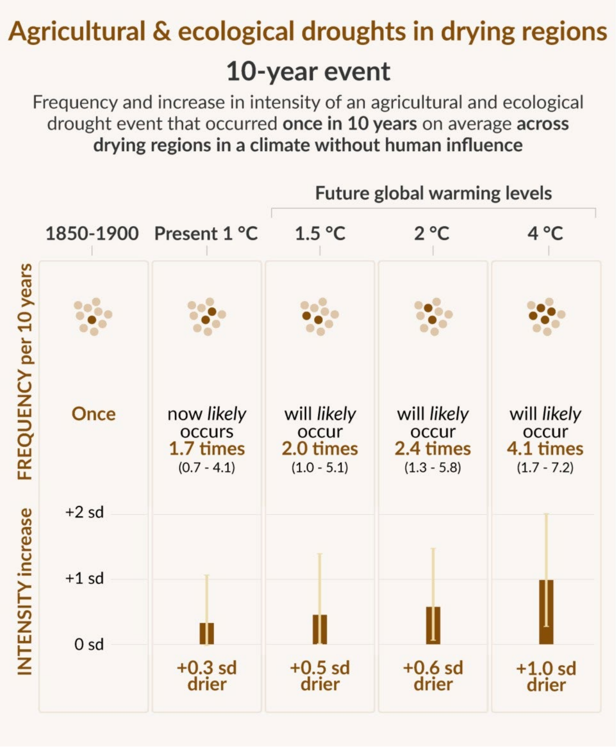


Joeri ROGELJ – j.rogelj@imperial.ac.uk

Projected changes in extremes are larger in frequency and intensity with every additional increment of global warming

Figure SPM.6





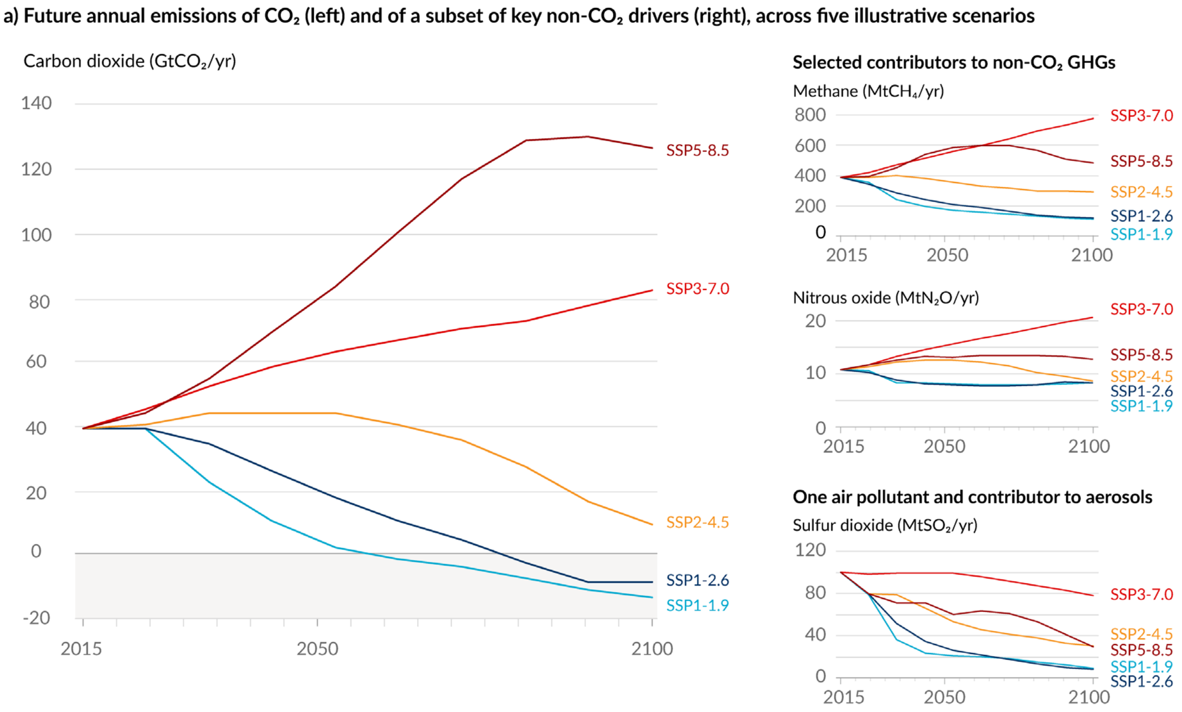
Joeri ROGELJ – j.rogelj@imperial.ac.uk

[Credit: Shari Gearheard | NSIDC]

“There’s no going back from some changes in the climate system. However, some changes could be slowed and others could be stopped by limiting warming.

Emissions scenarios as tools to understand our global futures

Figure SPM.8

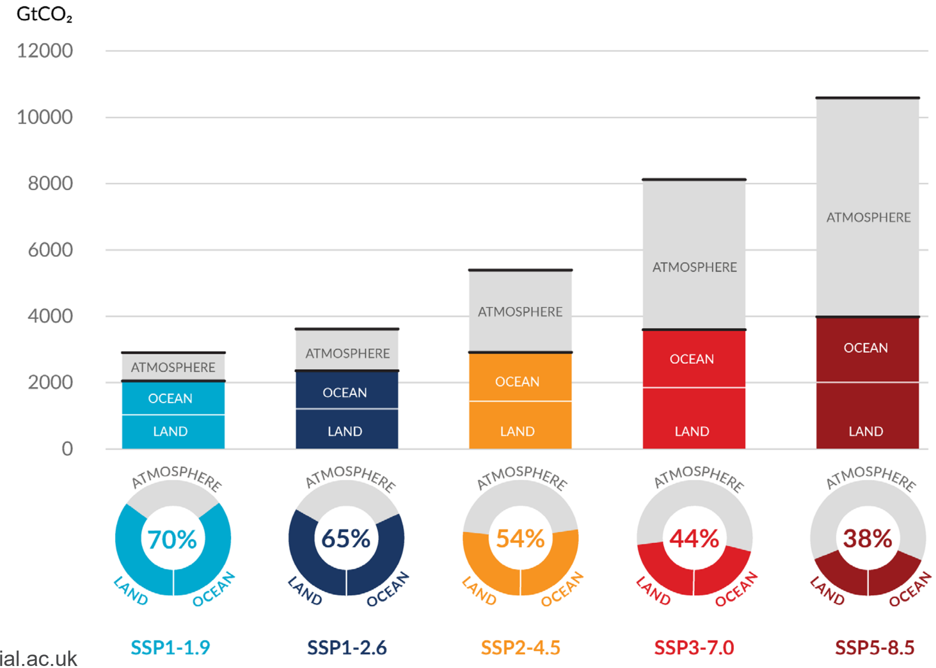


Joeri ROGELJ – j.rogelj@imperial.ac.uk

The proportion of CO_2 emissions taken up by land and ocean carbon sinks is smaller in scenarios with higher cumulative CO_2 emissions

Figure SPM.7

Total cumulative CO_2 emissions **taken up by land and oceans** (colours) and remaining in the atmosphere (grey) under the five illustrative scenarios from 1850 to 2100



For scenarios with **higher** cumulative CO_2 emissions...

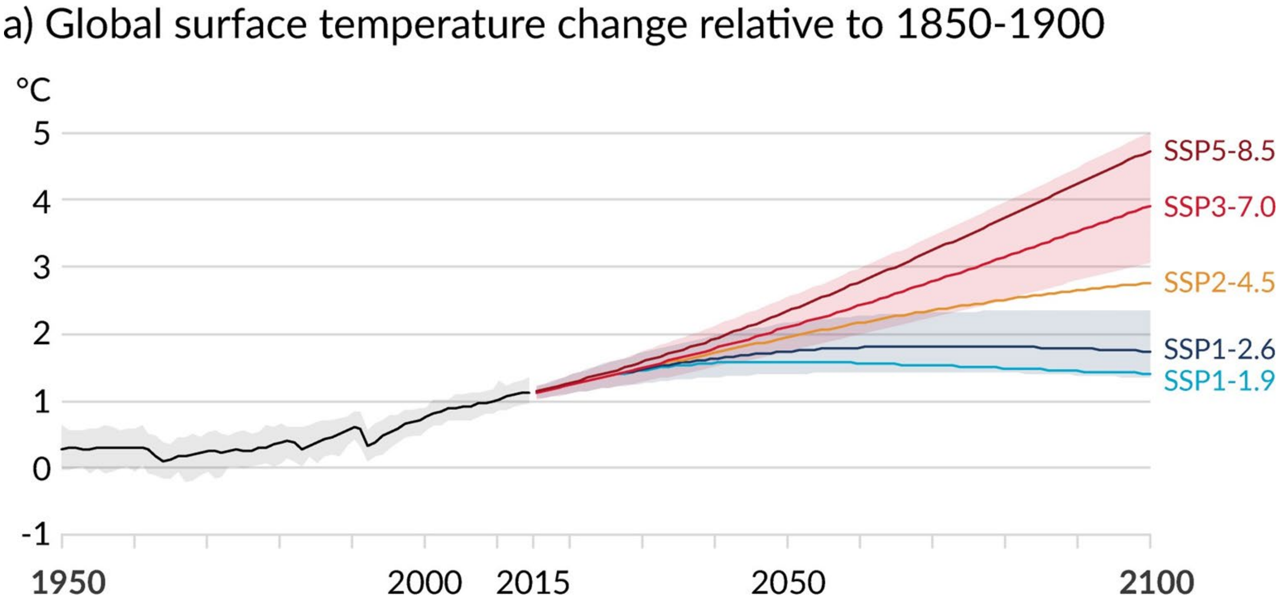
...the amount of CO_2 emissions taken up by land and ocean carbon sinks is **larger**, but more of the emitted CO_2 emissions remains in the atmosphere...

...meaning that the proportion of CO_2 emissions taken up by land and ocean carbon sinks from the atmosphere is **smaller** in scenarios with higher CO_2 emissions.

Joeri ROGELJ – j.rogelj@imperial.ac.uk

Figure SPM.8

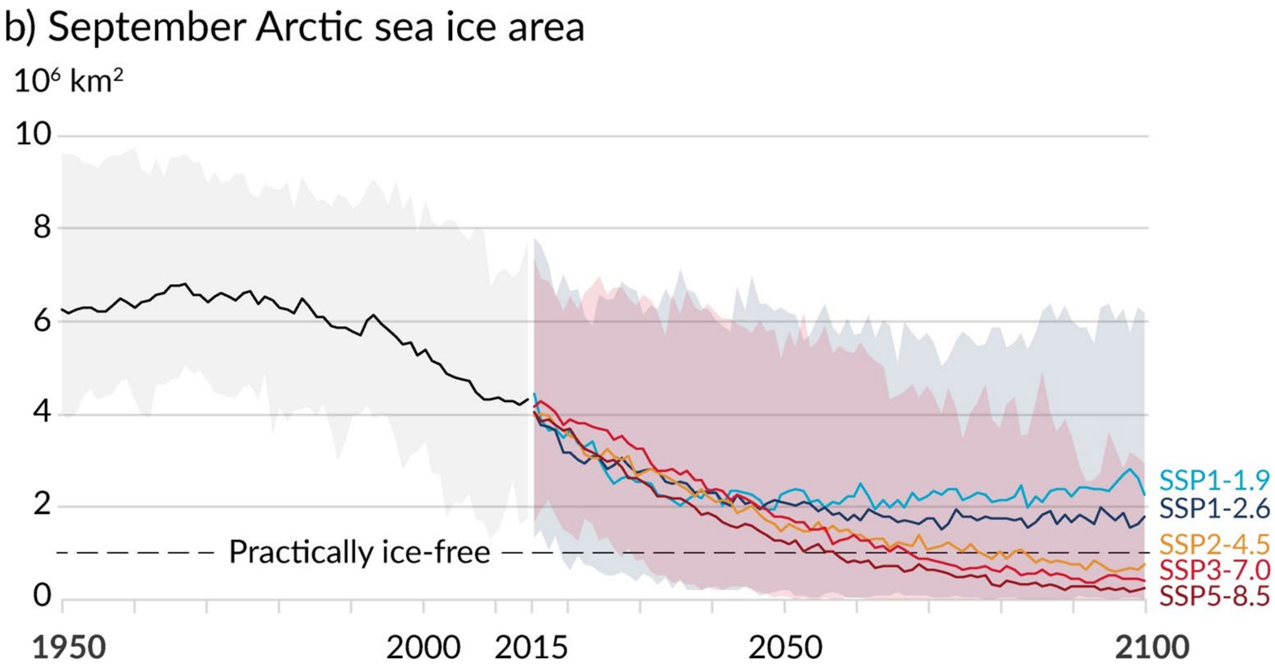
Human activities affect all the major climate system components, with some responding over decades and others over centuries



Joeri ROGELJ – j.rogelj@imperial.ac.uk

Human activities affect all the major climate system components, with some responding over decades and others over centuries

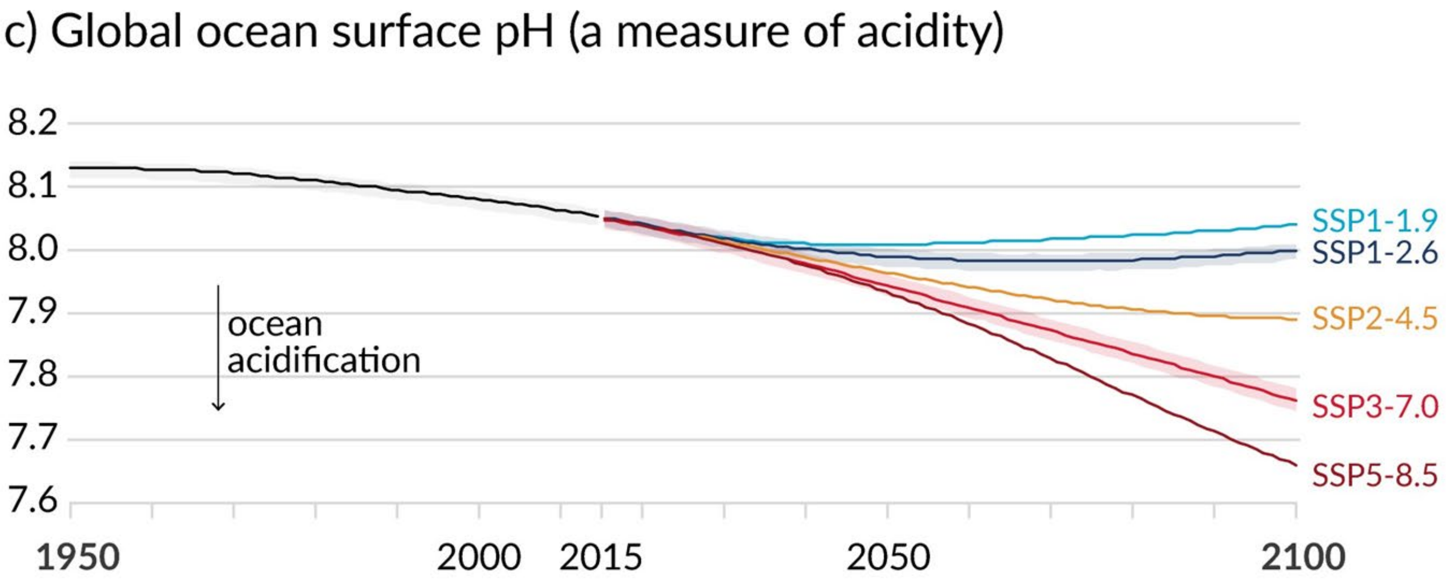
Figure SPM.8



Joeri ROGELJ – j.rogelj@imperial.ac.uk

Figure SPM.8

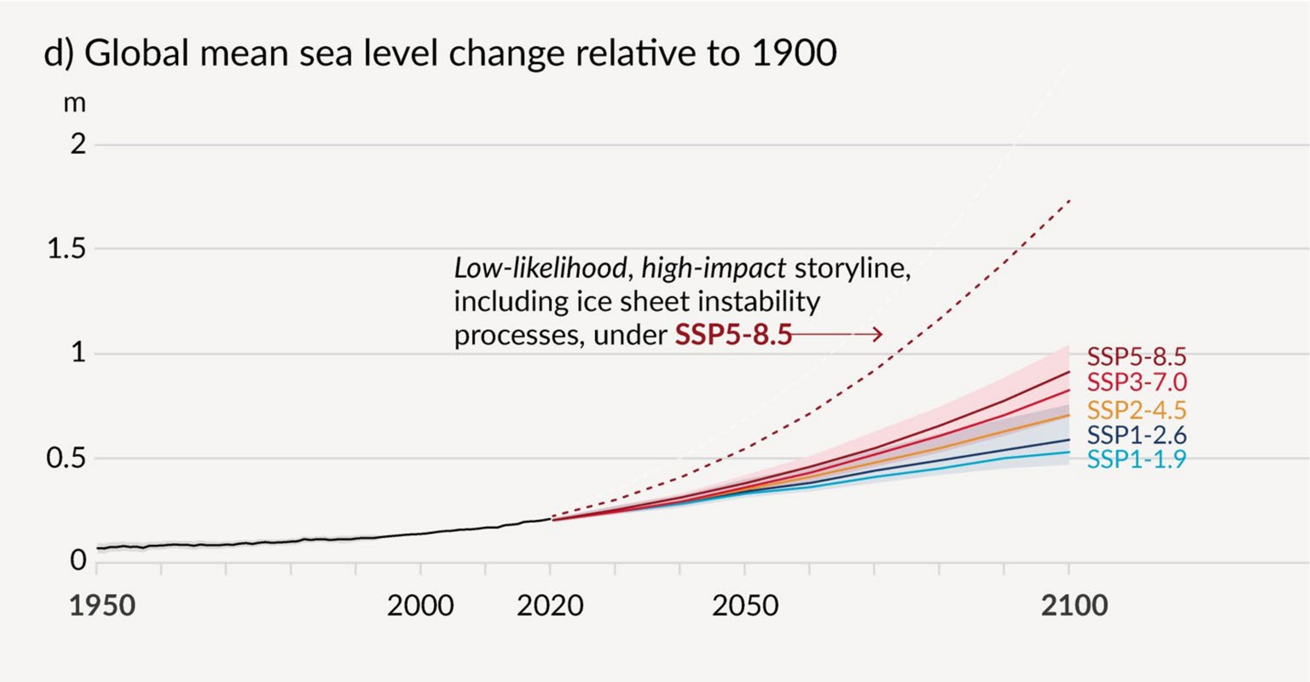
Human activities affect all the major climate system components, with some responding over decades and others over centuries



Joeri ROGELJ – j.rogelj@imperial.ac.uk

Figure SPM.8

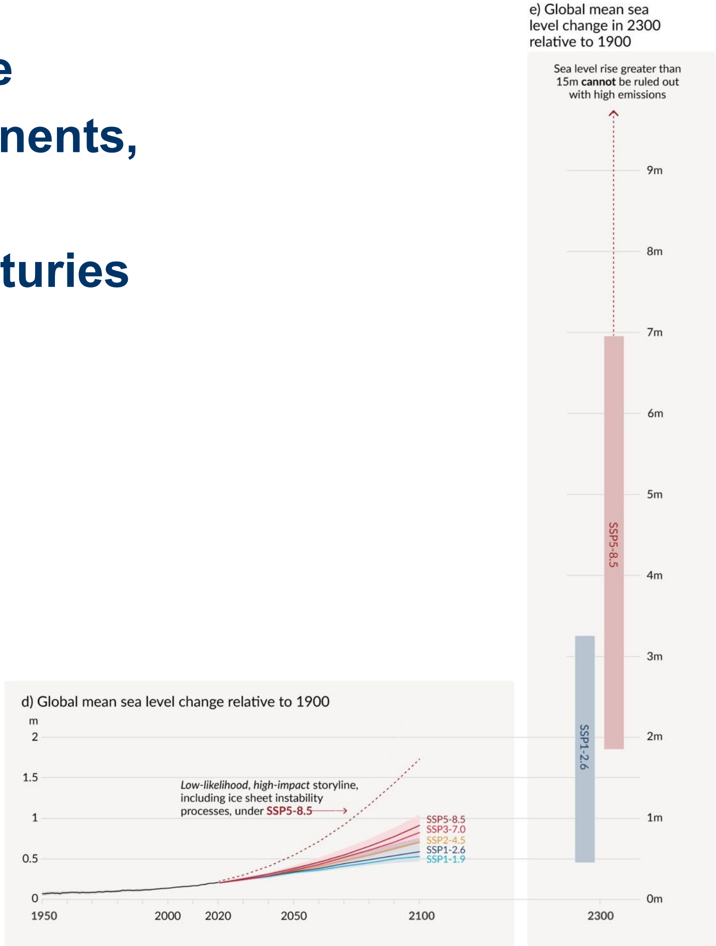
Human activities affect all the major climate system components, with some responding over decades and others over centuries



Joeri ROGELJ – j.rogelj@imperial.ac.uk

Human activities affect all the major climate system components, with some responding over decades and others over centuries

Figure SPM.8



Joeri ROGELJ – j.rogelj@imperial.ac.uk

[Credit: Evgeny Nelmin | Unsplash]

“ To limit global warming, strong, rapid, and sustained reductions in CO_2, methane, and other greenhouse gases are necessary.

This would not only reduce the consequences of climate change but also improve air quality.

Figure SPM.8

Future emissions cause future additional warming, with total warming dominated by past and future CO_2 emissions

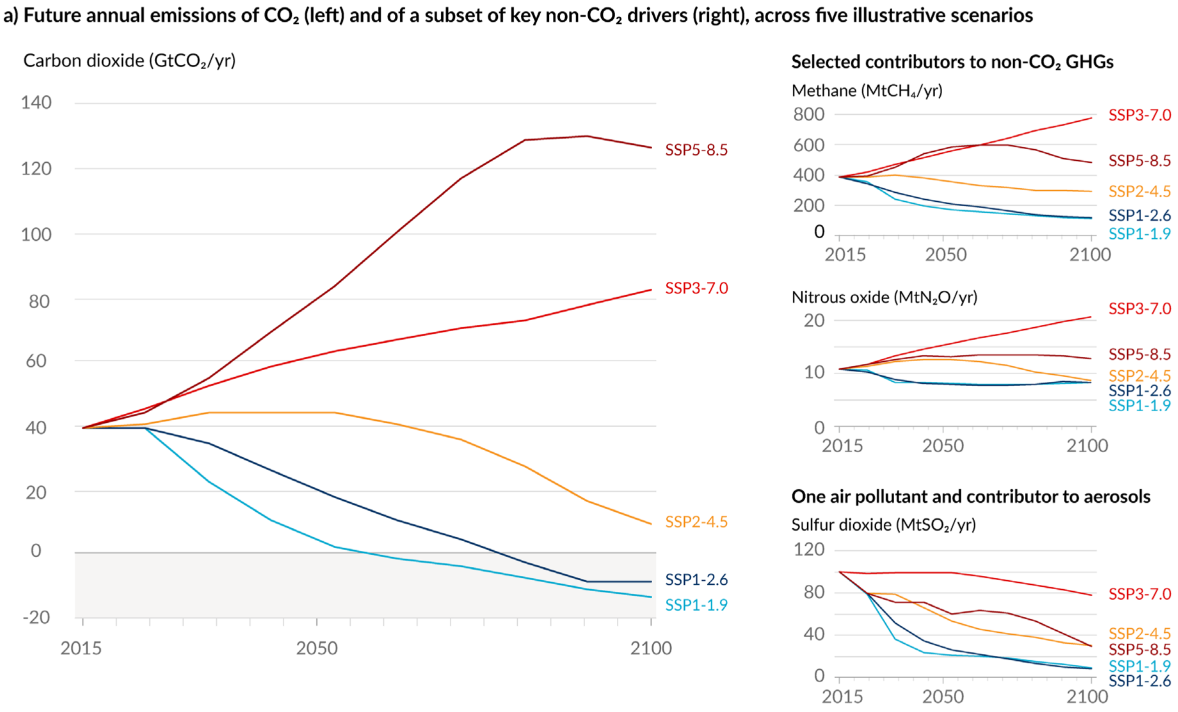
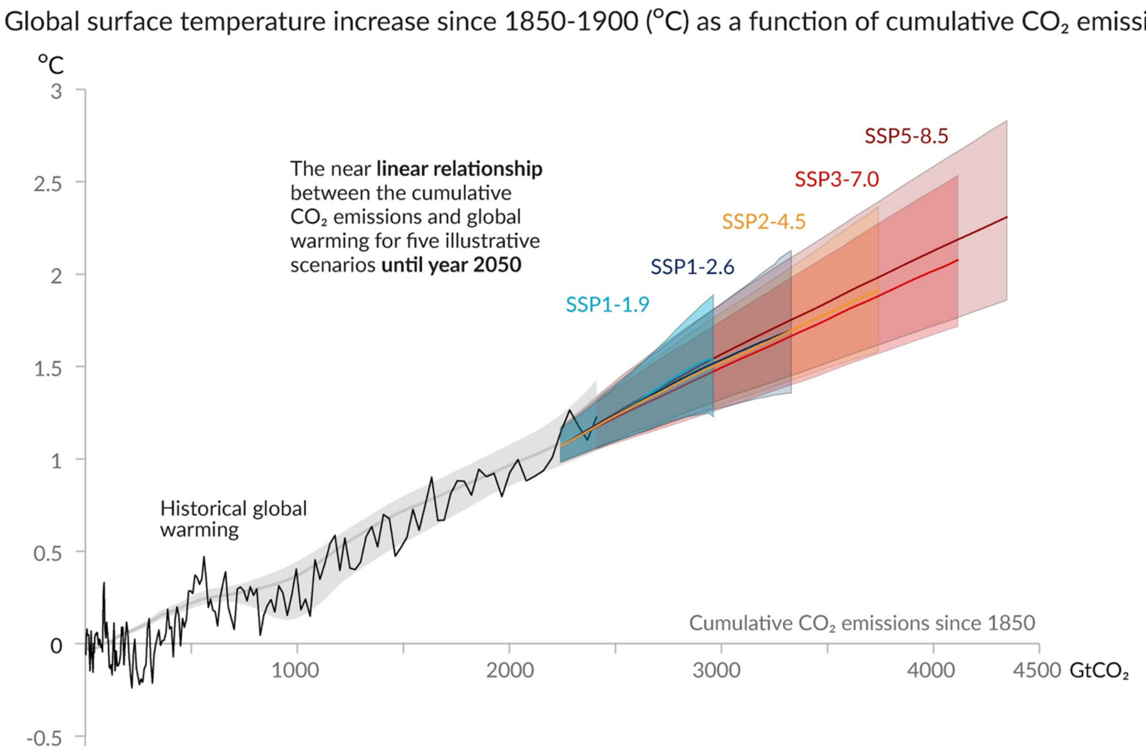


Figure SPM.10

Every tonne of CO_2 emissions adds to global warming

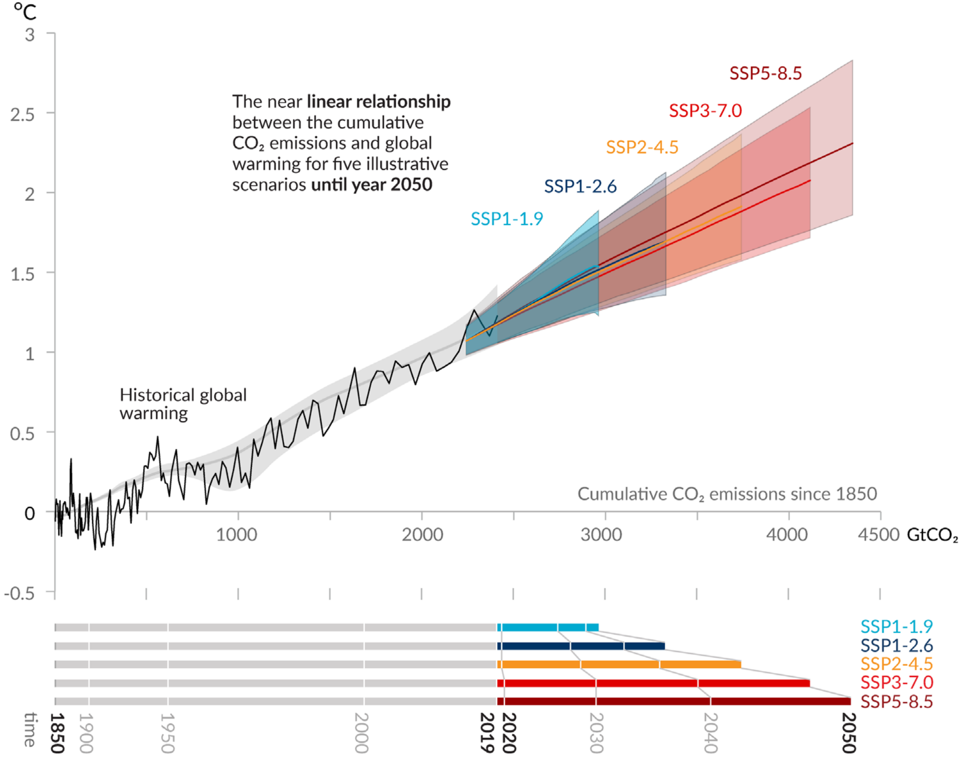


Joeri ROGELJ – j.rogelj@imperial.ac.uk

The next decades matter

Global surface temperature increase since 1850-1900 (°C) as a function of cumulative CO_2 emissions ($GtCO_2$)

Figure SPM.10



Future cumulative CO_2 emissions differ across scenarios, and determine how much warming we will experience

HISTORICAL
Cumulative CO_2 emissions between **1850** and **2019**

PROJECTIONS
Cumulative CO_2 emissions between **2020** and **2050**

Joeri ROGELJ – j.rogelj@imperial.ac.uk

Table SPM.2

We understand better than ever what needs to be done to limit warming to the goals of the Paris Agreement

Global warming between 1850–1900 and 2010–2019 *(°C)*	Historical cumulative CO_2 emissions from 1850 to 2019 *($GtCO_2$)*
1.07 (0.8–1.3; *likely* range)	2390 (± 240; *likely* range)

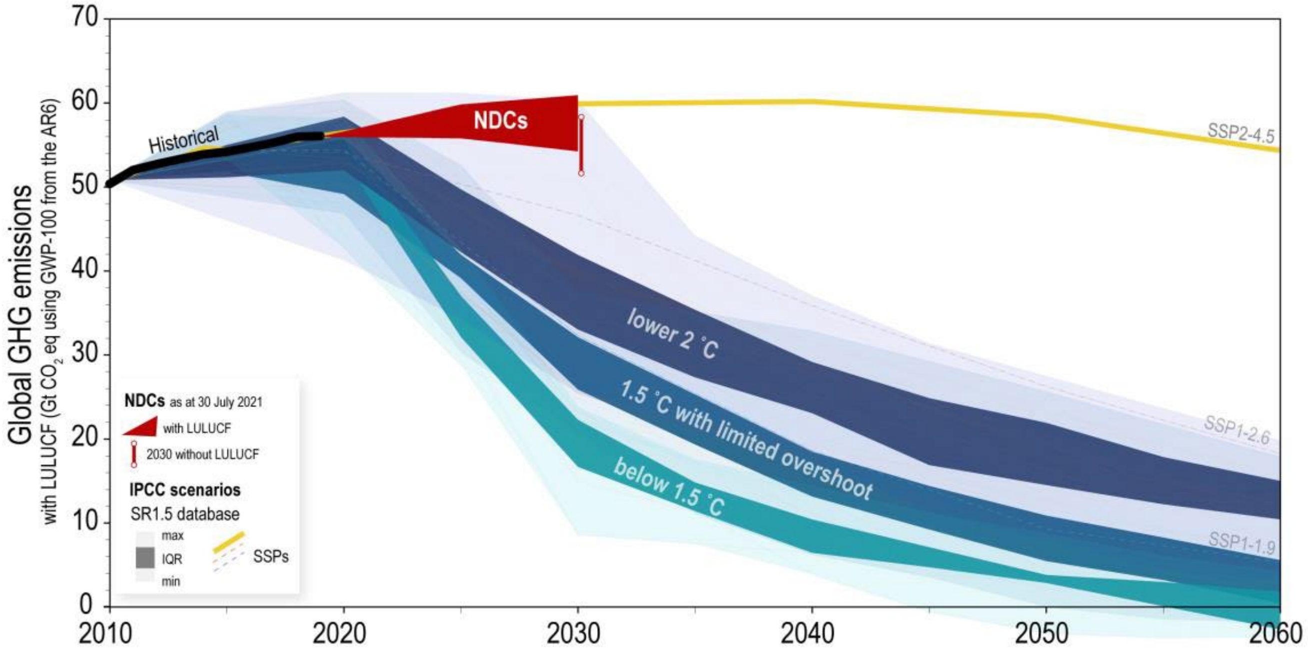
Approximate global warming relative to 1850–1900 until temperature limit *(°C)**(1)	Additional global warming relative to 2010–2019 until temperature limit *(°C)*	Estimated remaining carbon budgets from the beginning of 2020 *($GtCO_2$)* — *Likelihood of limiting global warming to temperature limit*(2)*					Variations in reductions in non-CO_2 emissions*(3)
		17%	*33%*	*50%*	*67%*	*83%*	
1.5	0.43	900	650	500	400	300	Higher or lower reductions in accompanying non-CO_2 emissions can increase or decrease the values on the left by 220 $GtCO_2$ or more
1.7	0.63	1450	1050	850	700	550	
2.0	0.93	2300	1700	1350	1150	900	

Joeri ROGELJ – j.rogelj@imperial.ac.uk

HISTORY | EVOLUTION OF THE IPCC

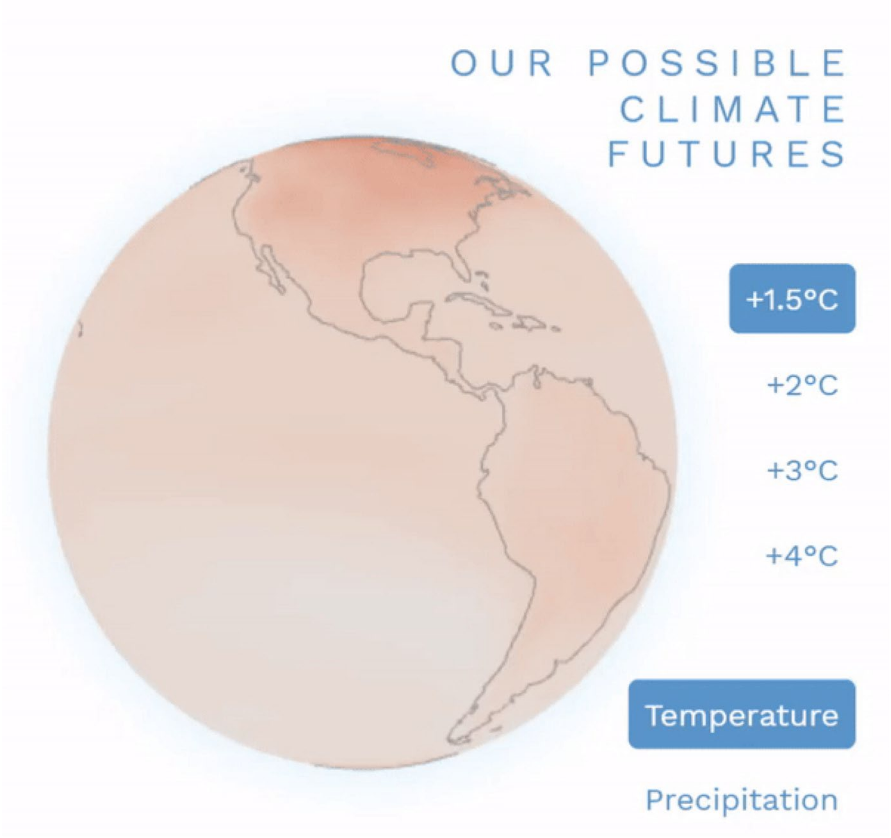
33 Years of IPCC: 1988-2021

Reality check : UNFCCC NDC Synthesis Report



Joeri ROGELJ – j.rogelj@imperial.ac.uk

Interactive



https://interactive-atlas.ipcc.ch/

#IPCCData #IPCCAtlas

Thank you.

More Information:

IPCC: www.ipcc.ch

IPCC Secretariat: ipcc-sec@wmo.int

IPCC Press Office: ipcc-media@wmo.int

Follow Us:

@IPCC

@IPCC_CH

linkedin.com/company/ipcc

#ClimateReport #IPCC