

# Future sea level rise through 2100 and beyond

Emma Stone

Uncertain World Summit (Tuesday 20 October 2015)



**Why are we interested in future sea level rise?**

**How certain are we about the worst case scenario at 2100?**



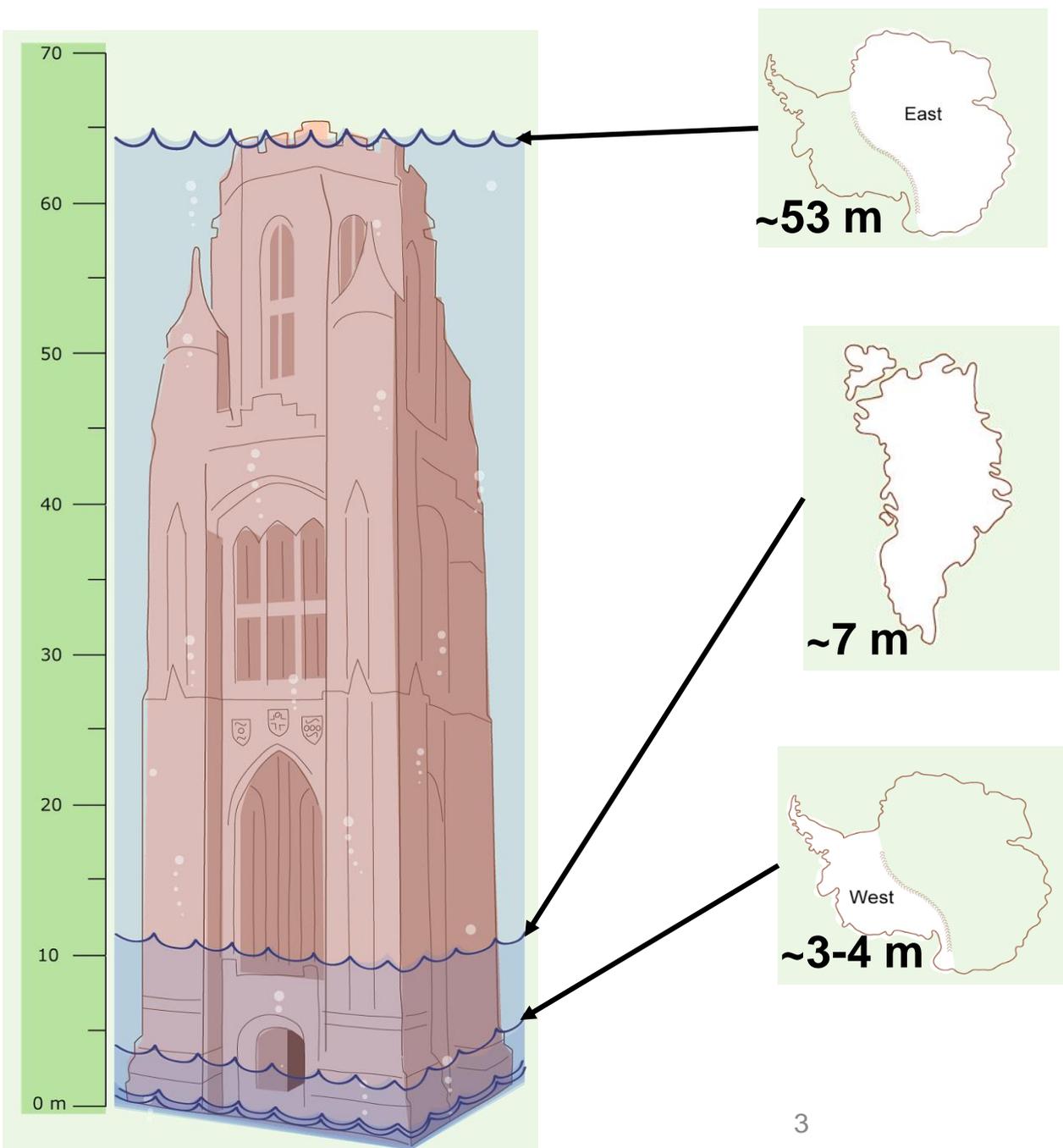
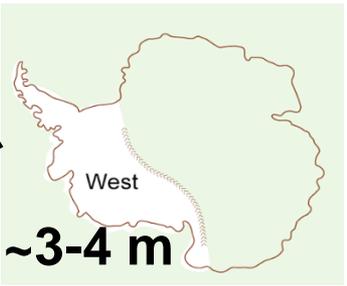
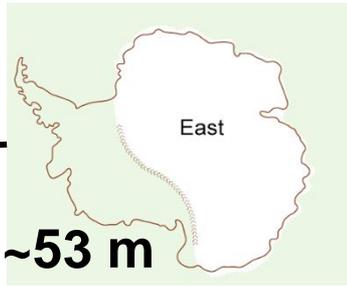
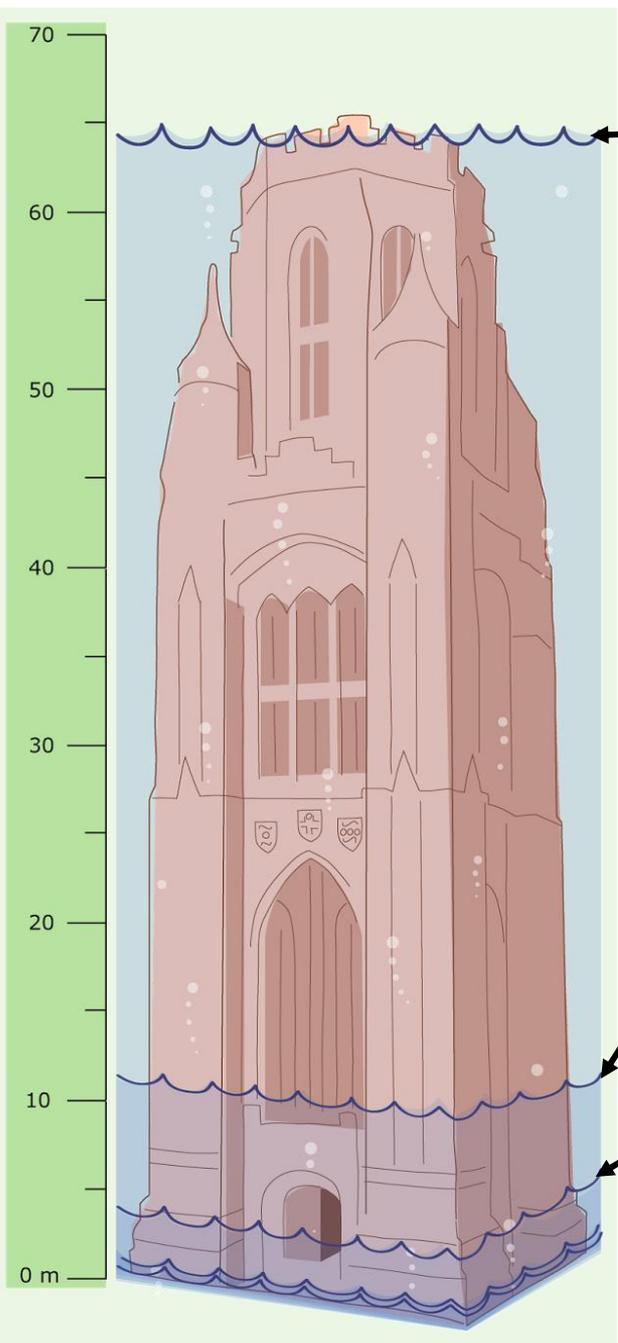


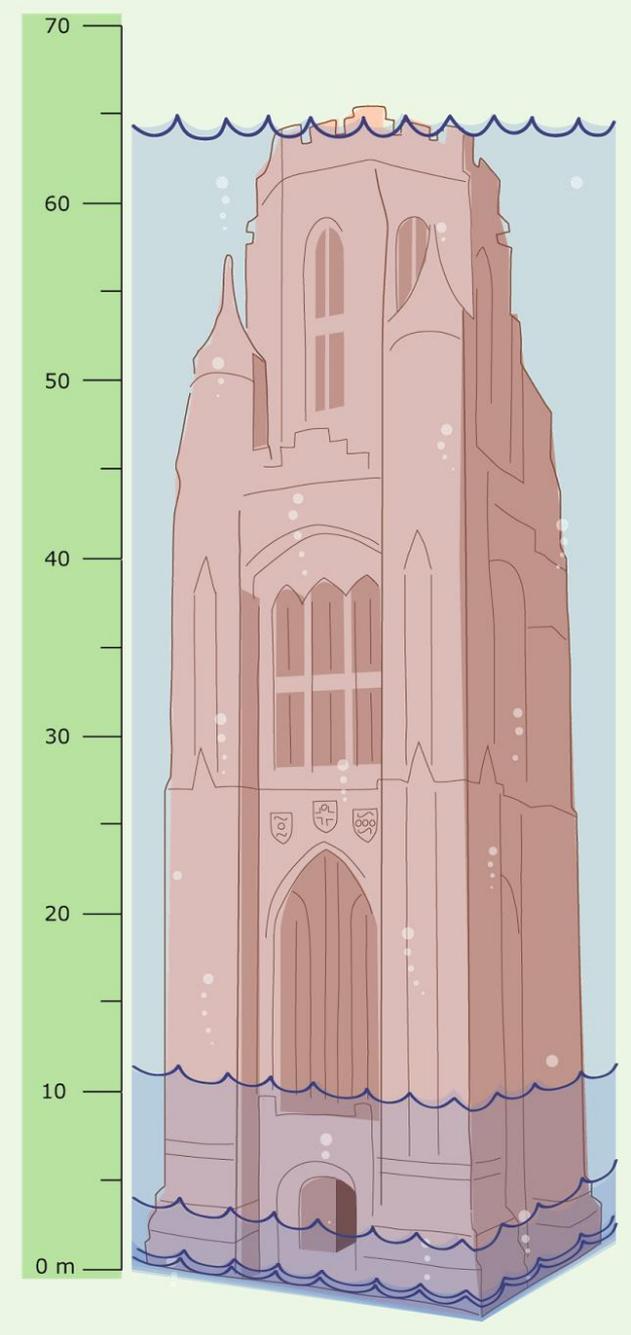
Figure provided by Gordon Inglis and Catherine Catherine McIntyre



- ## Contributions by 2100:
- **Glaciers (~0.16 m)**
  - **Thermal Expansion (~0.27 m)**
  - **Land water storage (~0.04 m)**
  - **Antarctica (~0.04 m)**
  - **Greenland (~0.12 m)**
  - **Ice sheet rapid dynamics (~0.12 m)**

# IPCC predictions for future sea level by 2100

IPCC AR5 prediction by 2100: **0.26 to 0.98 m**  
(Business as usual: 0.52 to 0.98 m)



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**Low probability, high impact region**

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**Magnitude & rate  
of ice sheet  
contributions**

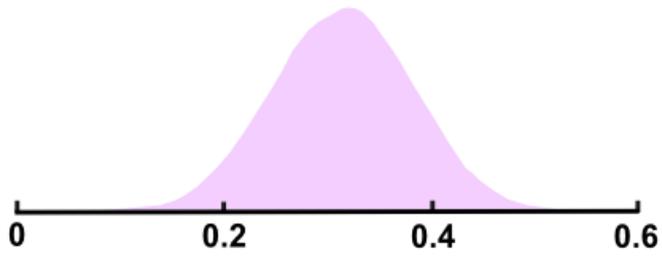
**Regional  
distribution of sea  
level rise**

## **Current 'known' uncertainties**

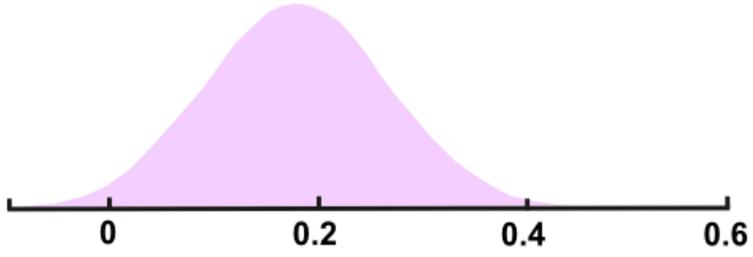
**Future emissions  
scenarios and climate  
sensitivity**

**Regional  
changes in  
storm frequency  
and intensity**

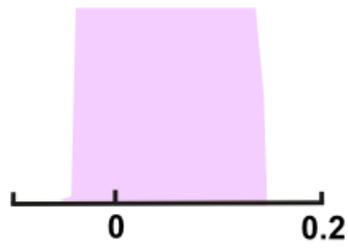
**Thermal Expansion**



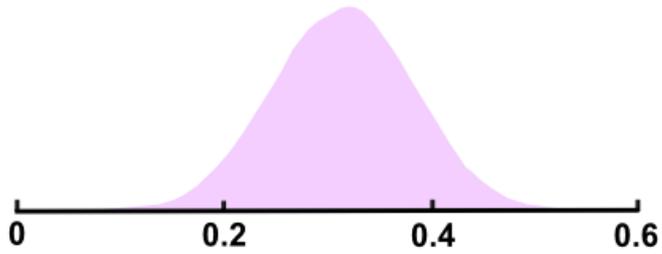
**Glaciers**



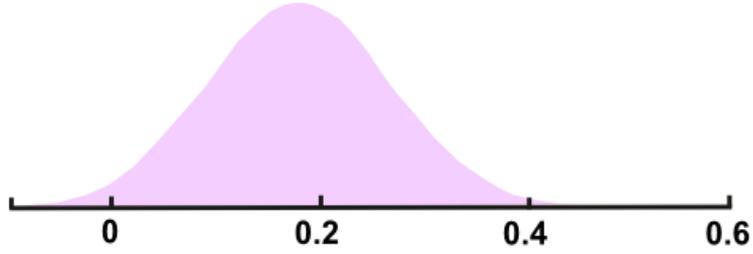
**Land water**



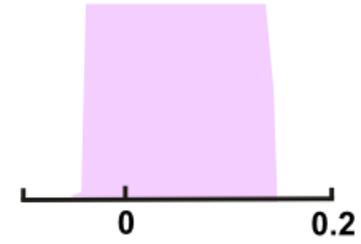
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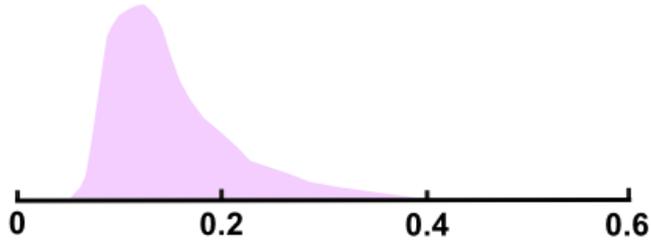
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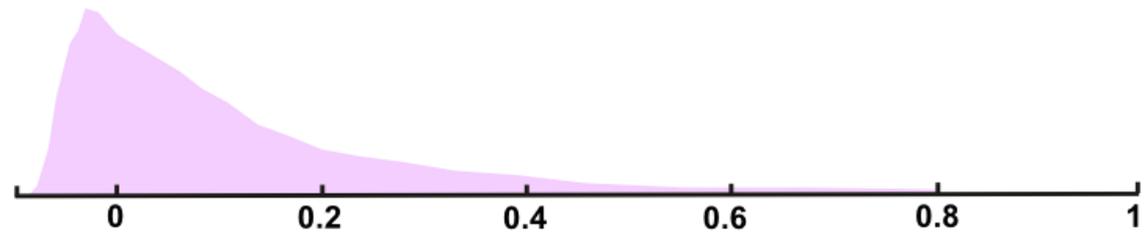
**Land water**



**Greenland**

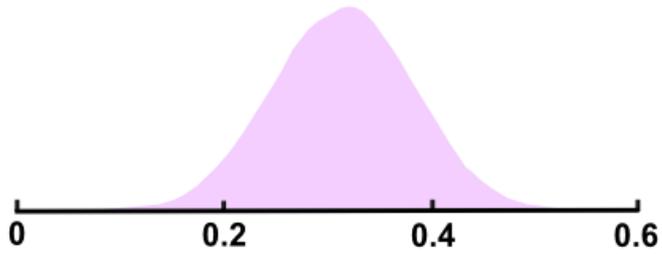


**Antarctica**

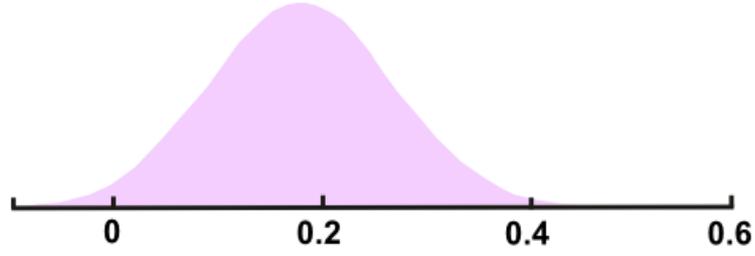


# Expert Elicitation

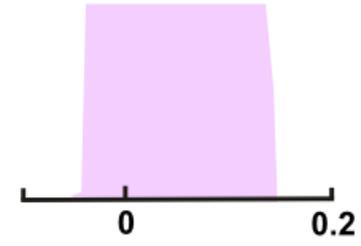
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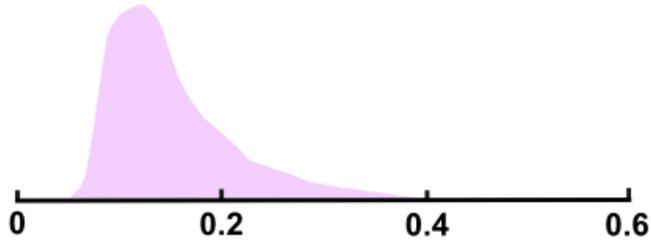
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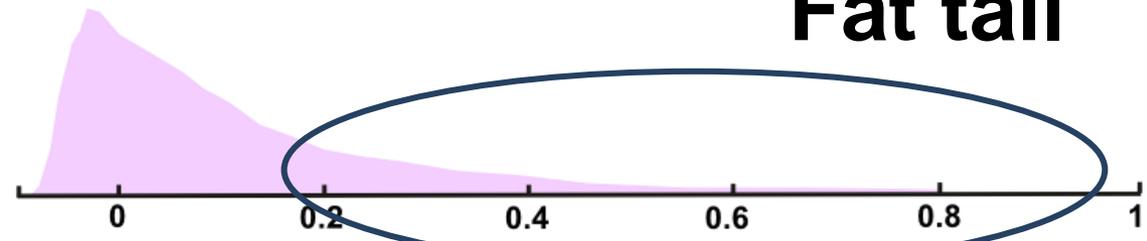
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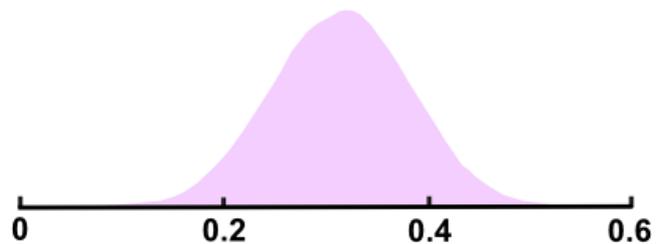
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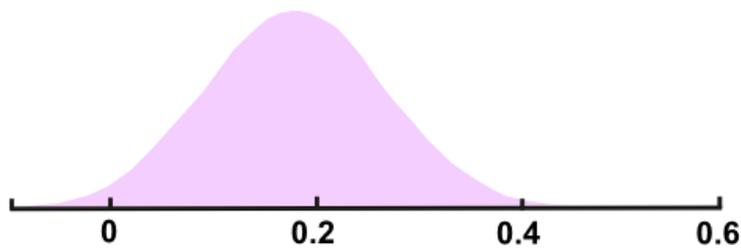
**Fat tail**

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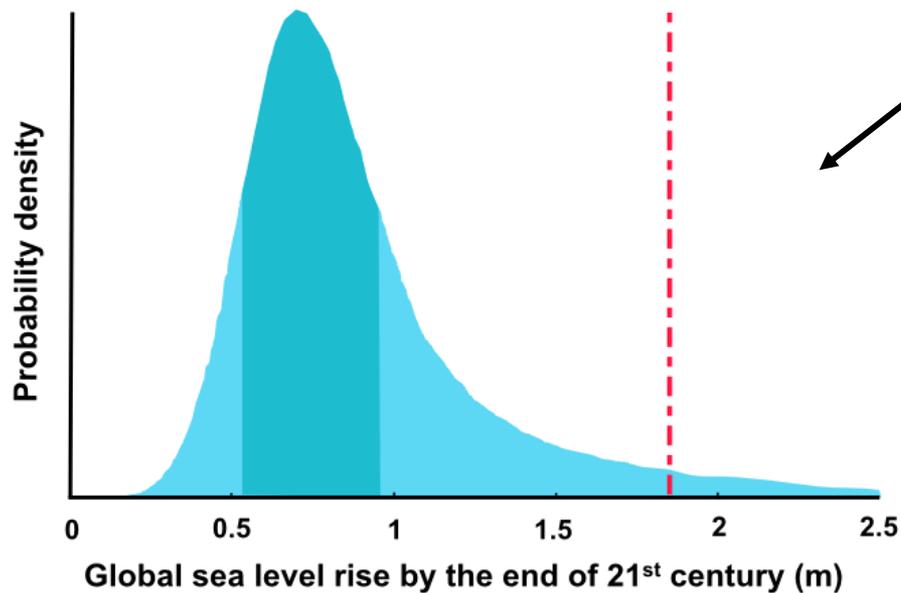
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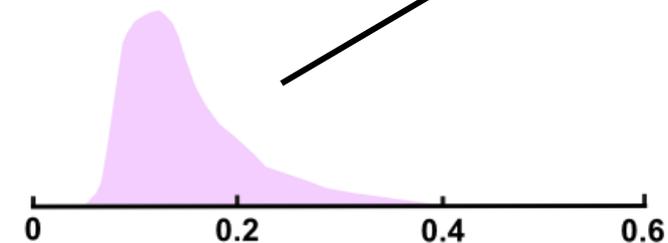
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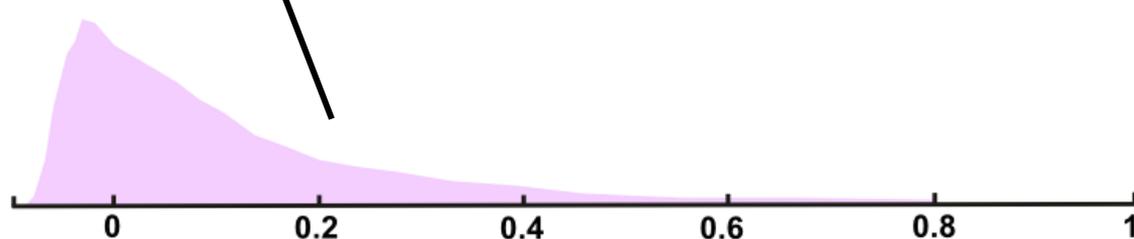
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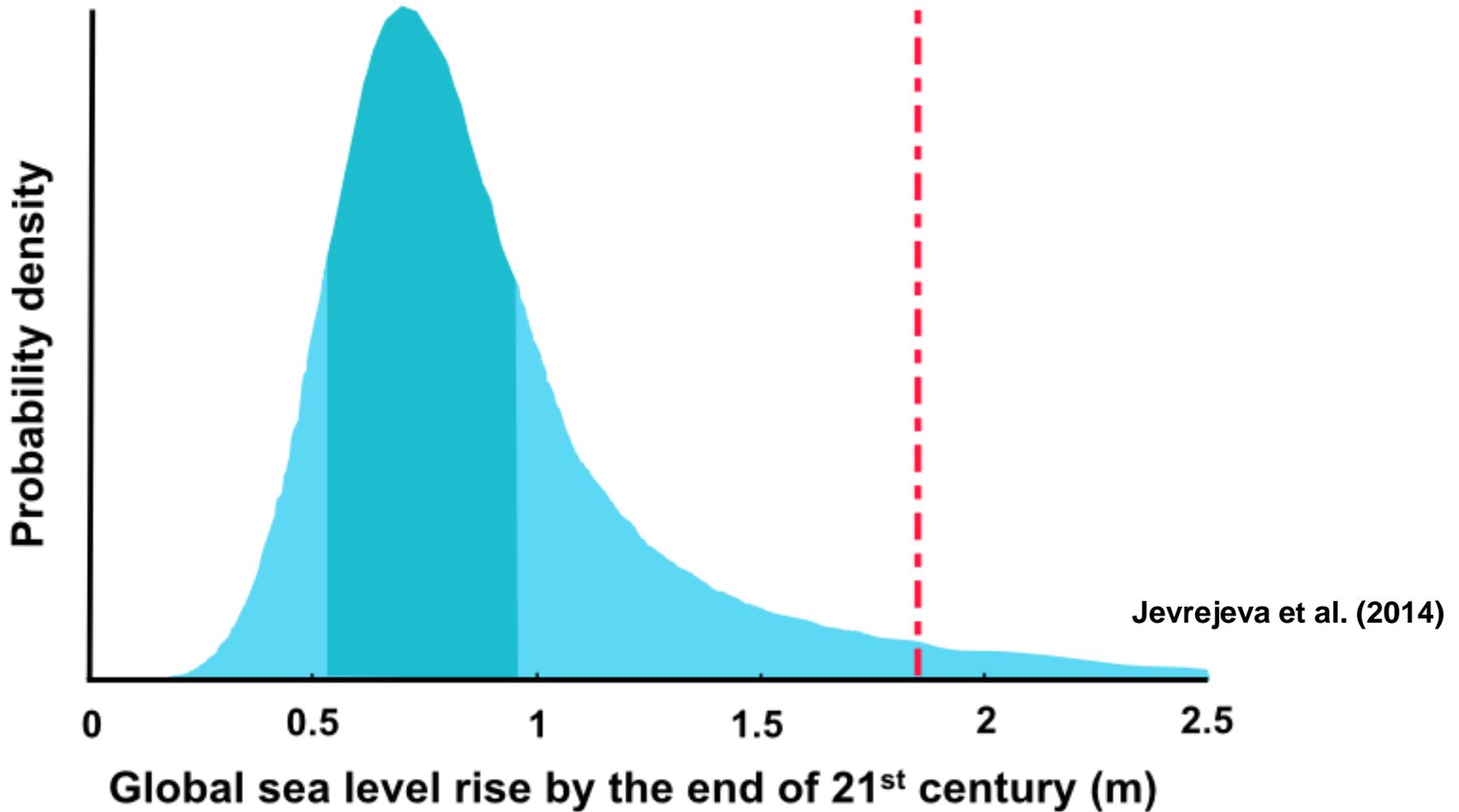


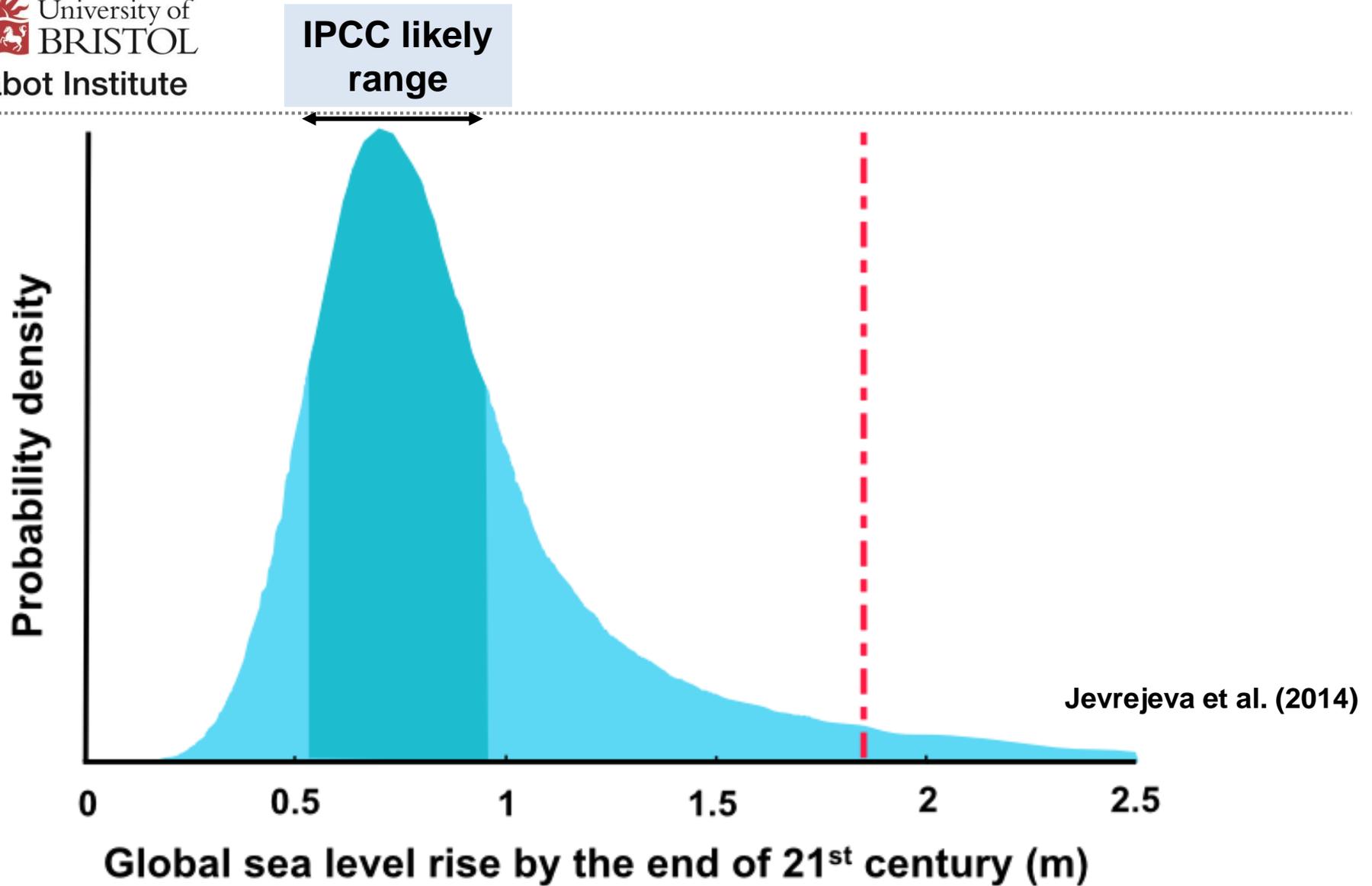
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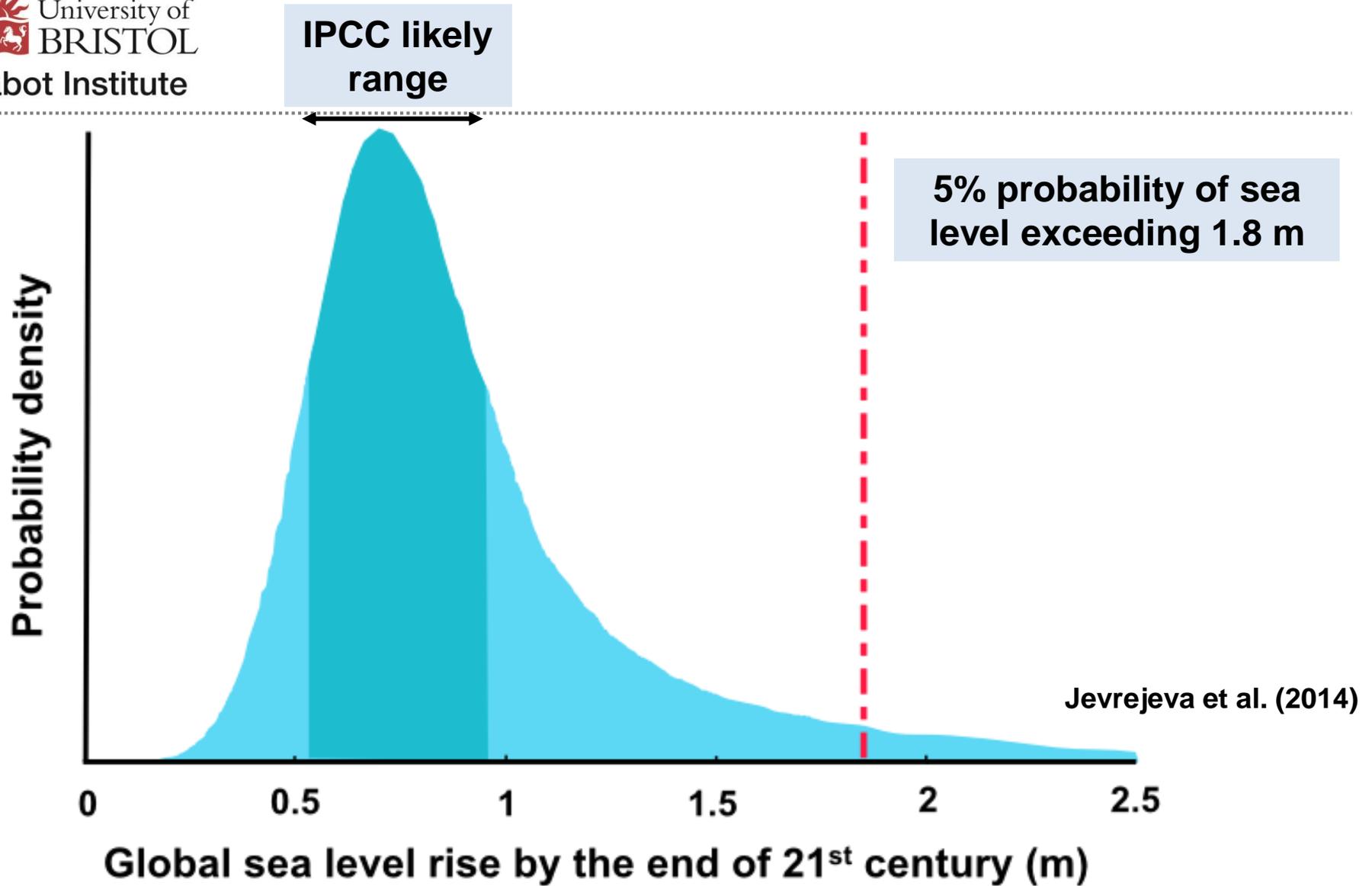


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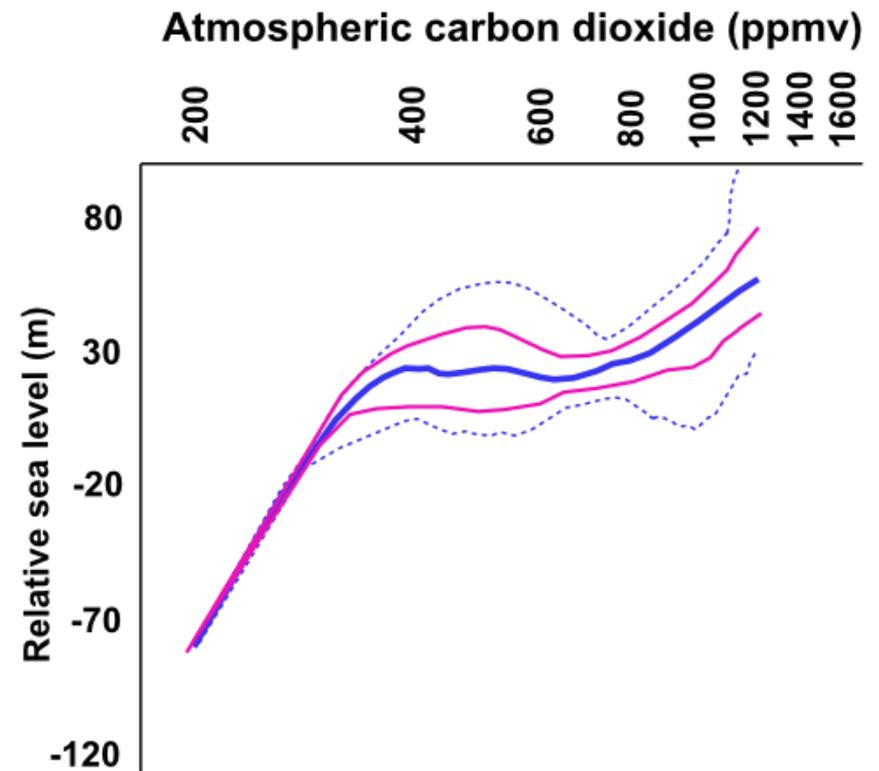
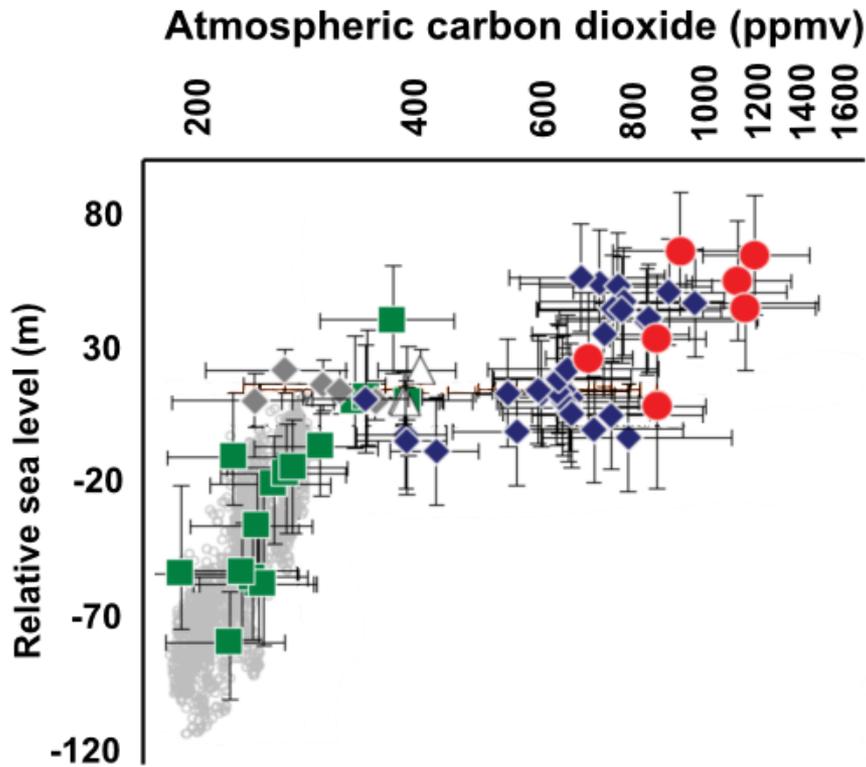




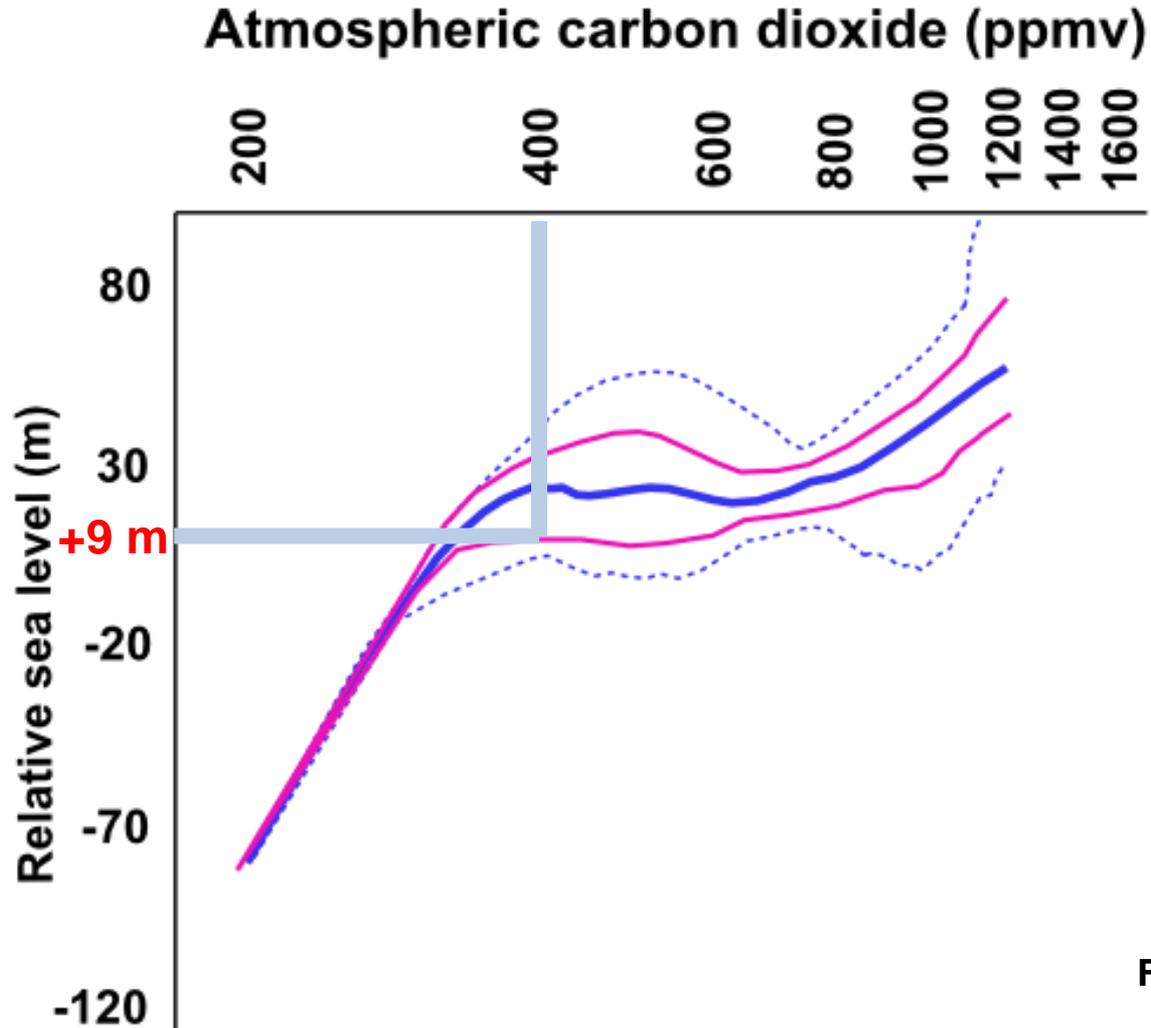
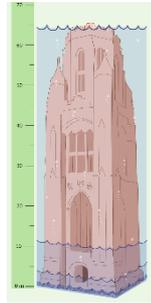




# What about beyond 2100? Can the past help us understand future sea level?



Foster and Rohling (2013)

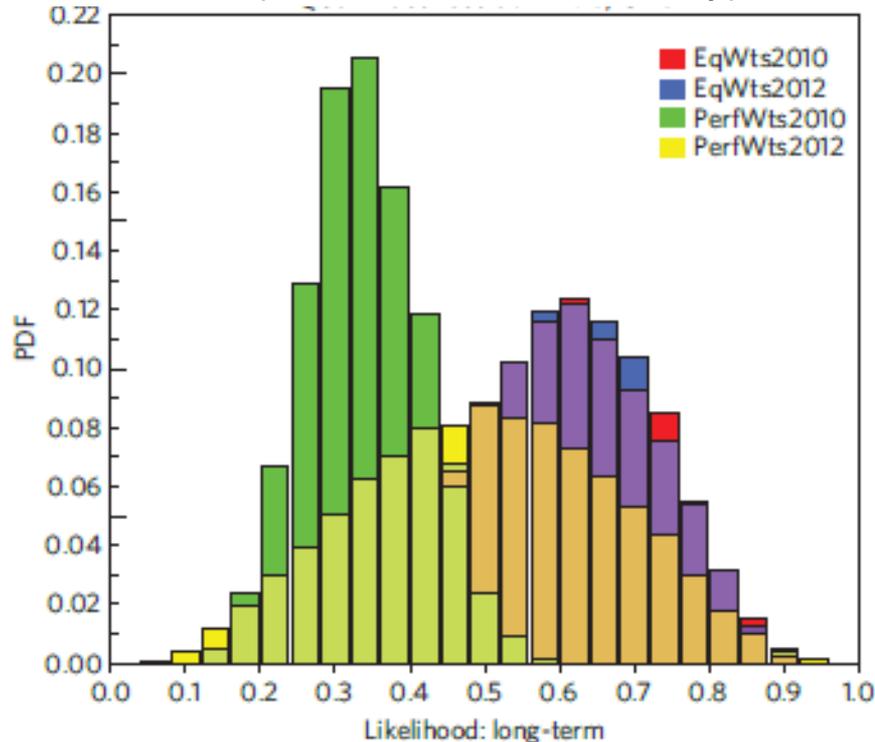


Foster and Rohling (2013)

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  - Ice-sheet 'weather' (short term variability)
  - Ice-sheet 'climate' (a long term trend)
  - Or both?

# Final thoughts for discussion

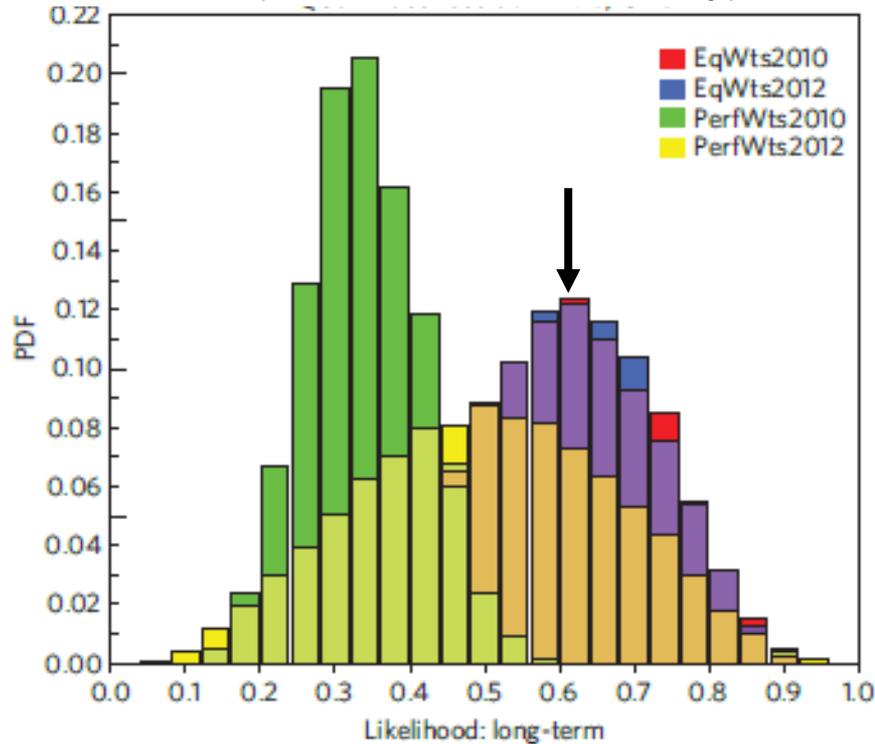
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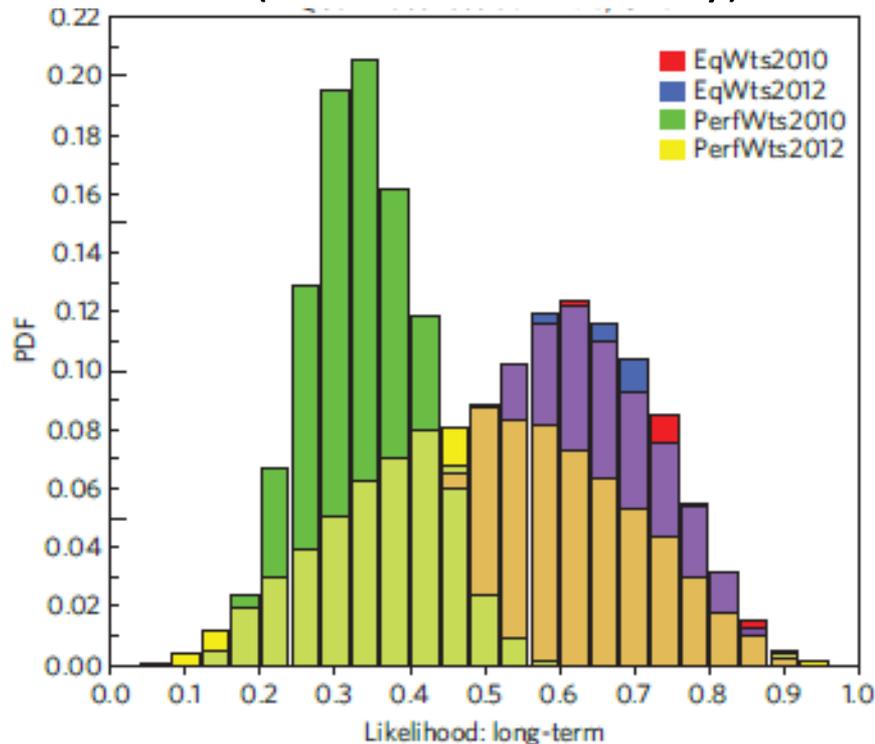
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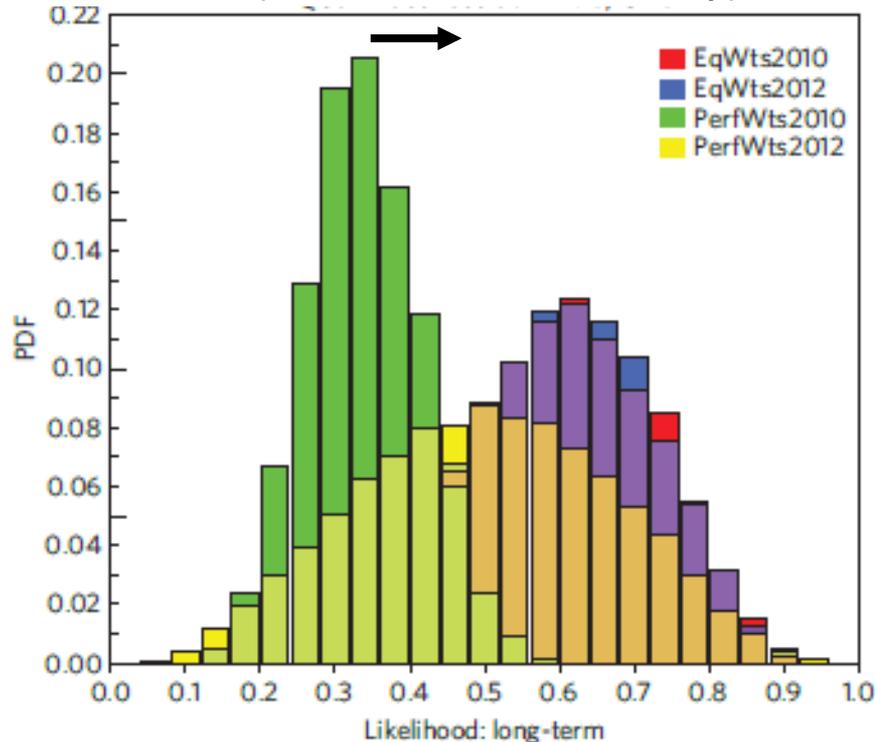
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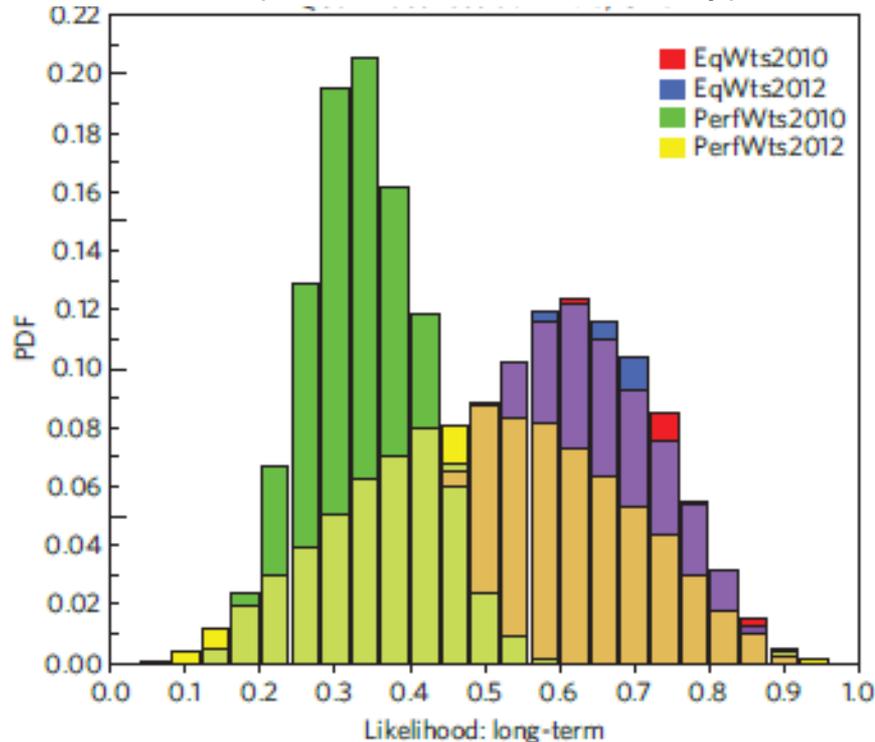
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- What about the ‘unknown’ unknowns?
- How much will increased understanding of the processes at play reduce the size of the ‘fat tail’ from ice sheet contributions?
- What do we regard as a ‘reasonable’ worst case scenario for sea level rise?