Department for Environment Food & Rural Affairs

Department for Business, Energy & Industrial Strategy

Met Office Hadley Centre

Environment Agency

Working together on
UK Climate Projections

UKCP18 Marine Projections

Dr Matt Palmer, Met Office Hadley Centre

Elements of UKCP18 marine projections

21st Century Projections

- Mean sea level change
- Changes in storm surges
- Changes in wave climate
- Changes in tides

Exploratory projections to 2300

- Mean sea level change
- Changes in tides

UKCP18 Key Findings

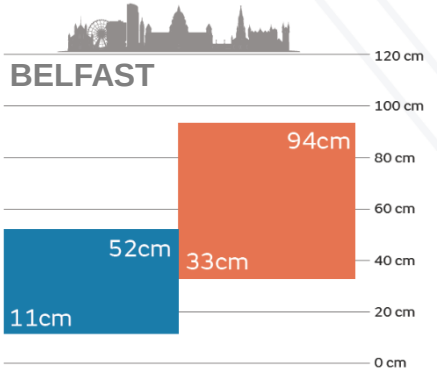
- UK coastal flood risk is expected to increase over the 21st century and beyond under all climate change scenarios
- Mean sea level (MSL) rise is the dominant factor and varies by location and climate change scenario
- We find storm surge and wave changes of up to ~10% of the MSL signal, but cannot rule out larger changes
- Coastal sea level variability is an important consideration for shorter (decadal-to-multi-decadal) planning time-horizons
- Future ice loss from Antarctica remains a major uncertainty, particularly for post-2100 time horizons

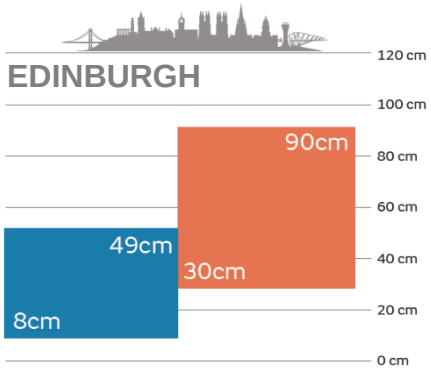
Mean sea level rise: UK capital cities

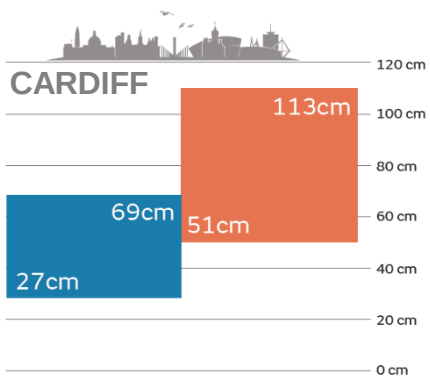
Projected range at 2100 relative to the average for the period 1981-2000

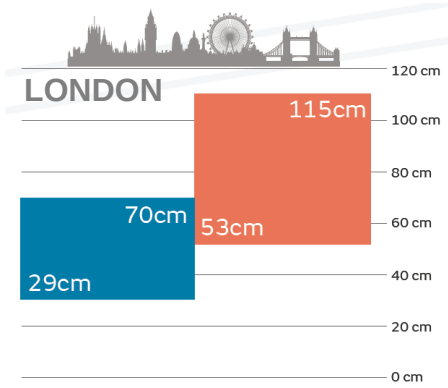
Strong dependence on **high** or **low** emissions scenario

Larger rise in the south than the north









Why do we see spatial variations in the amount of sea level rise?

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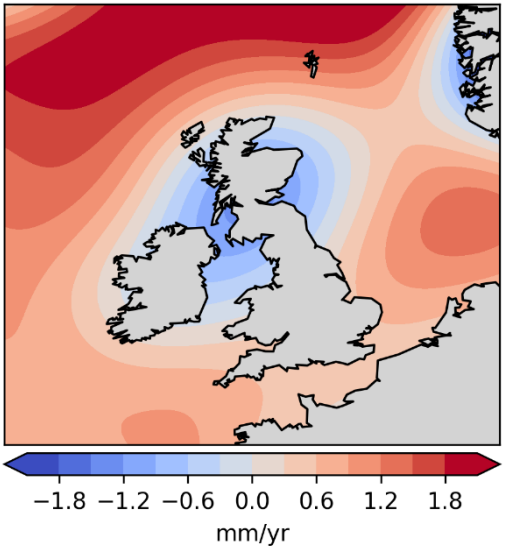
1. Glacial isostatic adjustment



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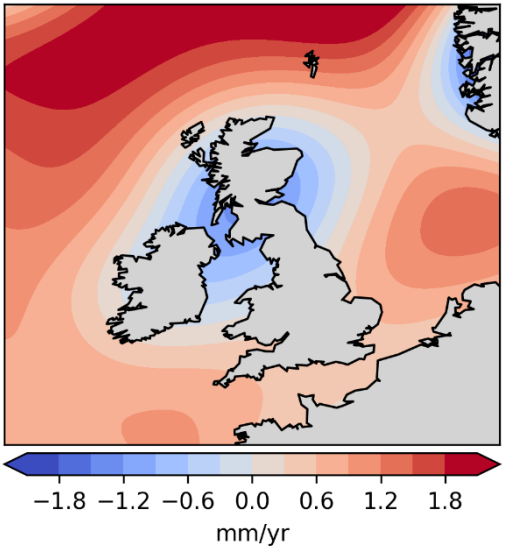
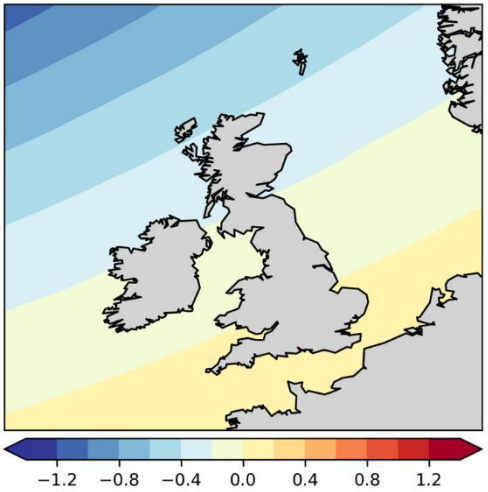
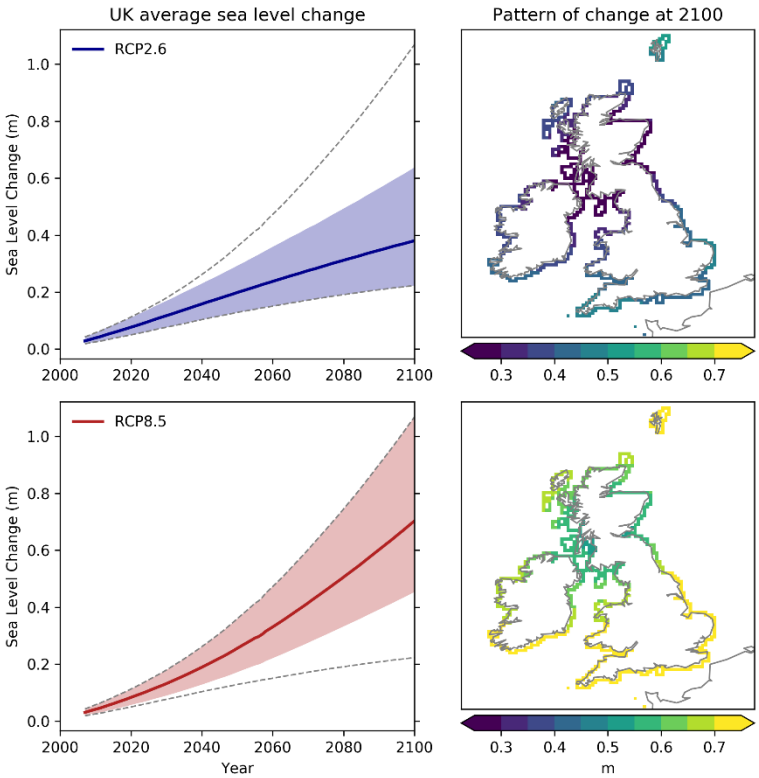
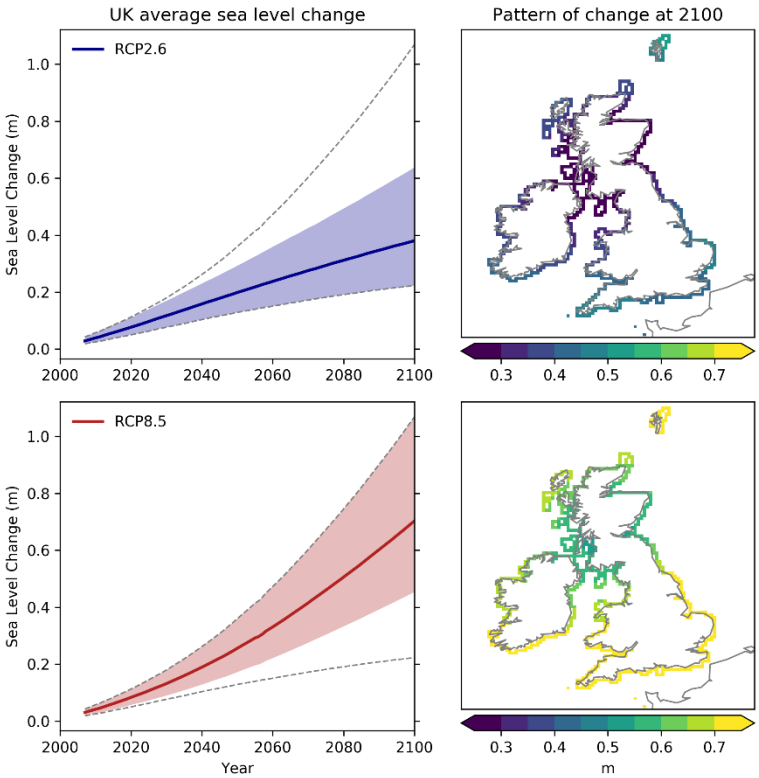
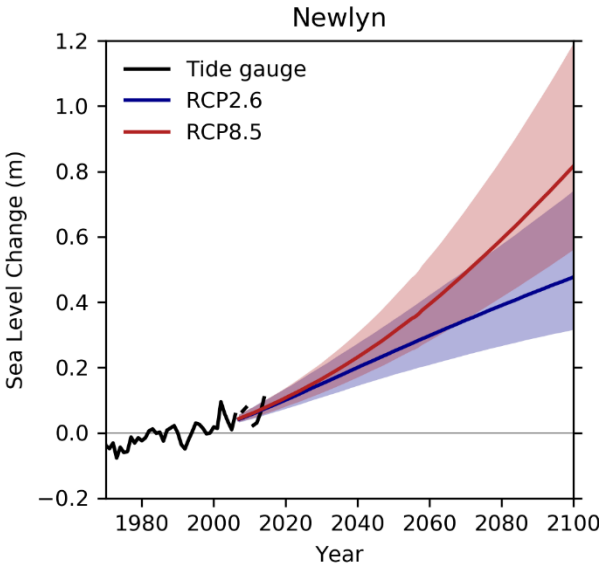


2. Greenland “fingerprint”

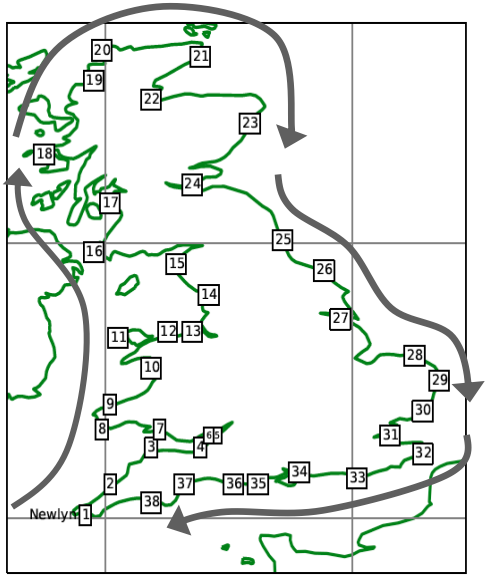


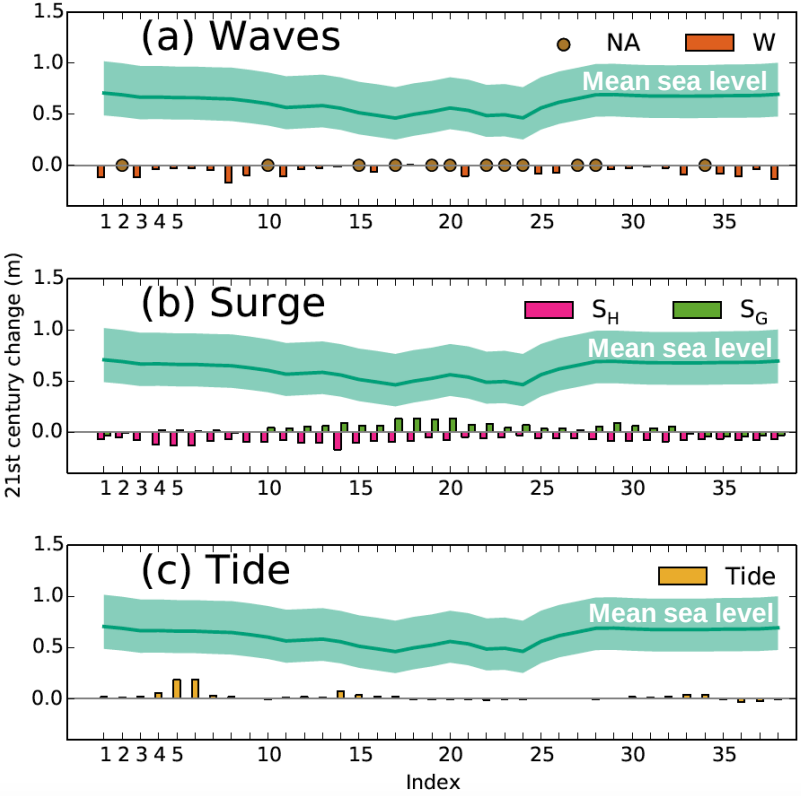


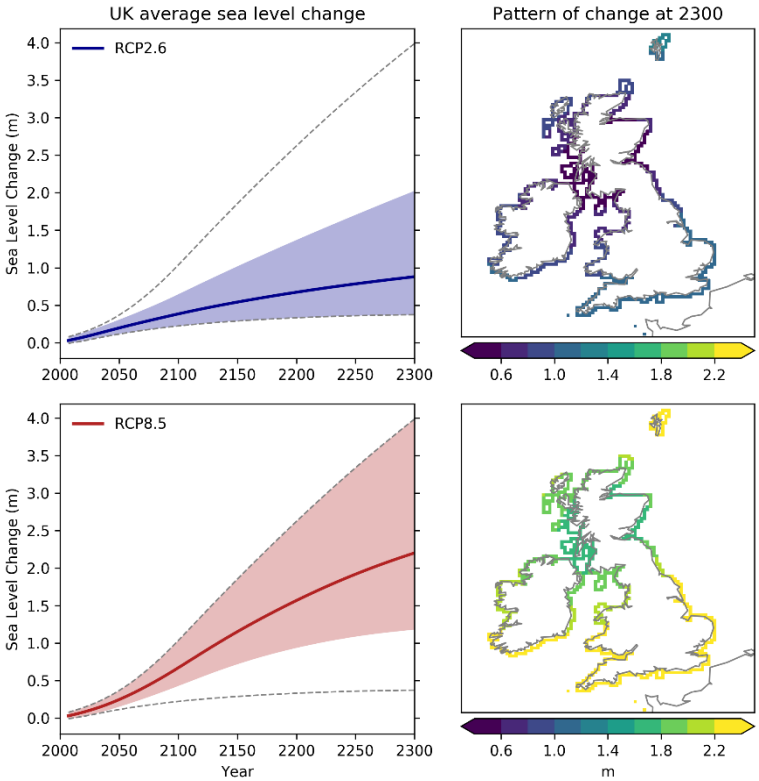




Synthesis of UKCP18 21st century projections



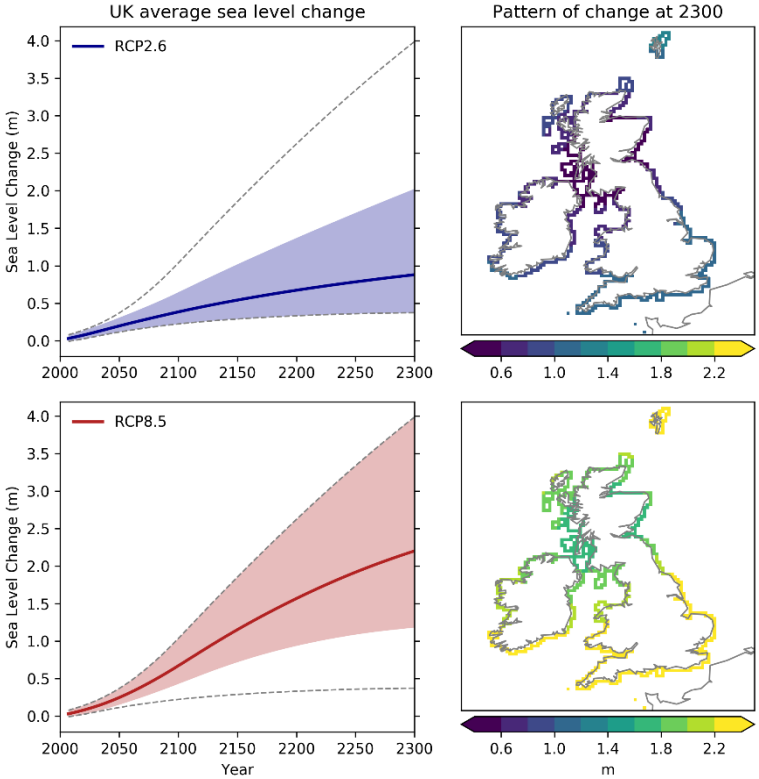


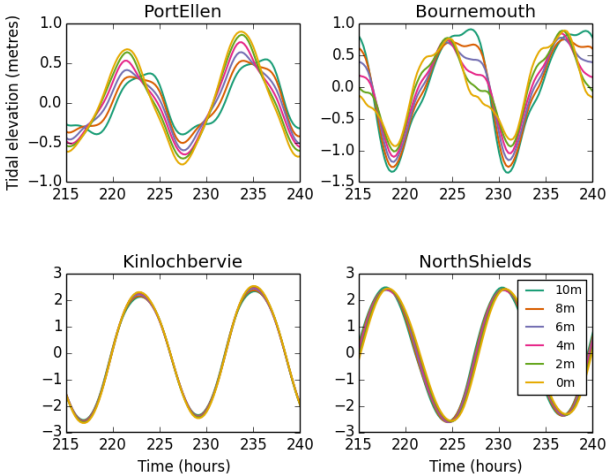


UKCP18 exploratory extended projections

This research was funded by the Joint Flood and Coastal Erosion Risk Management Research and Development Programme (FCERM)

UKCP18 exploratory extended projections





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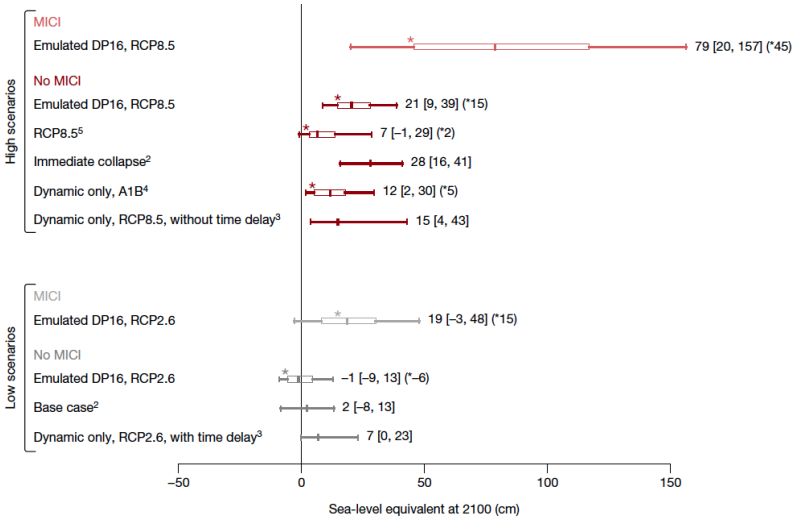
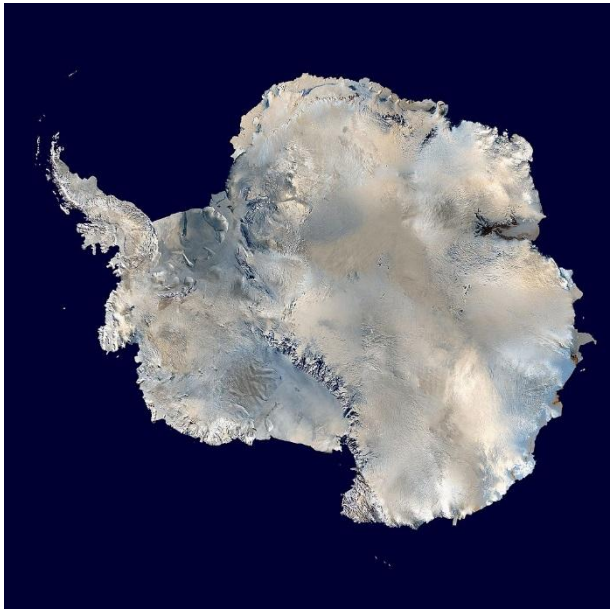
Key uncertainty: Antarctica

MICI = Marine Ice Cliff Instability





Edwards et al (2019) *Nature*

Image author: Dave Pape

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UKCP18 Marine Report authors:

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Acknowledgements:

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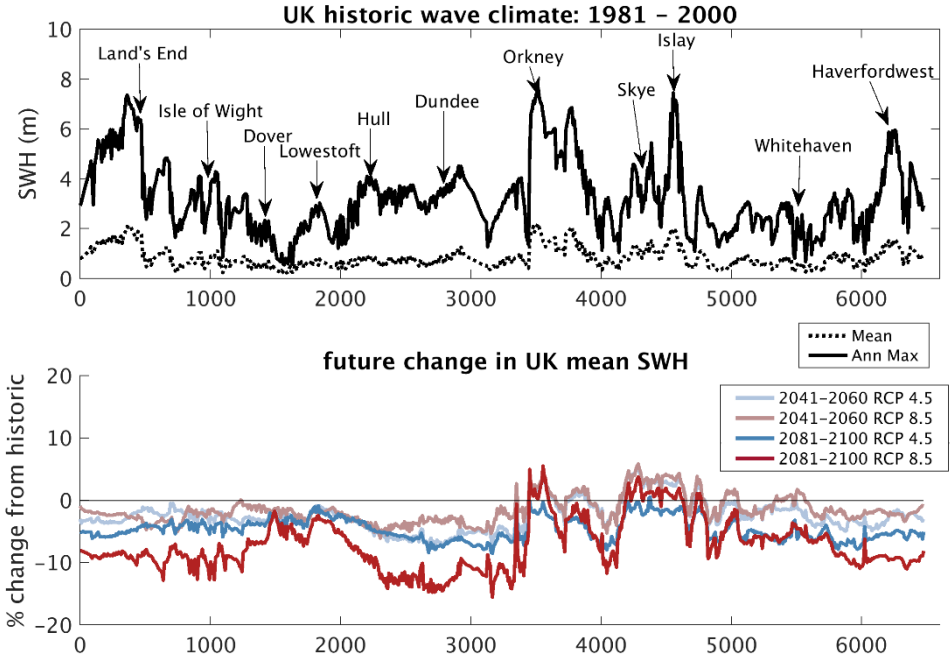
Additional Slides

Wave changes

The majority of model simulations show a decrease in wave heights under climate change.

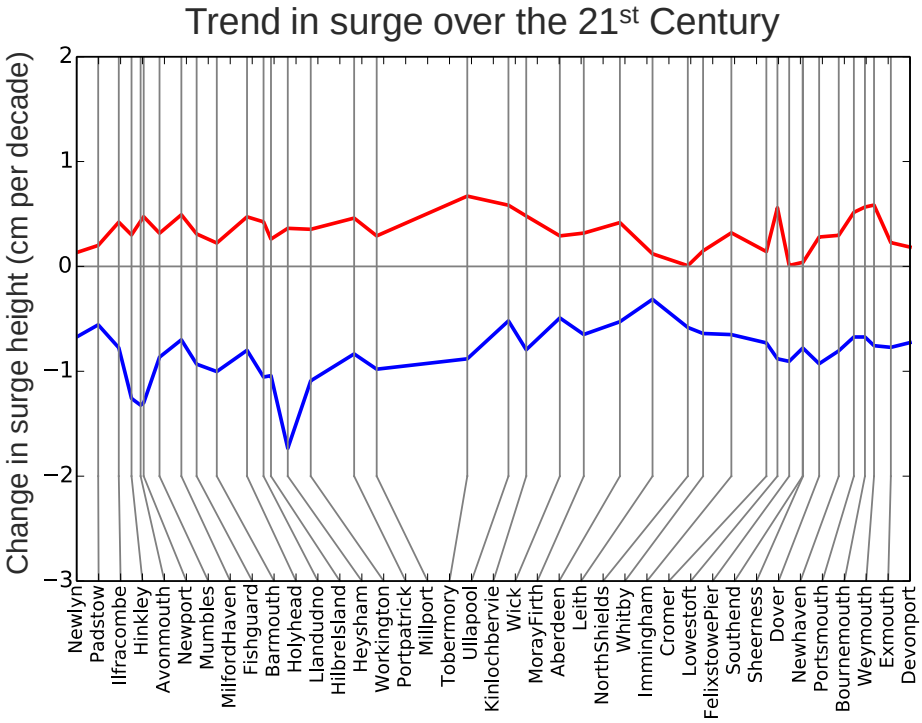
Potential for an increase in the extreme wave conditions



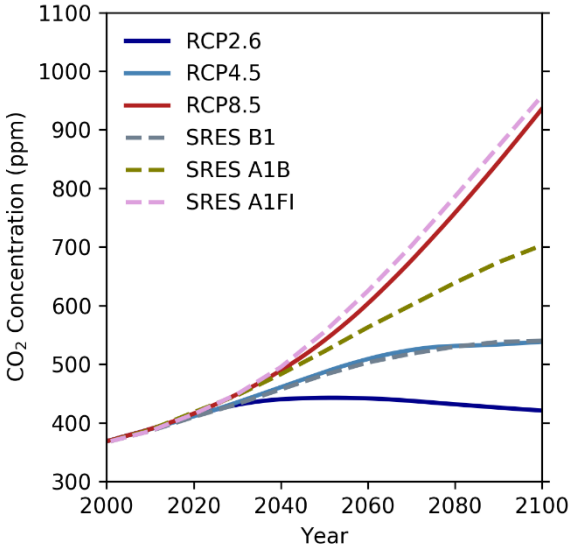
Storm surges could increase or decrease over the 21st Century

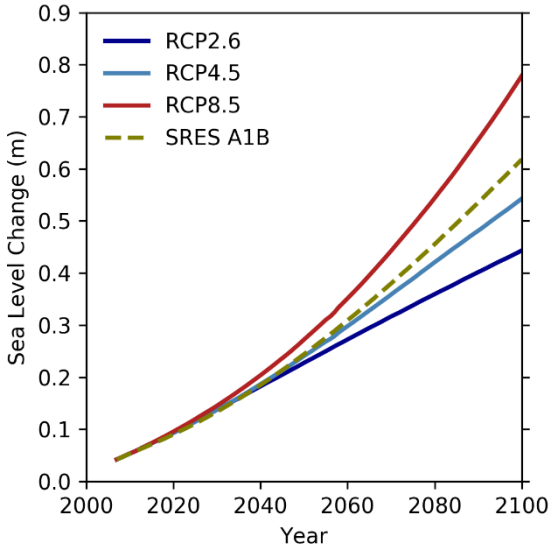
Simulations changes of up to 10-15 cm over the century

However, our best estimate is for no significant change in storm surge activity



Comparison with UKCP09: scenarios





Comparison with UKCP09:

sea level rise