Has the Paris Agreement on climate change changed anything for carbon cycle research?

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Paris Agreement on climate change:

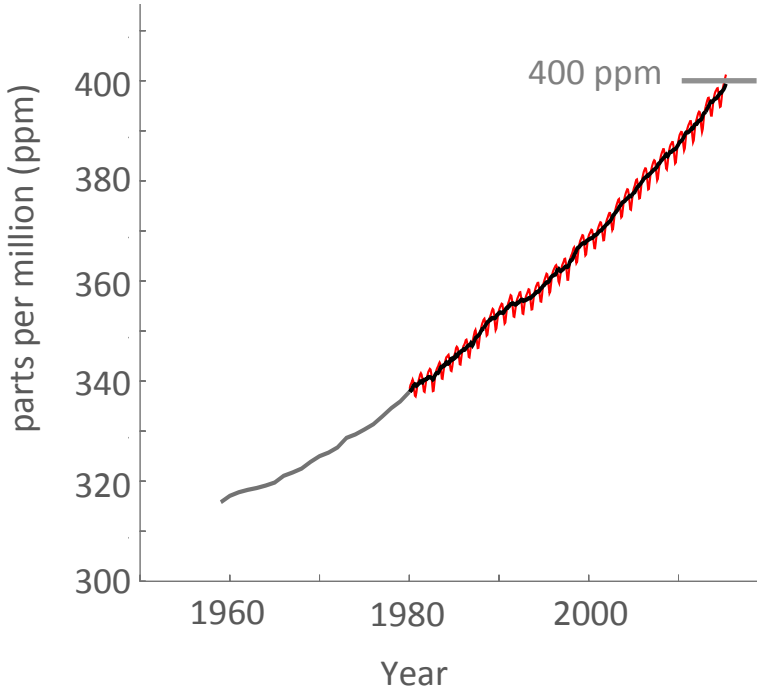
- Ambition of *well below* 2°C warming
- Balance of sources and sinks
- 5-year review process

UNFCCC plenary, Paris, 4pm on December 12th 2015

IPCC plenary, Stockholm, 4am on Sept 27th 2013

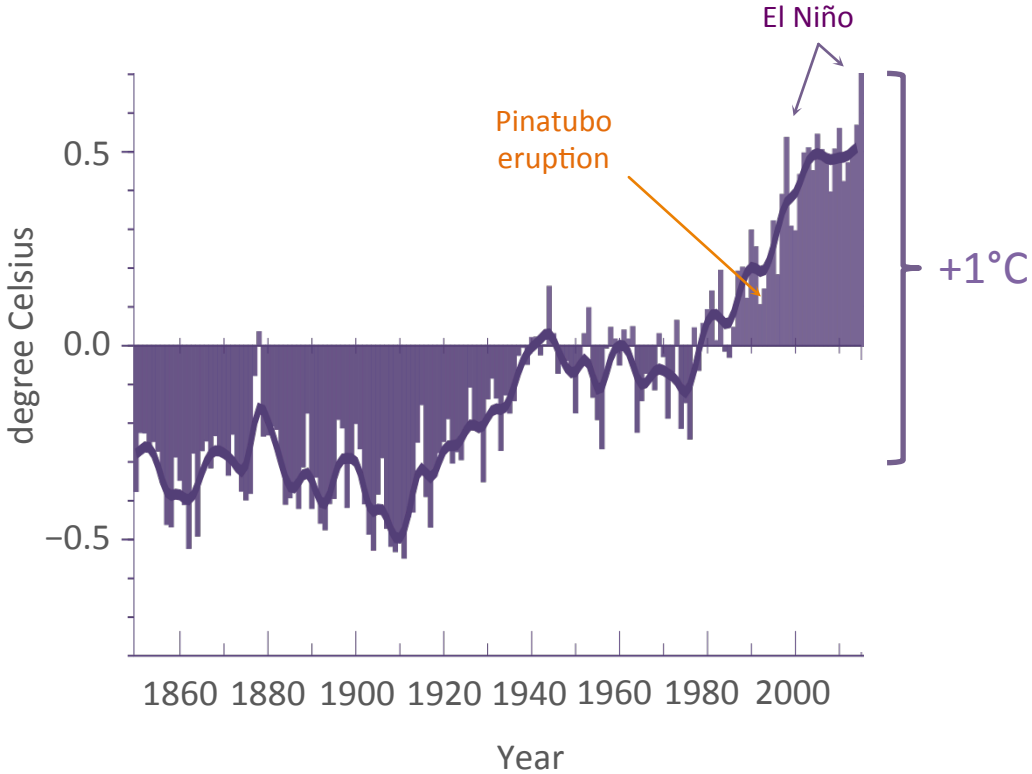
Latest trends on atmospheric CO_2 and temperature

atmospheric CO_2 concentration



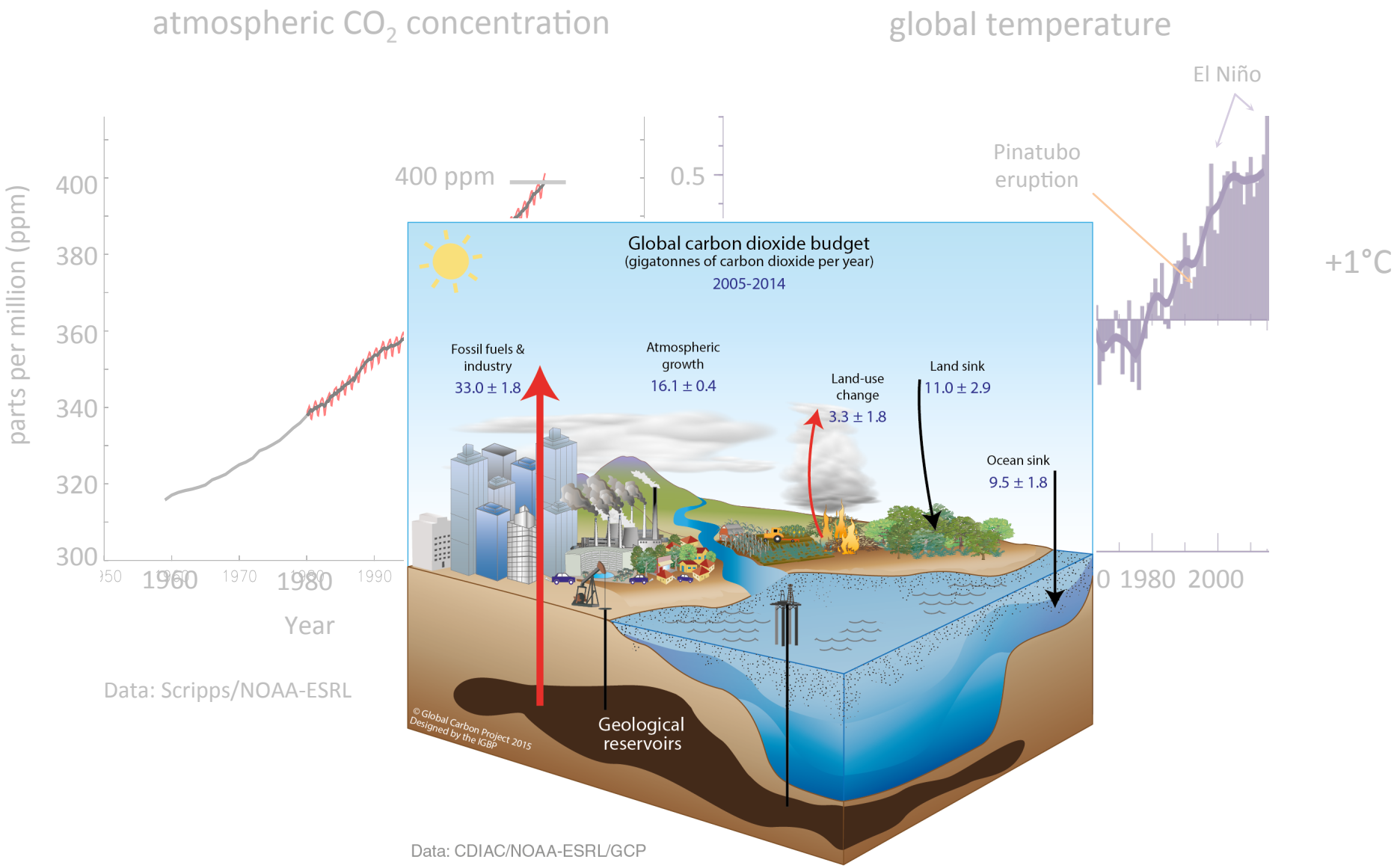
Data: Scripps/NOAA-ESRL

global temperature



Data: HadCRUT4

Latest trends on atmospheric CO_2 and temperature



Fate of anthropogenic CO_2 emissions (2005-2014 average)

91%

Sources

9%

Partitioning

44%

30%

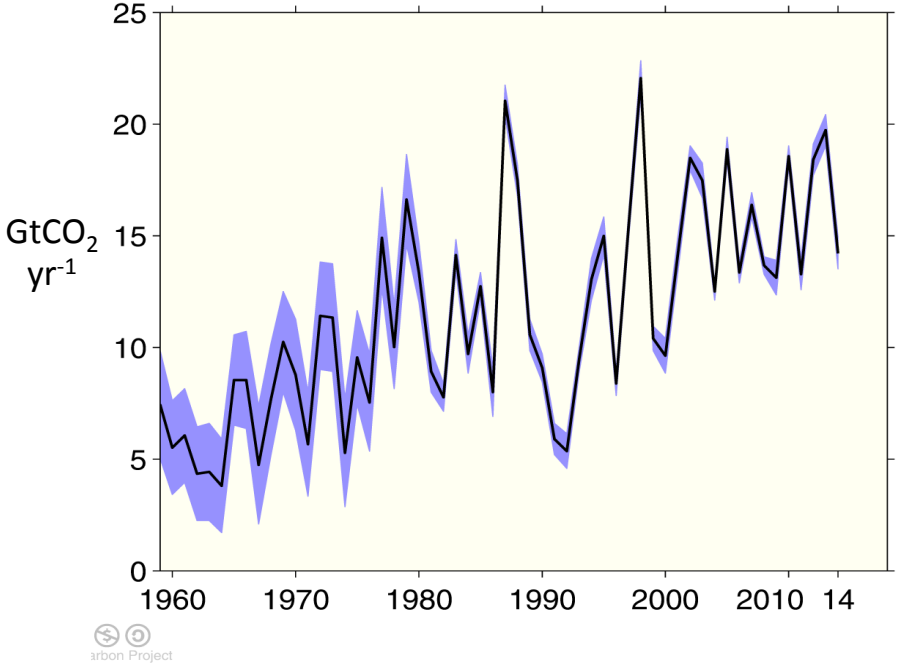
Calculated as the residual
of all other flux components

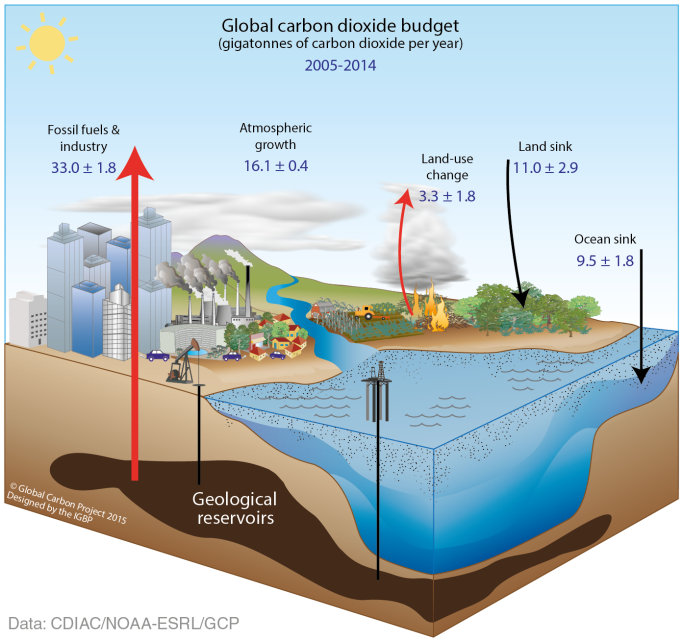
26%

Source: CDIAC; NOAA-ESRL; Houghton et al 2012; Giglio et al 2013; Le Quéré et al 2015; Global Carbon Budget 2015

partitioning

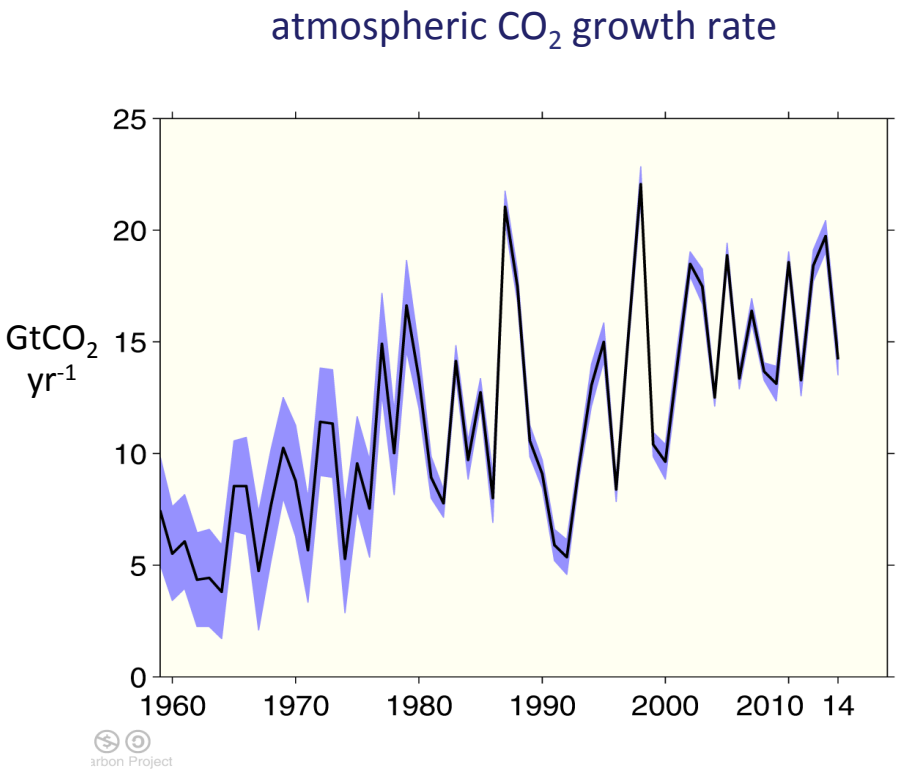
atmospheric CO_2 growth rate

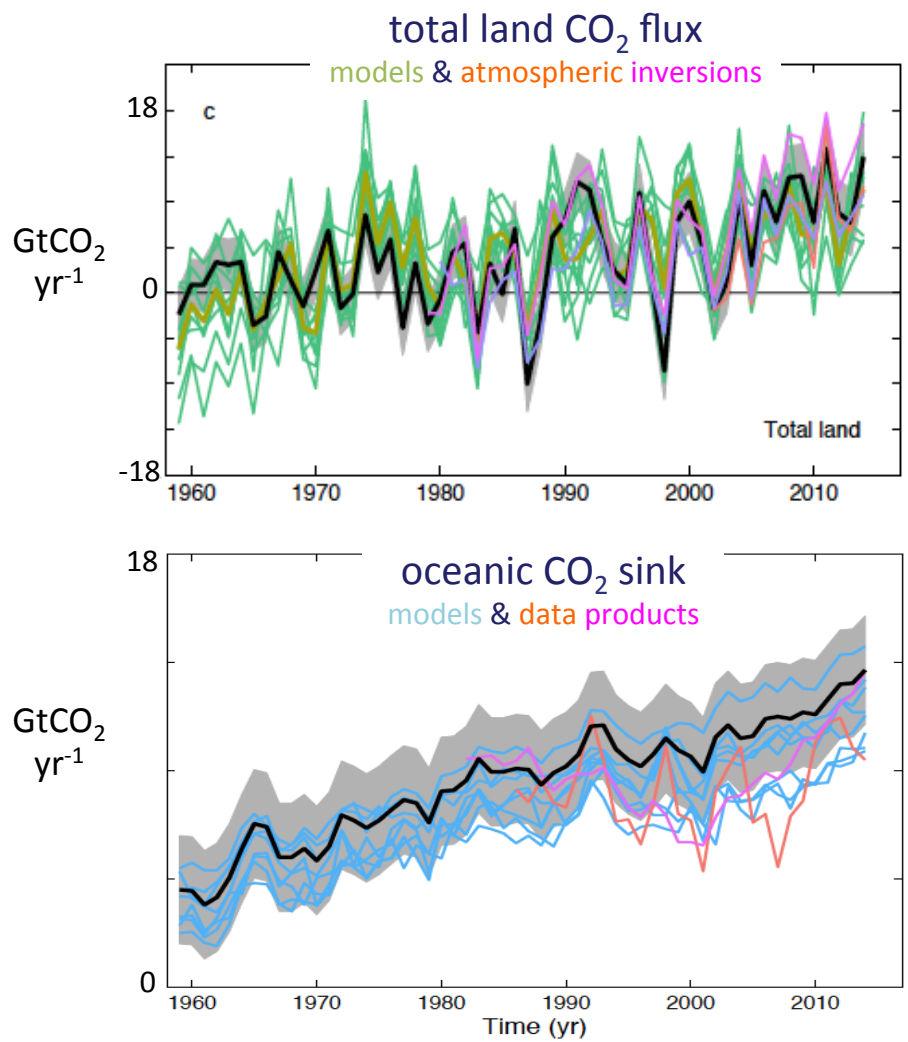




Source: NOAA/ESRL Data; Le Quéré et al ESSD 2015; Global Carbon Project 2015

partitioning



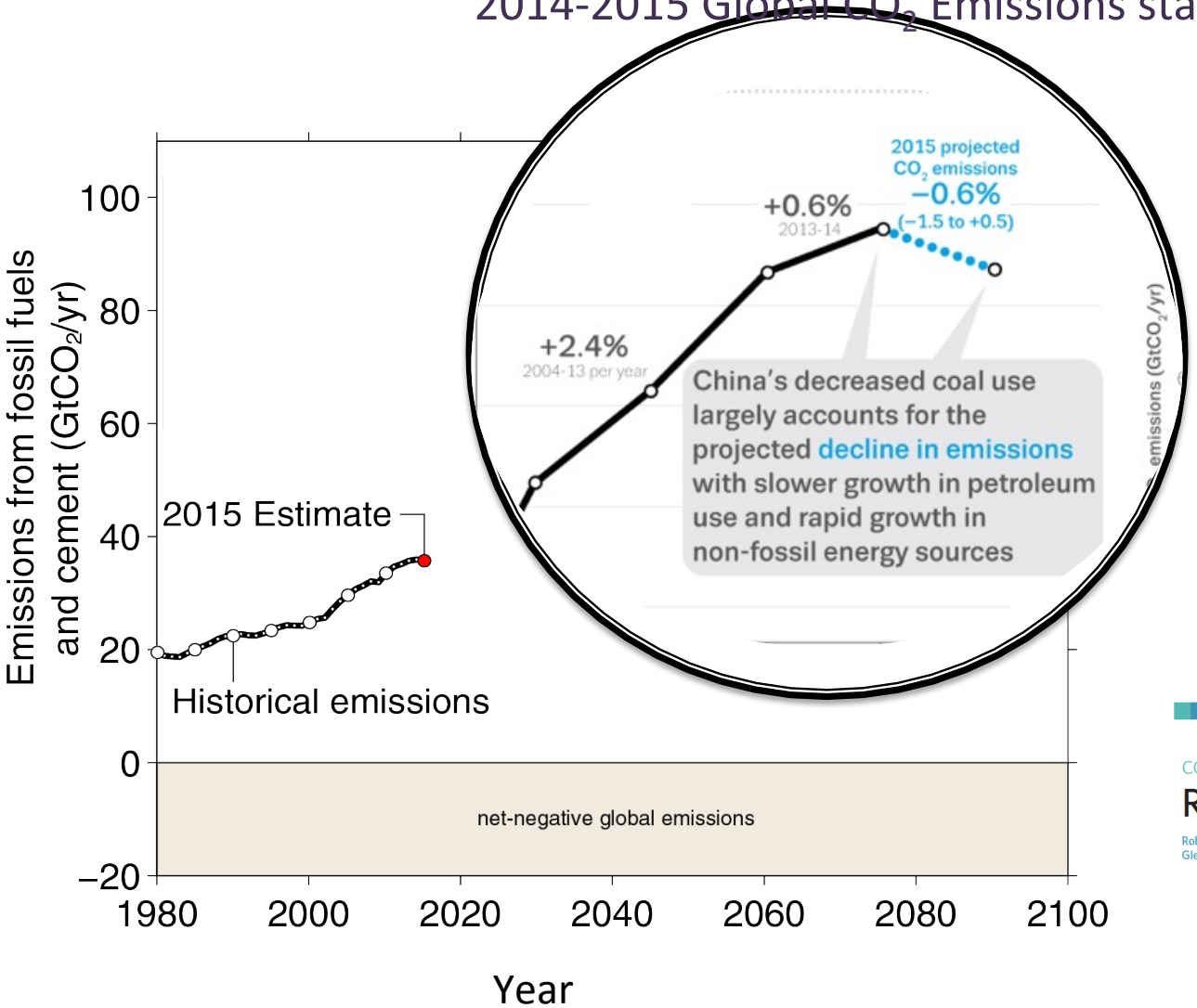


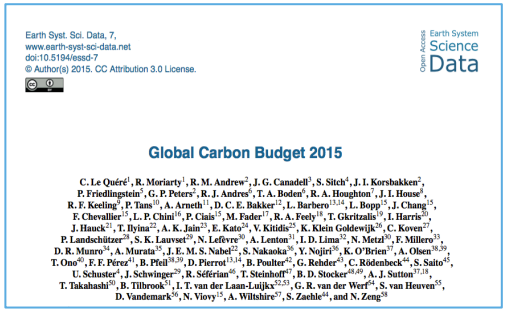
What we now know:

- the missing sink has been found!
- decadal trend and variability in land and ocean
- interannual variability on land >> ocean
- uncertainty in sinks ≈ uncertainty in emissions

Source: NOAA/ESRL Data; Le Quéré et al ESSD 2015; Global Carbon Project 2015

2014-2015 Global CO_2 Emissions stall





Earth Syst. Sci. Data, 7,
www.earth-syst-sci-data.net
doi:10.5194/essd-7
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Global Carbon Budget 2015

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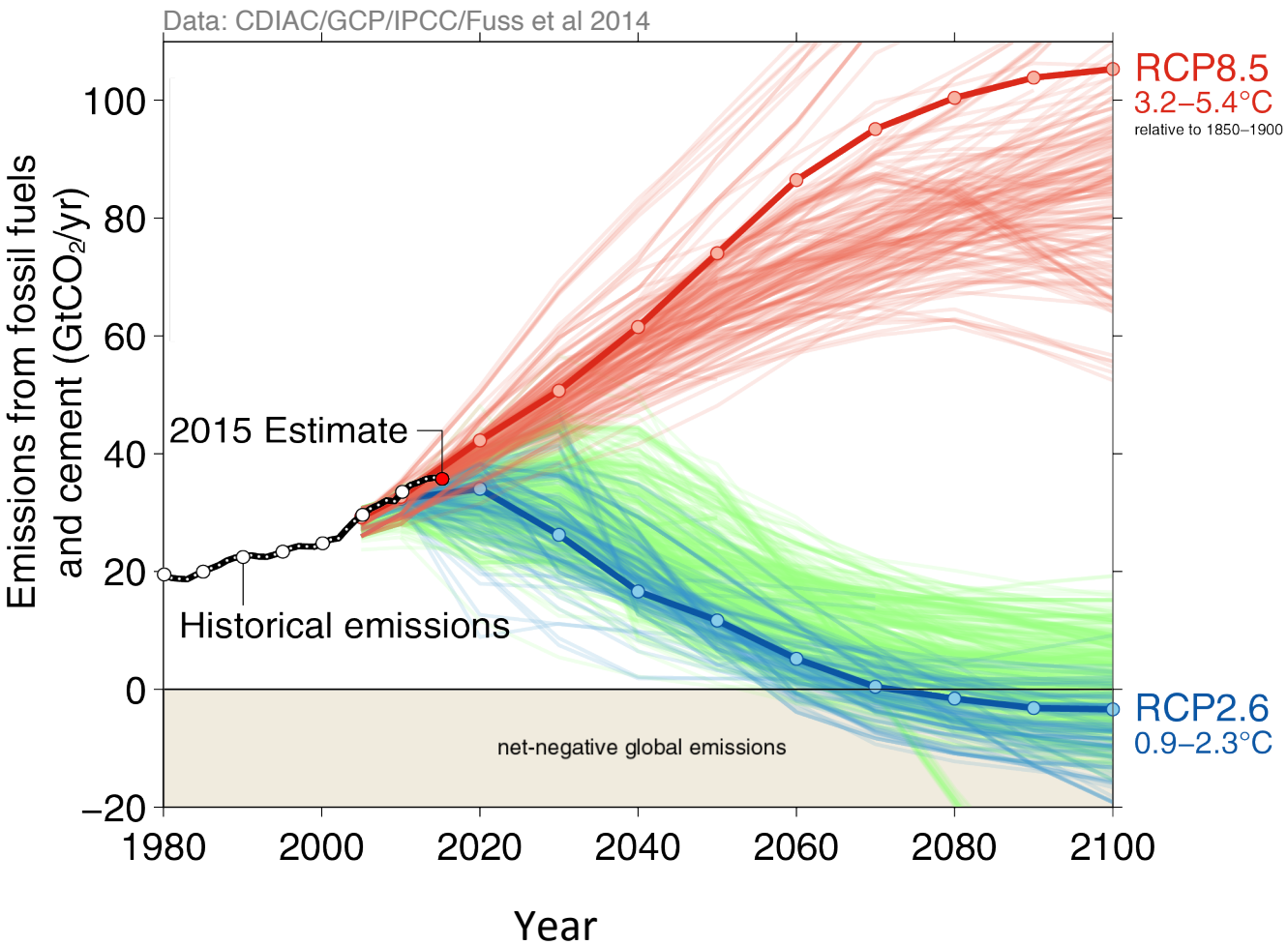
opinion & comment

COMMENTARY:

Reaching peak emissions

Robert B. Jackson, Josep G. Canadell, Corinne Le Quéré, Robbie M. Andrew, Jan Ivar Korsbakken, Glen P. Peters and Nebojsa Nakicenovic

emissions need to decrease to near zero to achieve climate stabilisation



high-risk climate future

consistent with 2°C limit

Source: Fuss et al 2014; CDIAC; Global Carbon Budget 2014; IPCC WGI & WGIII scenario database

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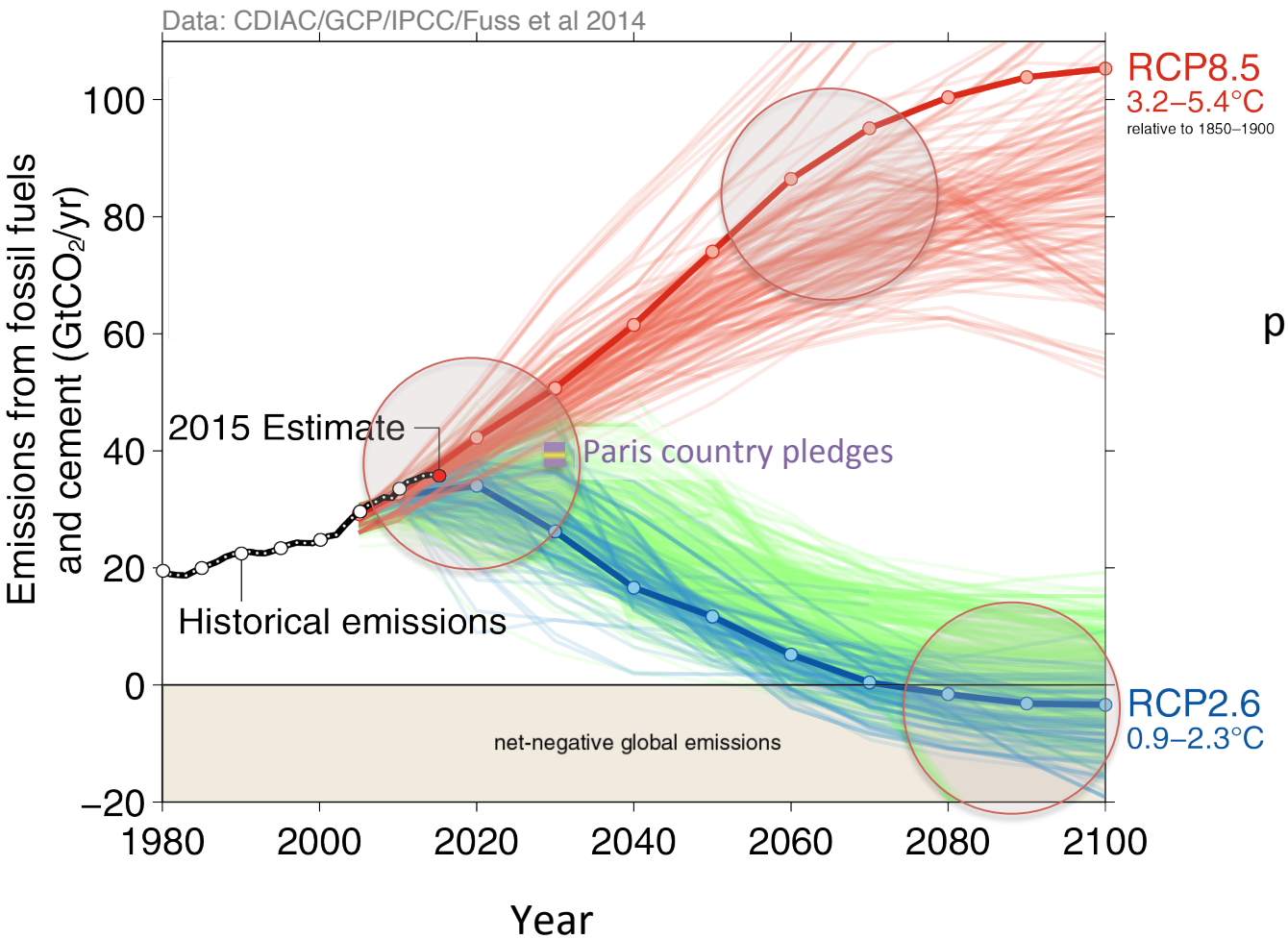
emissions need to decrease to near zero to achieve climate stabilisation



high-risk climate future

pathways consistent with countries INDC

Source: growth above 2010 from UNFCCC

consistent with 2°C limit

Source: Fuss et al 2014; CDIAC; Global Carbon Budget 2014; IPCC WGI & WGIII scenario database

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All the data is shown in billion tonnes CO_2 ($GtCO_2$)

1 Gigatonne (Gt) = 1 billion tonnes = 1×10^{15}g = 1 Petagram (Pg)

1 kg carbon (C) = 3.664 kg carbon dioxide (CO_2)

1 GtC = 3.664 billion tonnes CO_2 = 3.664 $GtCO_2$

Disclaimer

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