Palaeo perspectives, and high-end scenarios

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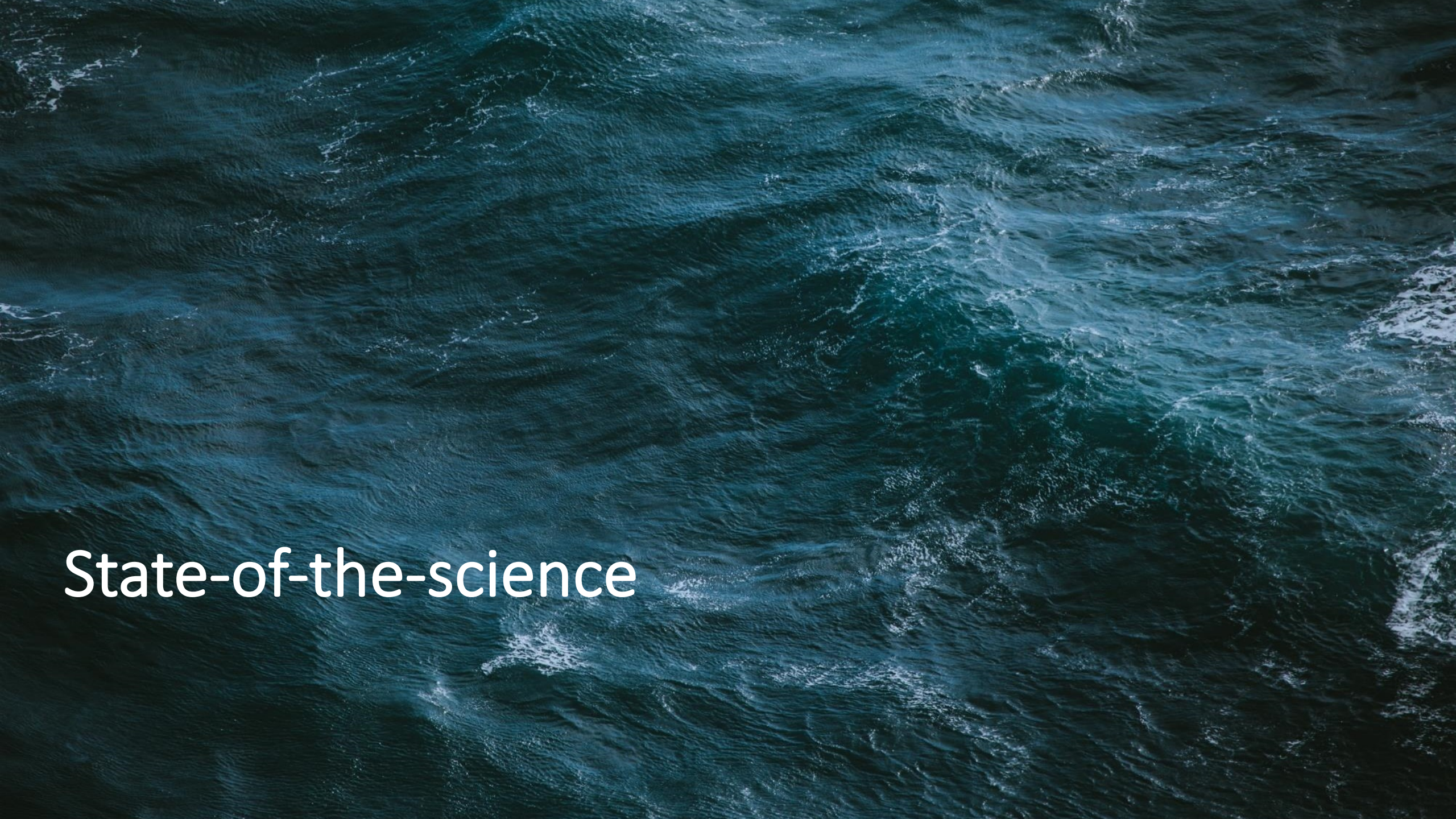
Priestley International Centre for Climate
Delivering research to underpin robust and timely climate solutions

PALSEA



State-of-the-science

Palaeo sea level

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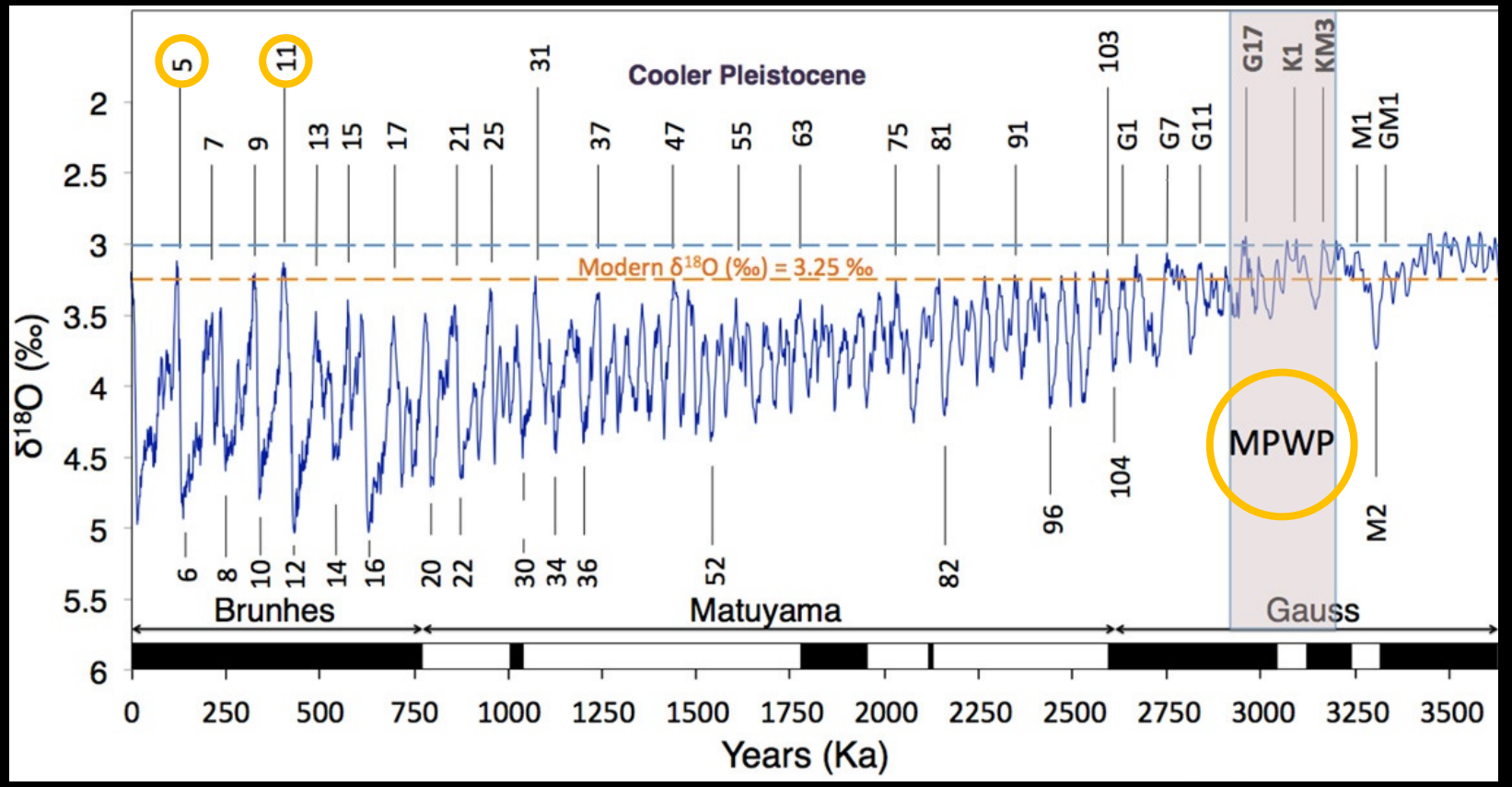

Raymo et al. (2018)

Orange dashed line is mean $\delta^{18}O$ value of last 5 kyr of the Holocene.

Palaeo sea level during warm periods

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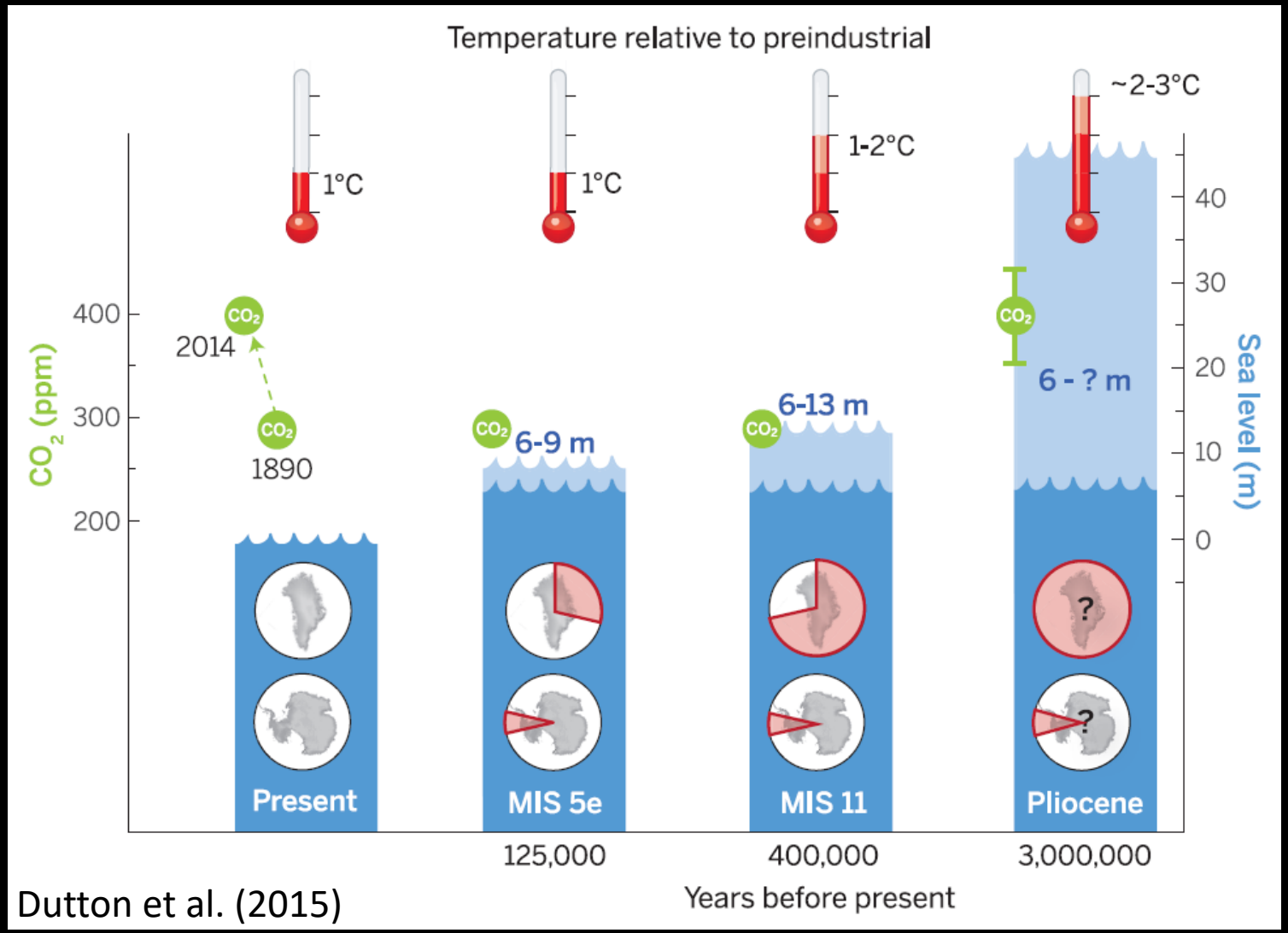

Dutton et al. (2015)

Palaeo sea level during warm periods

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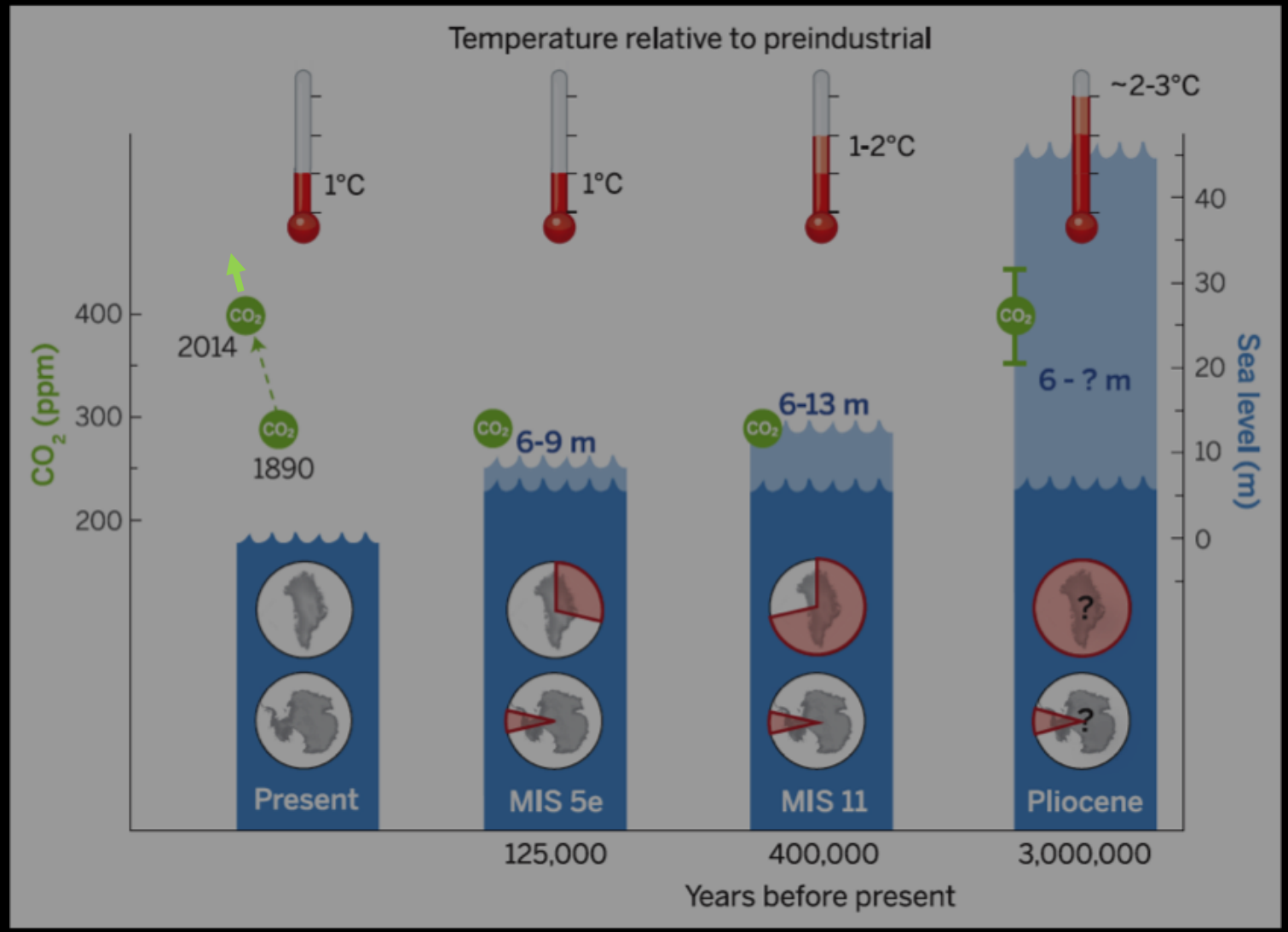

Palaeo sea level during warm periods

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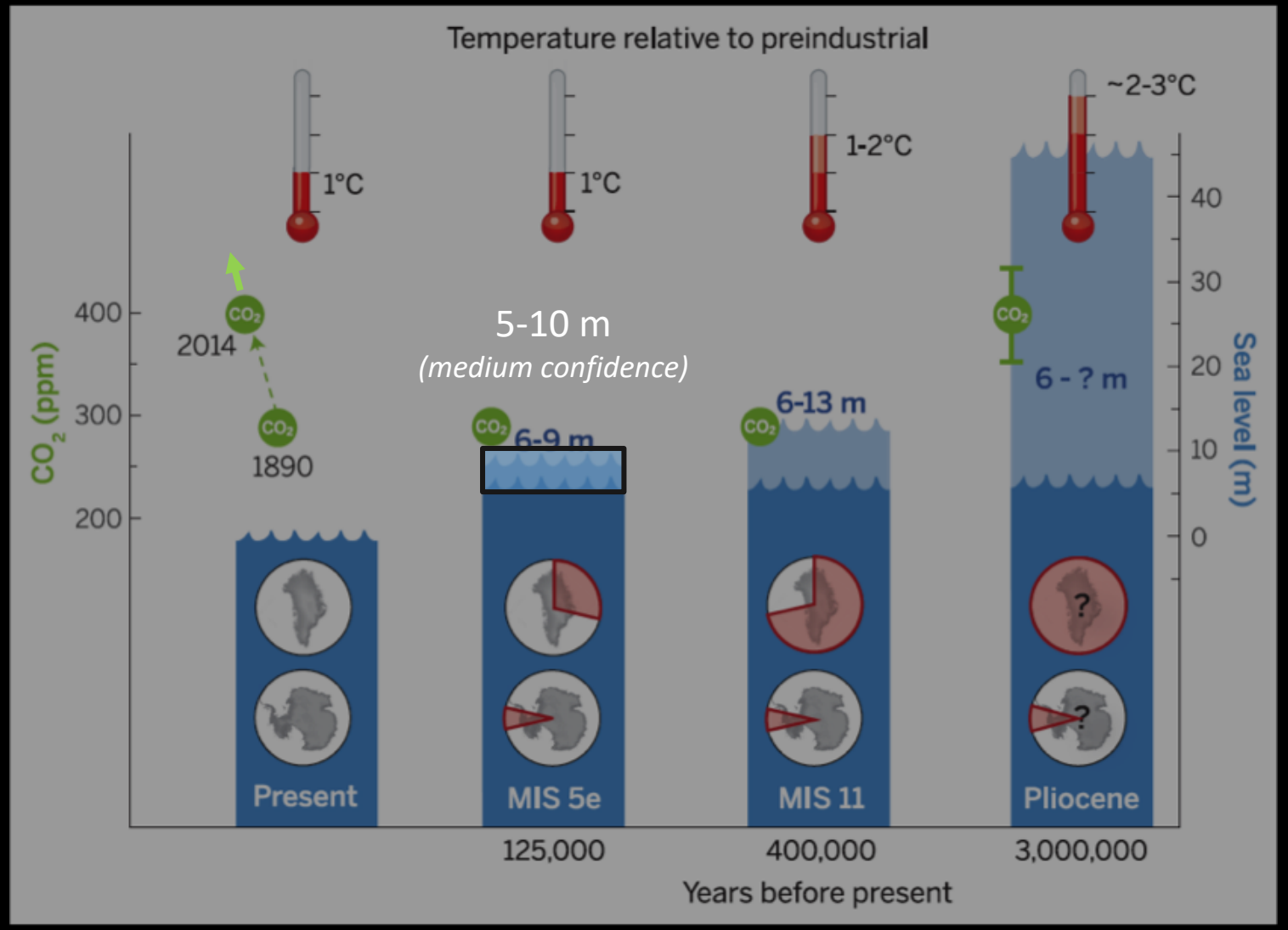

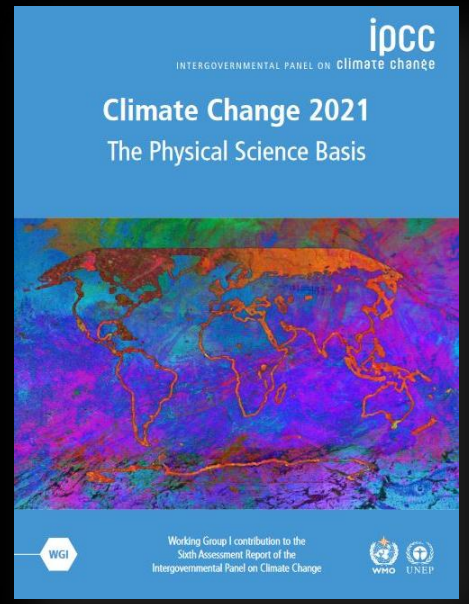

Palaeo sea level during warm periods

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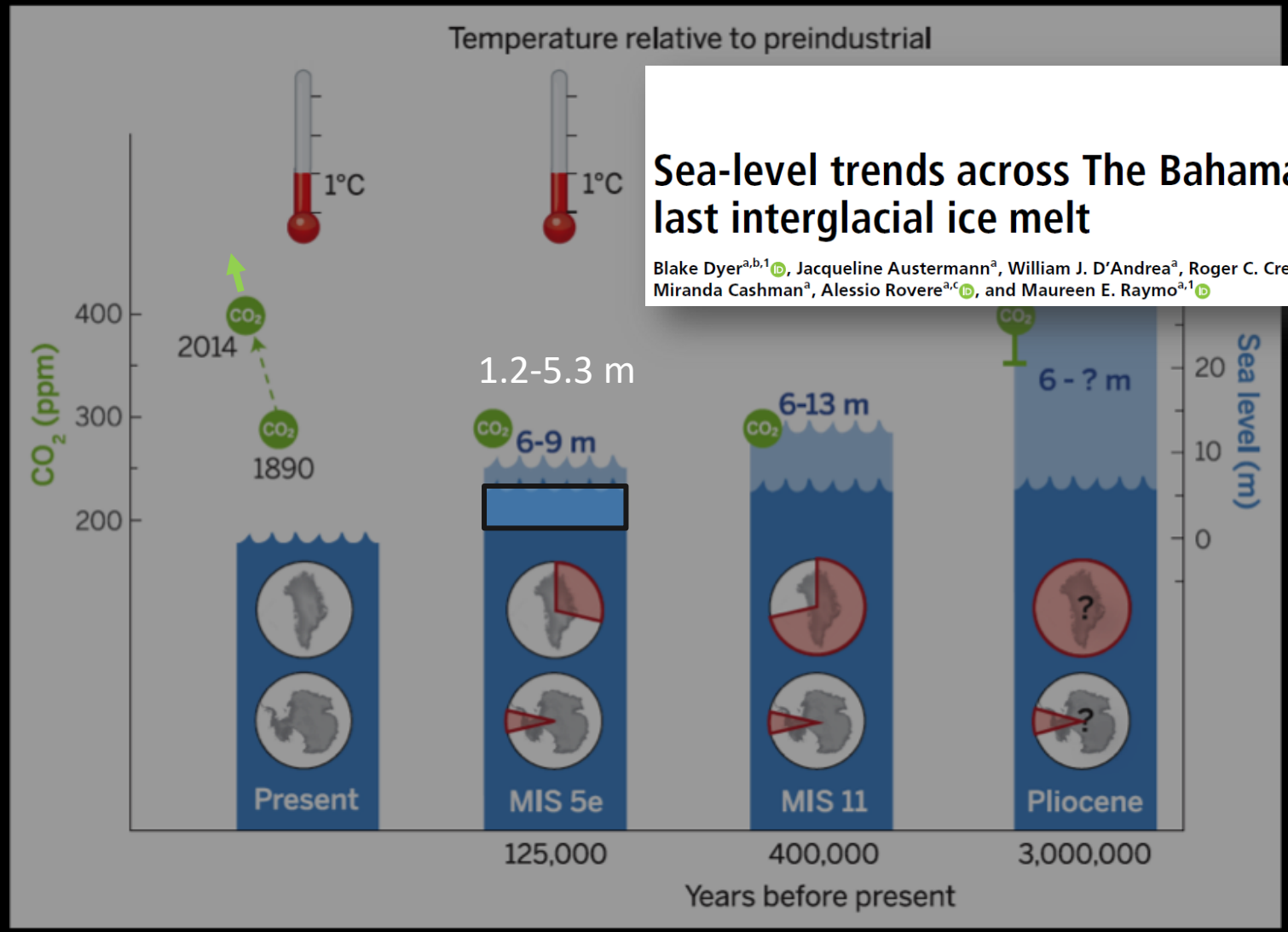

Check for updates

Sea-level trends across The Bahamas constrain peak last interglacial ice melt

Blake Dyer[a,b,1], Jacqueline Austermann[a], William J. D'Andrea[a], Roger C. Creel[a], Michael R. Sandstrom[a], Miranda Cashman[a], Alessio Rovere[a,c], and Maureen E. Raymo[a,1]

Palaeo sea level during warm periods

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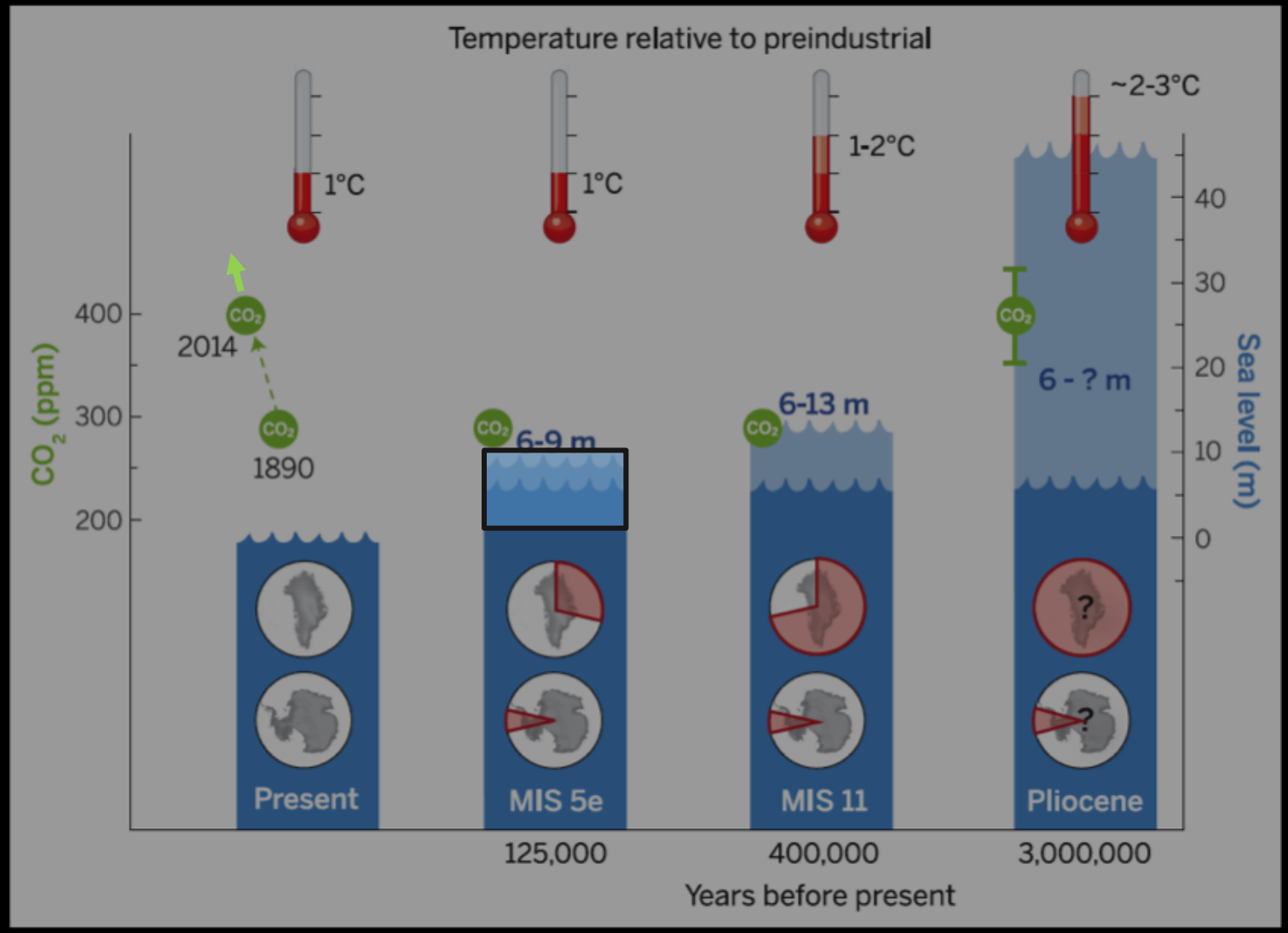

Palaeo sea level during warm periods

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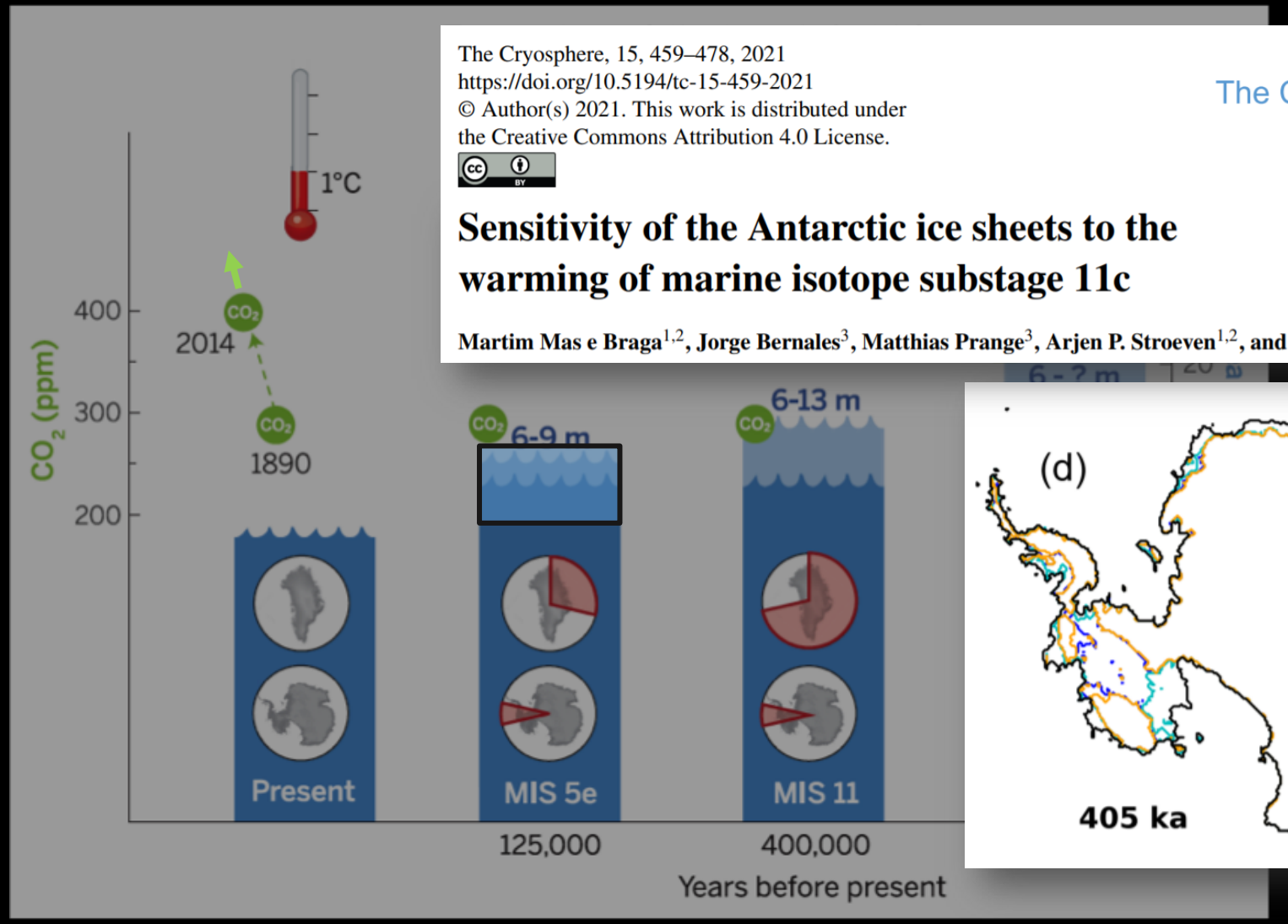

The Cryosphere, 15, 459–478, 2021
https://doi.org/10.5194/tc-15-459-2021

The Cryosphere
Open Access
EGU

Sensitivity of the Antarctic ice sheets to the warming of marine isotope substage 11c

Martim Mas e Braga[1,2], Jorge Bernales[3], Matthias Prange[3], Arjen P. Stroeven[1,2], and Irina Rogozhina[4]

Palaeo sea level during warm periods

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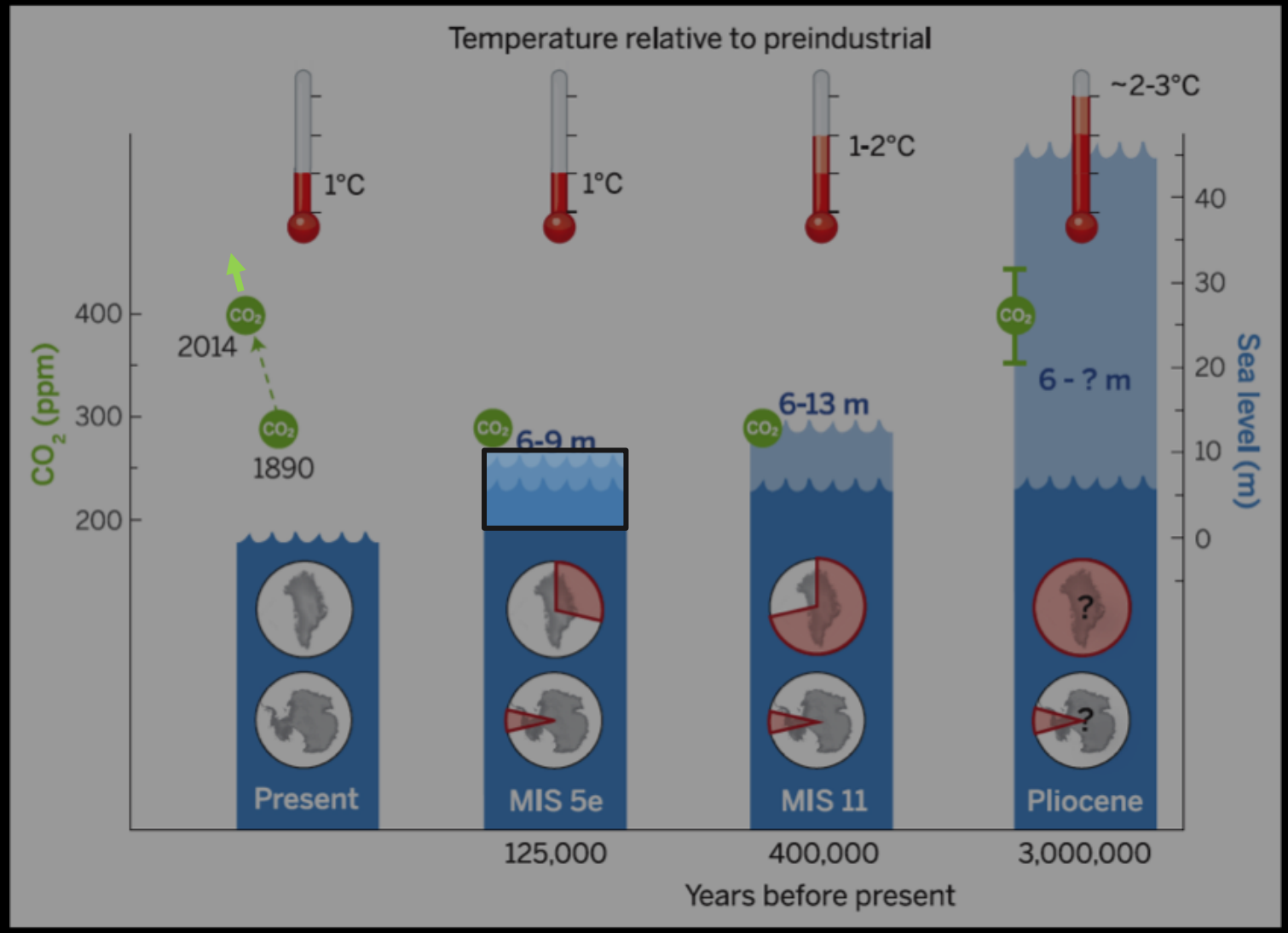

Palaeo sea level during warm periods

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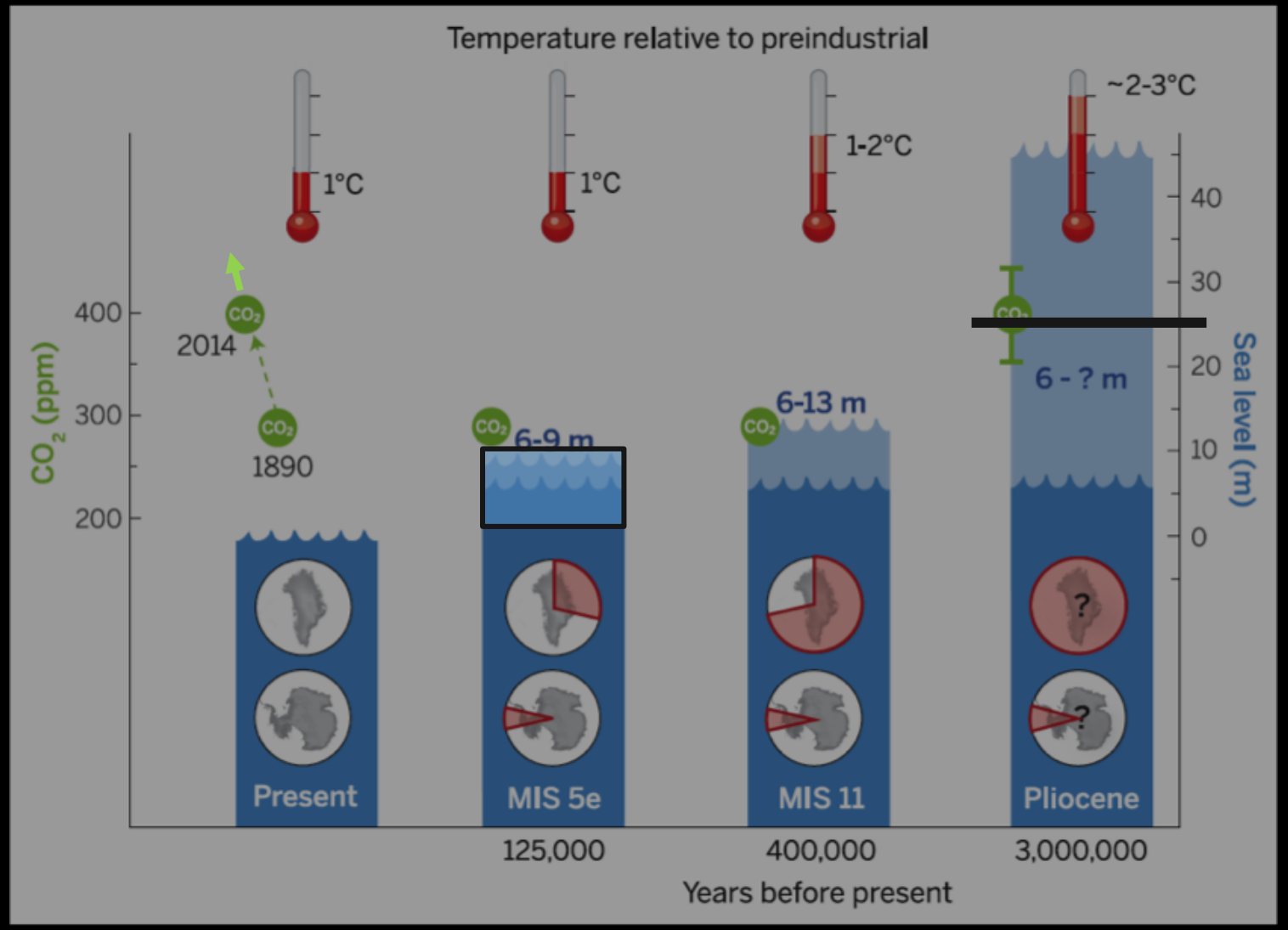

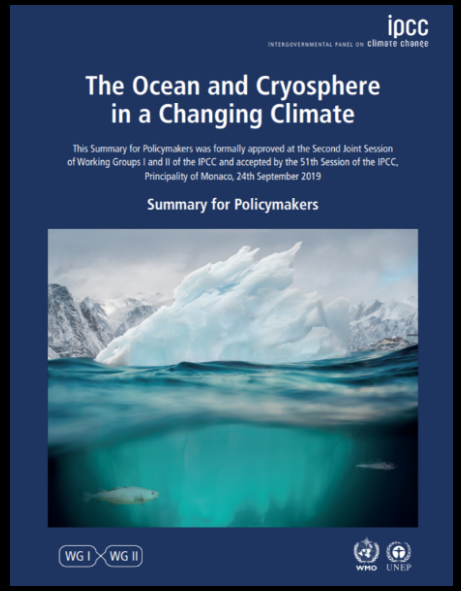

Palaeo sea level during warm periods

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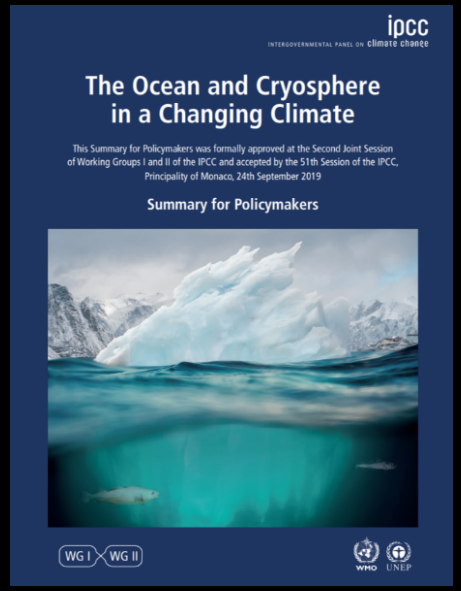
LETTER

https://doi.org/10.1038/s41586-019-1619-z

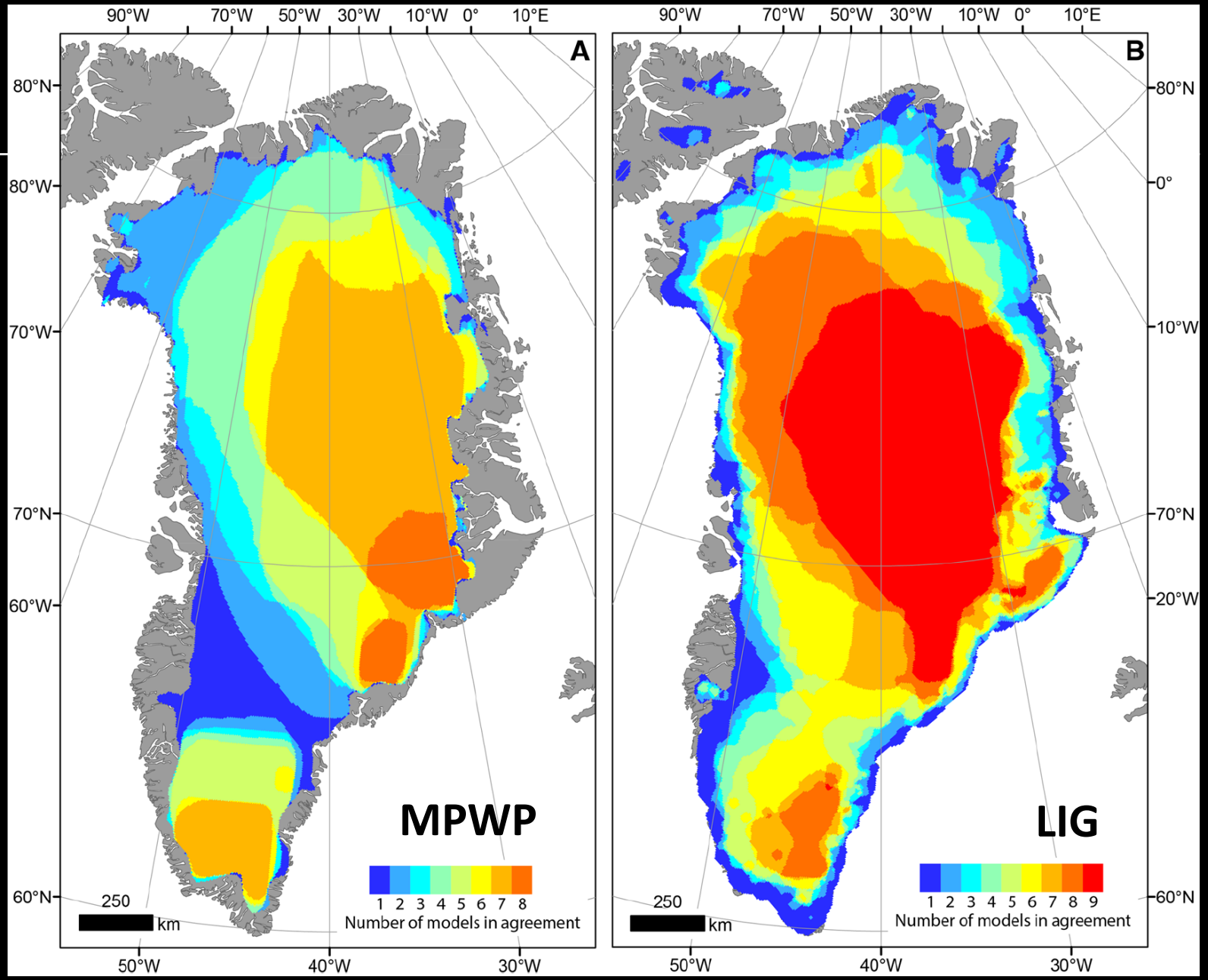
The amplitude and origin of sea-level variability during the Pliocene epoch

G. R. Grant[1,2*], T. R. Naish[1], G. B. Dunbar[1], P. Stocchi[3], M. A. Kominz[4], P. J. J. Kamp[5], C. A. Tapia[6], R. M. McKay[1], R. H. Levy[1,2] & M. O. Patterson[7]



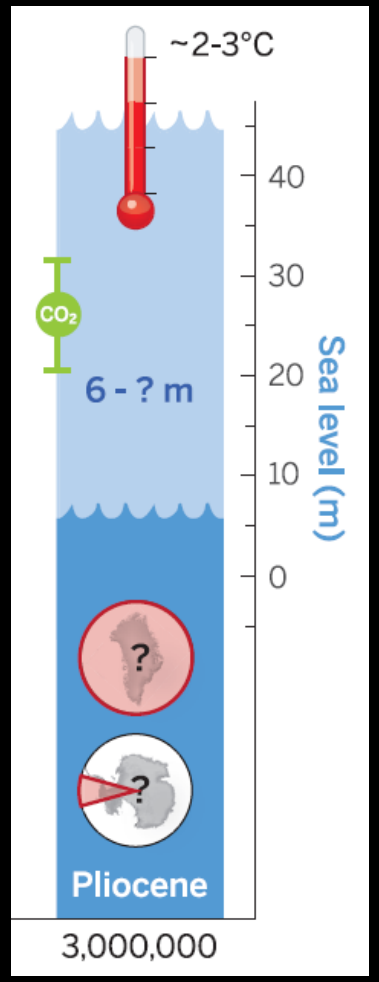

Uncertainties

Uncertainties



Haywood et al. (2019)

Uncertainties



5-15 m

11-21 m

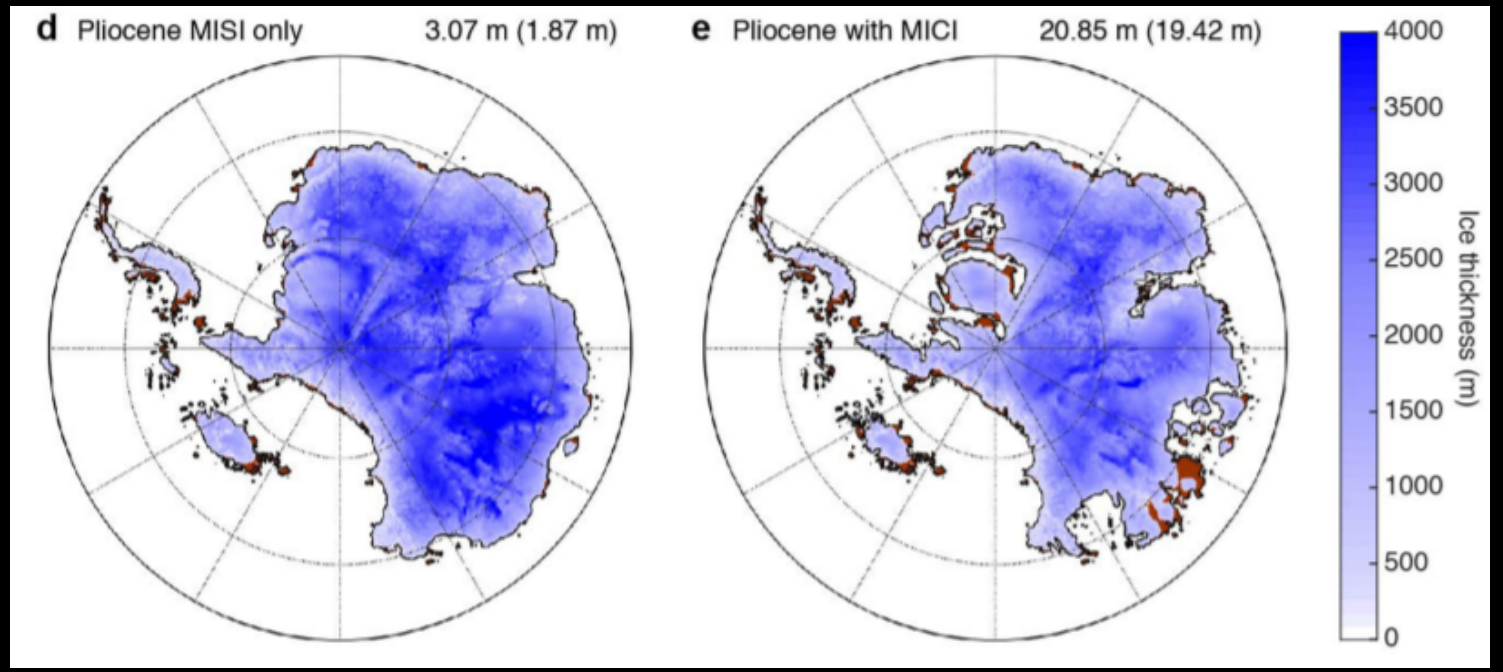
ARTICLE

Edwards et al. (2019)

https://doi.org/10.1038/s41586-019-0901-4

Revisiting Antarctic ice loss due to marine ice-cliff instability

Tamsin L. Edwards[1*], Mark A. Brandon[2], Gael Durand[3], Neil R. Edwards[2], Nicholas R. Golledge[4,5], Philip B. Holden[2], Isabel J. Nias[6], Antony J. Payne[7], Catherine Ritz[3] & Andreas Wernecke[2]



DeConto et al. (2021)

Dynamic topography

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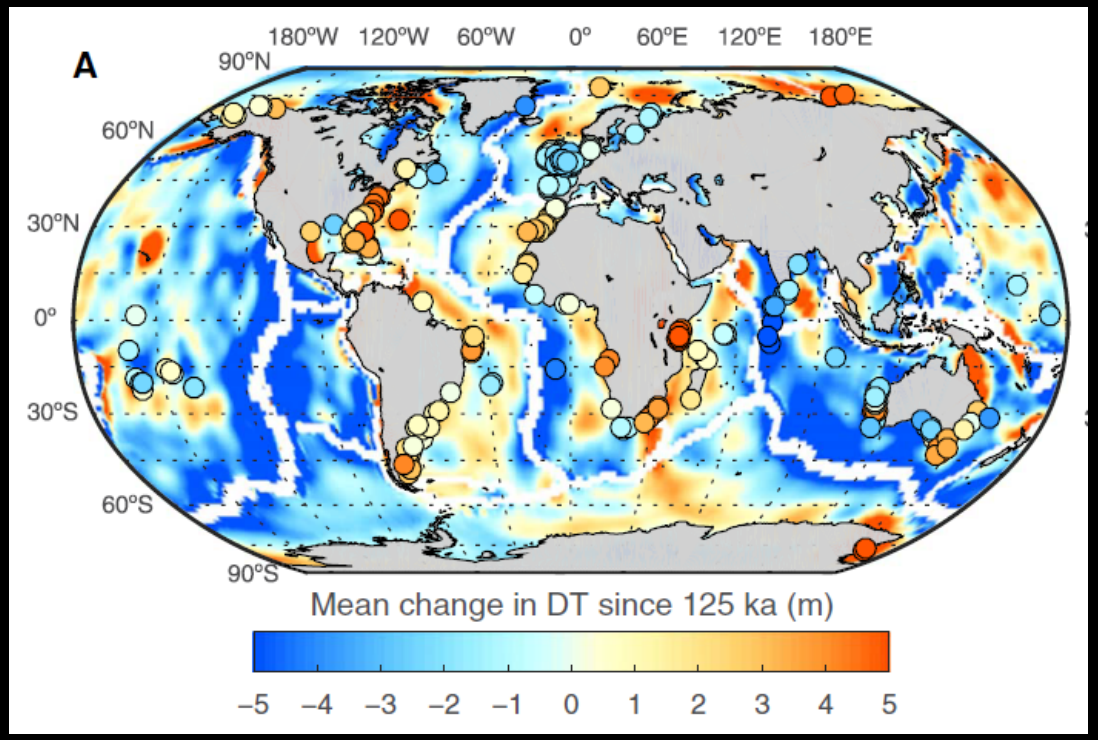
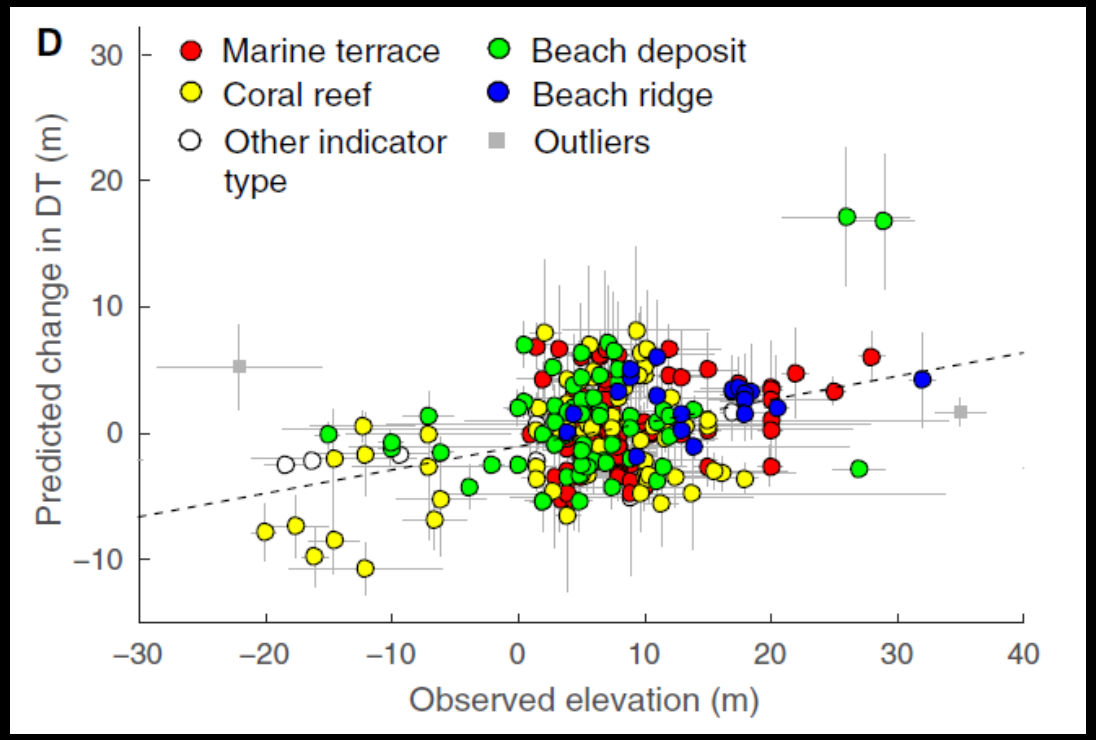


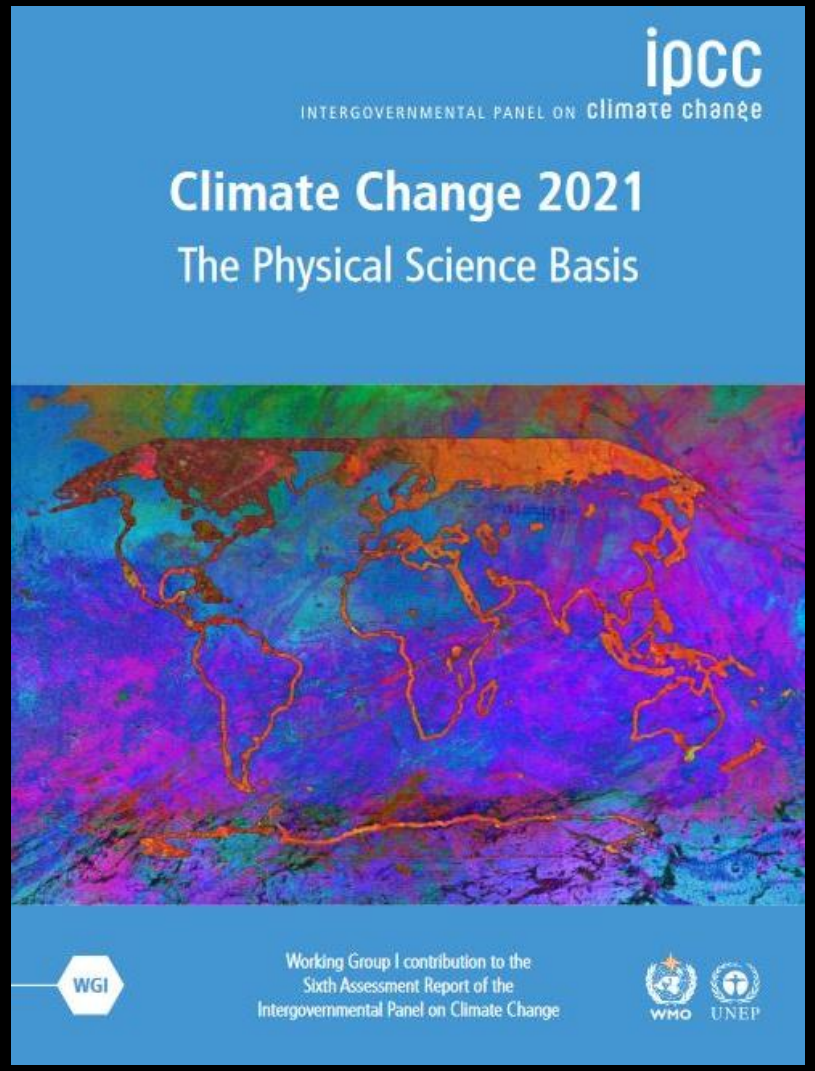


Austermann et al. (2017)

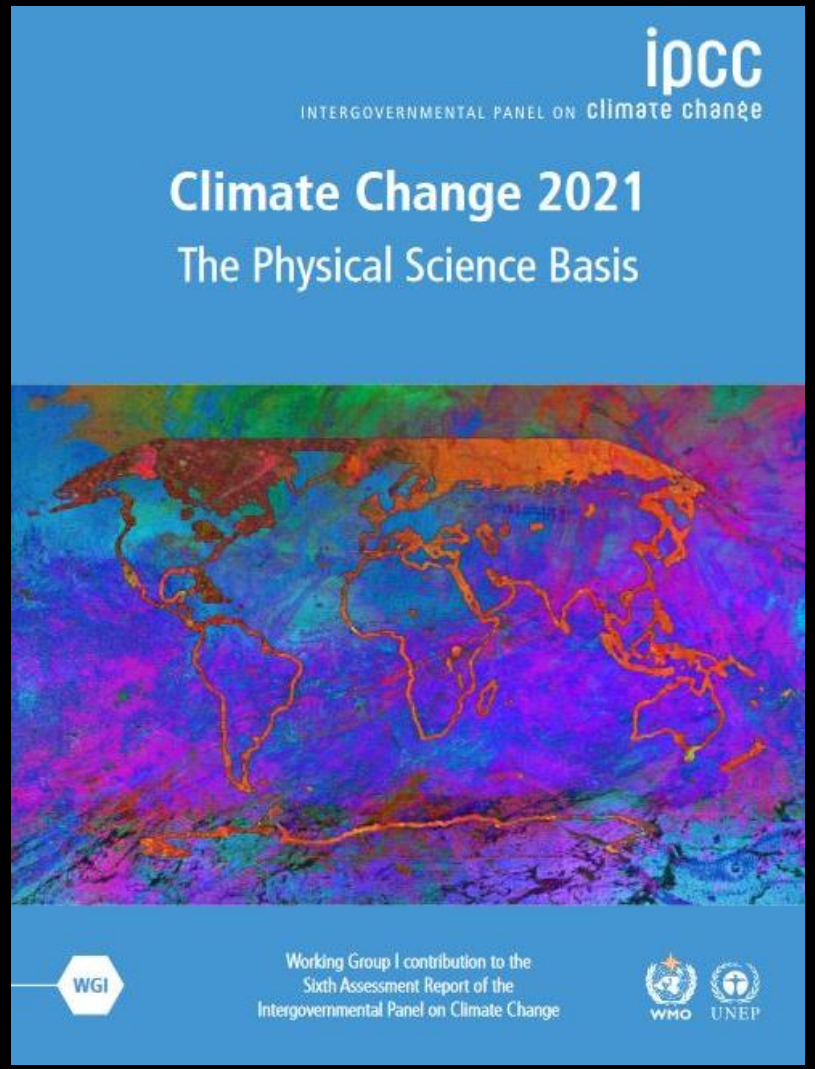
What can palaeo tell us about future sea level?

Drew Beamer, Unsplash

"Given uncertainties in paleo-sea level …and limited temporal resolution of paleo-sea level records, there is *low confidence* in the utility of paleo-sea level records for quantitatively informing near-term GMSL change."



"Nonetheless the paleo record does contextualise sea level and can test projection models."



Long-term commitment to SLR

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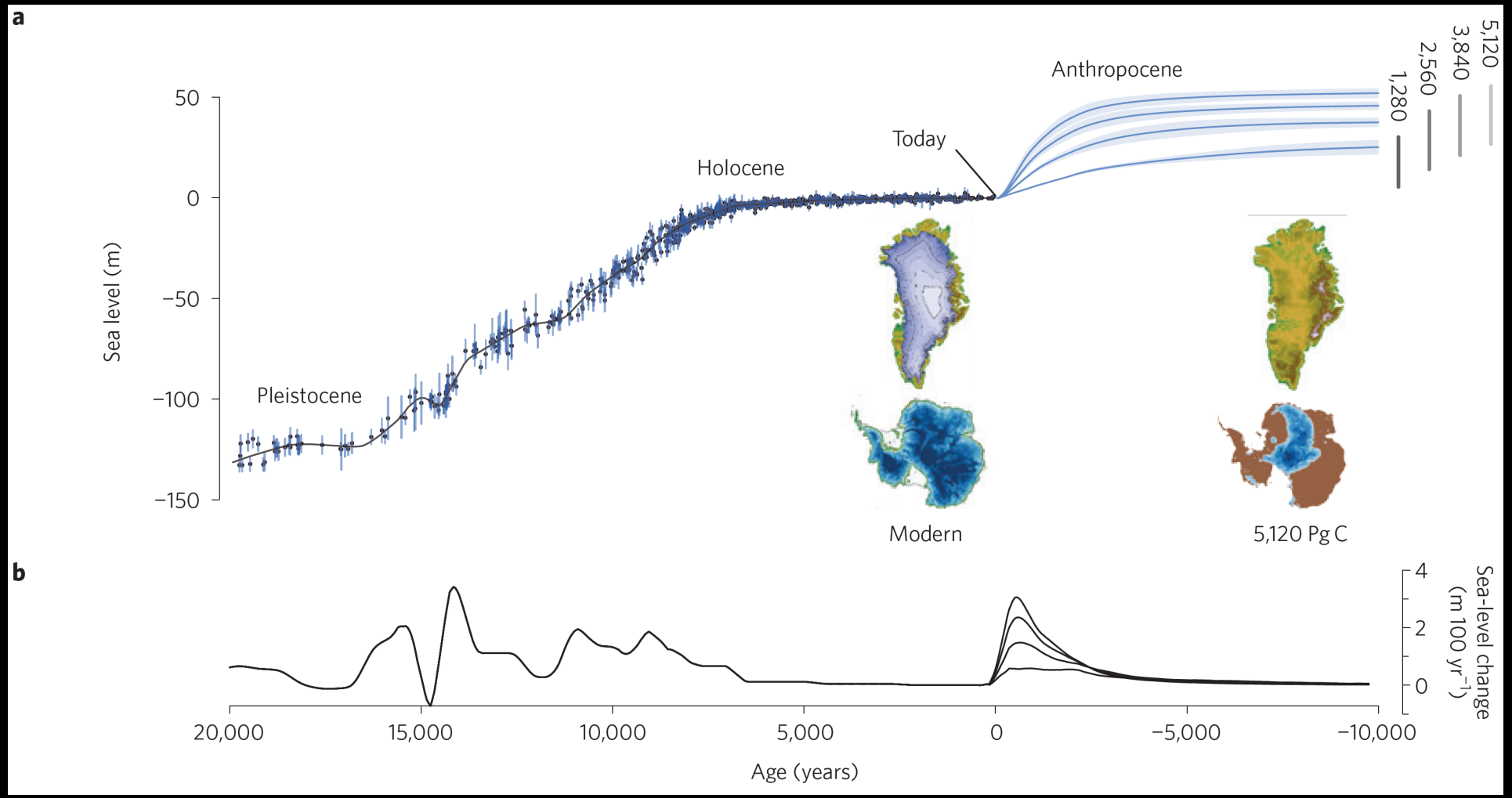

Clark et al. (2016)

Preparing for High-impact, Low-probability Events

Lessons from Eyjafjallajökull

A Chatham House Report

Bernice Lee and Felix Preston, with Gemma Green

CHATHAM HOUSE

www.chathamhouse.org

High-end sea-level scenarios

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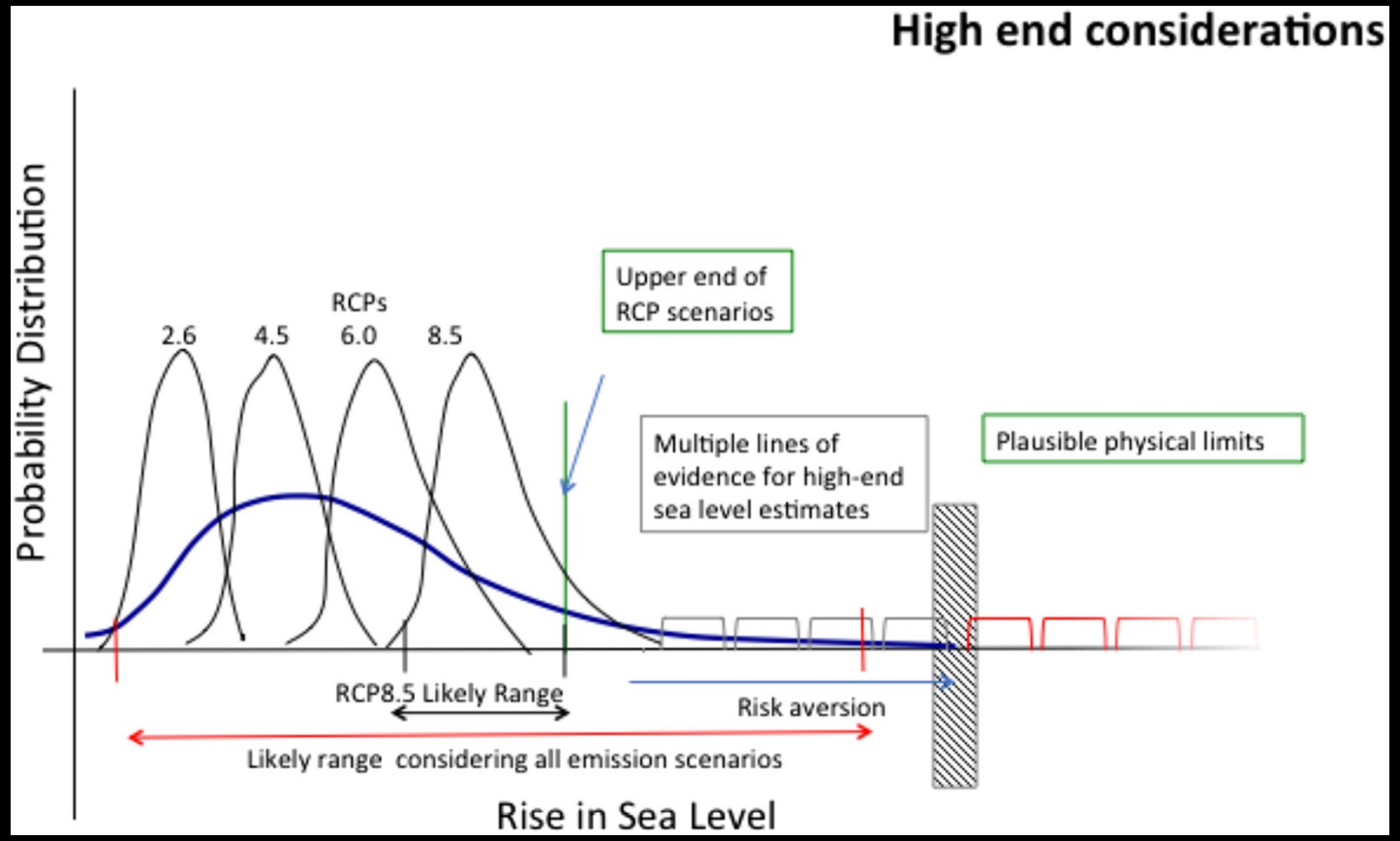
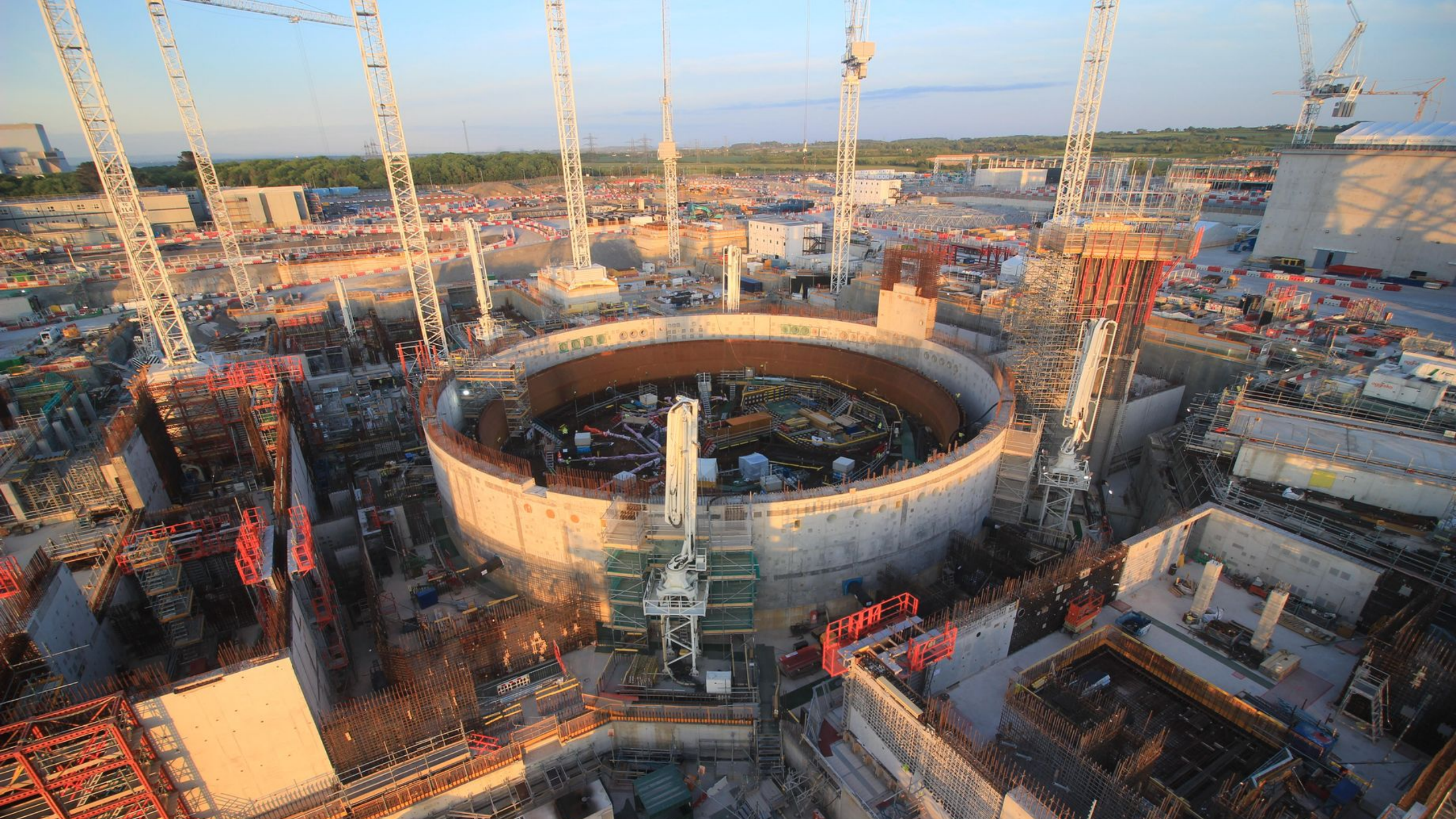
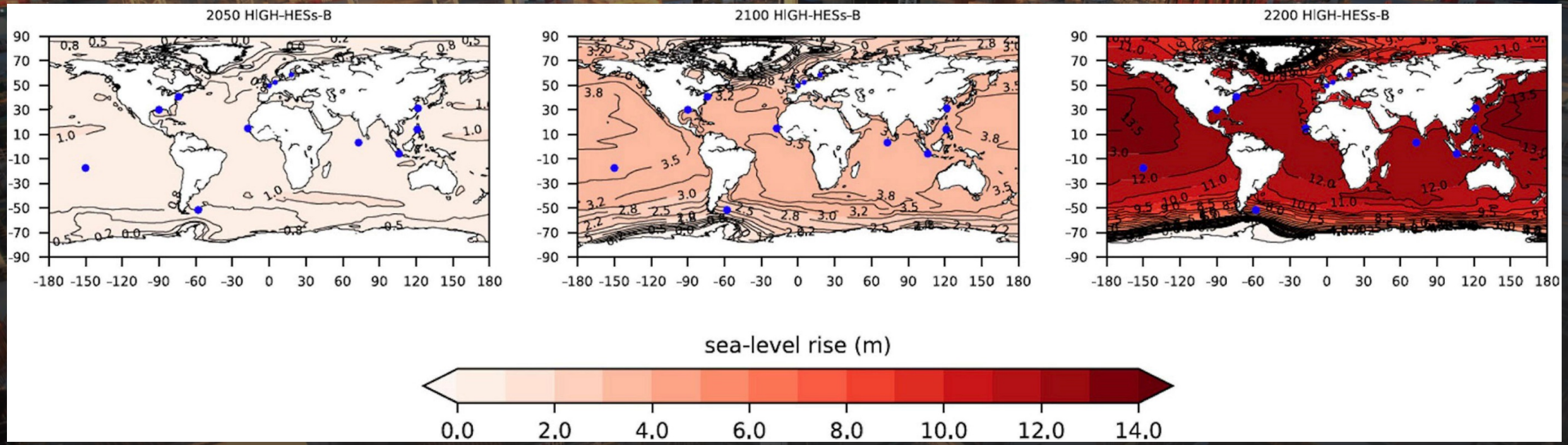
- The large uncertainties in ice sheet melting processes bring in a range of unlikely – but not impossible – high-end sea-level scenarios (HESs).
- HESs (in UK referred to as H++ scenarios), are typically extreme scenarios on the margins or outside of the 10th to 90th percentile range.
- H++ for sea-level rise not been formally updated since UKCP09: 1.9 m by 2100 (based on 1990 baseline)



Stammer et al. (2019)





Dayan et al. (2021)

High-end sea-level scenarios

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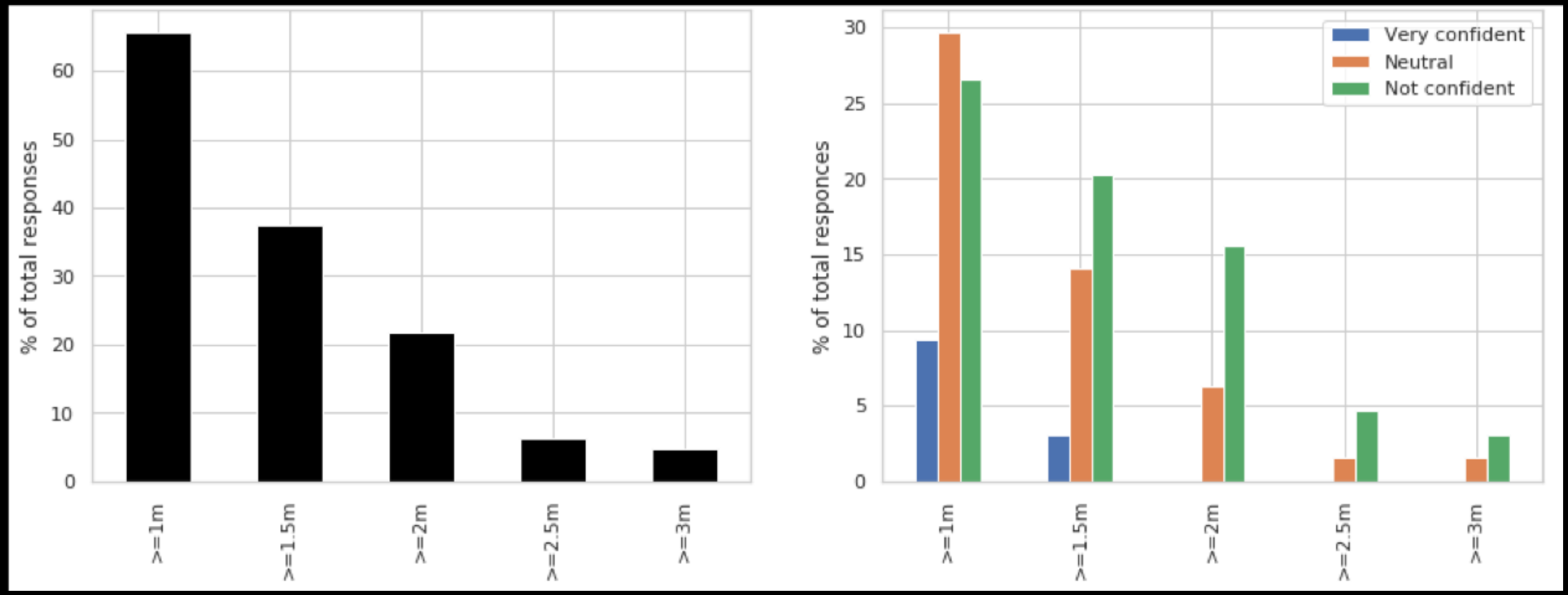
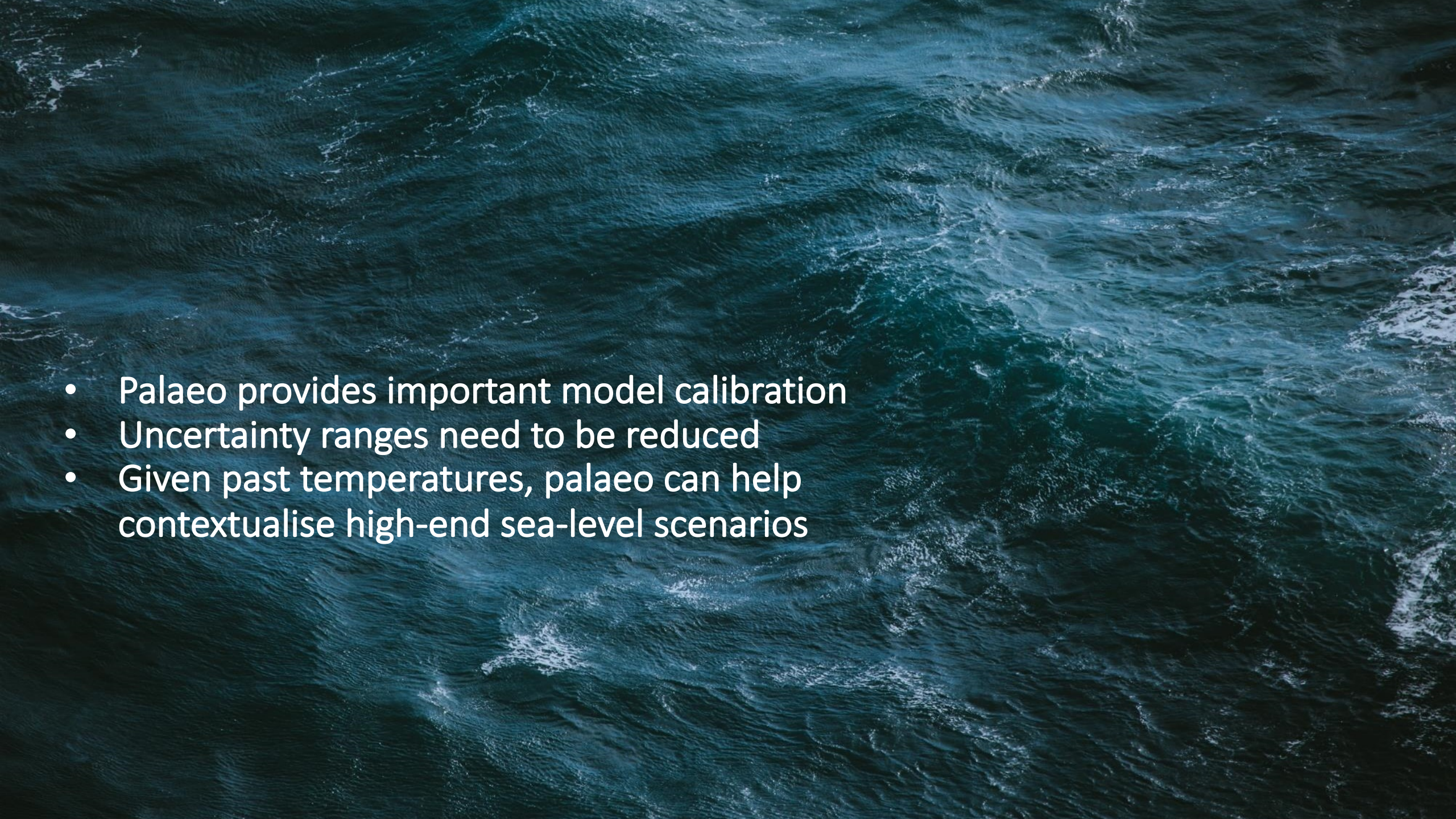
Percentage of respondents who believe sea level could exceed given elevations (m) by 2100



Lowe et al. (in prep)
42 full respondents, summer 2019



- Palaeo provides important model calibration
- Uncertainty ranges need to be reduced
- Given past temperatures, palaeo can help contextualise high-end sea-level scenarios