

Mechanisms of Sea-Level Change from Florida to Maine and Their Predictability

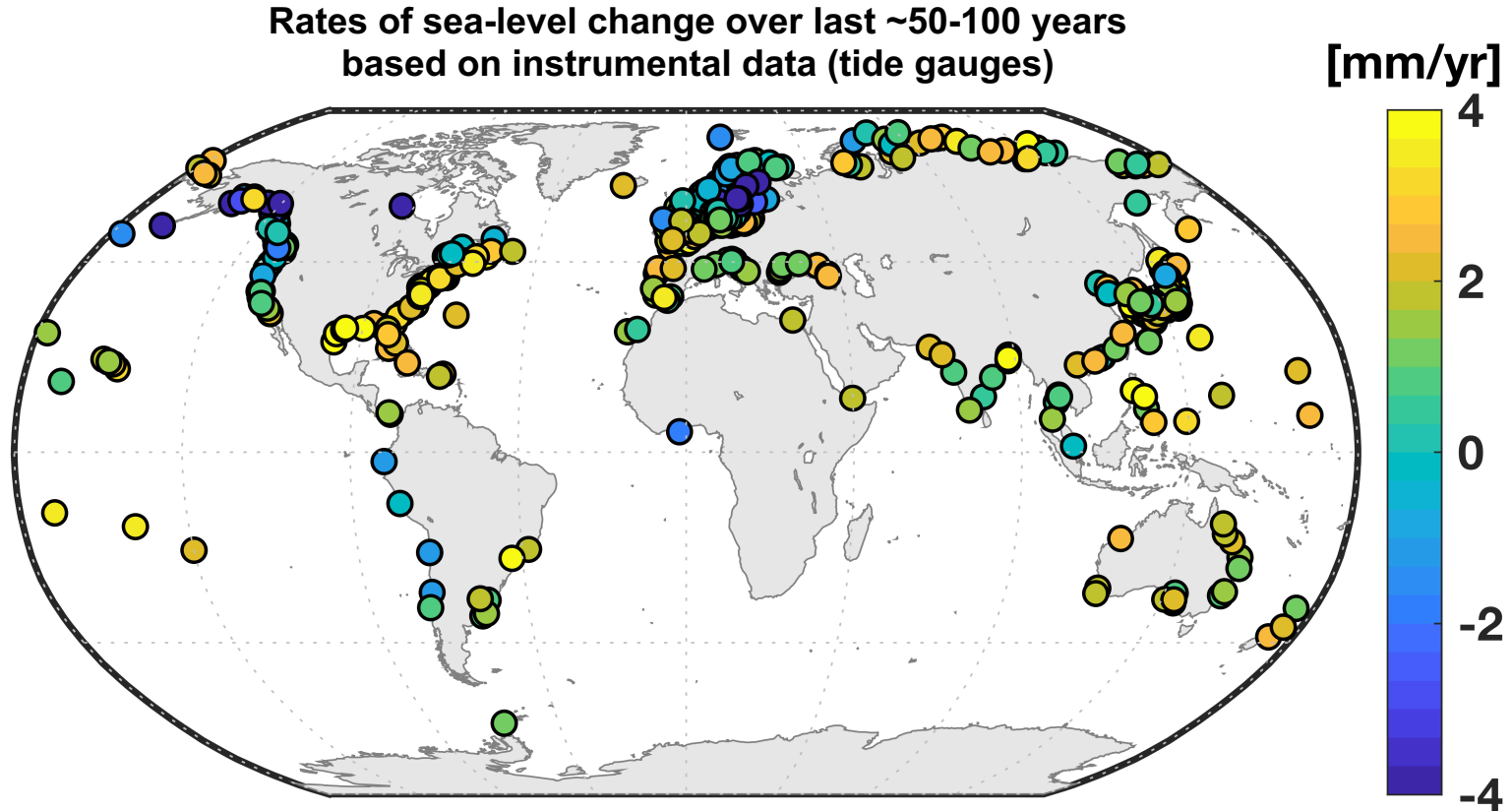
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Sea Level Hotspots from Florida to Maine: Drivers, Impacts, and Adaptation
US CLIVAR Workshop | Norfolk, VA | April 23-25, 2019

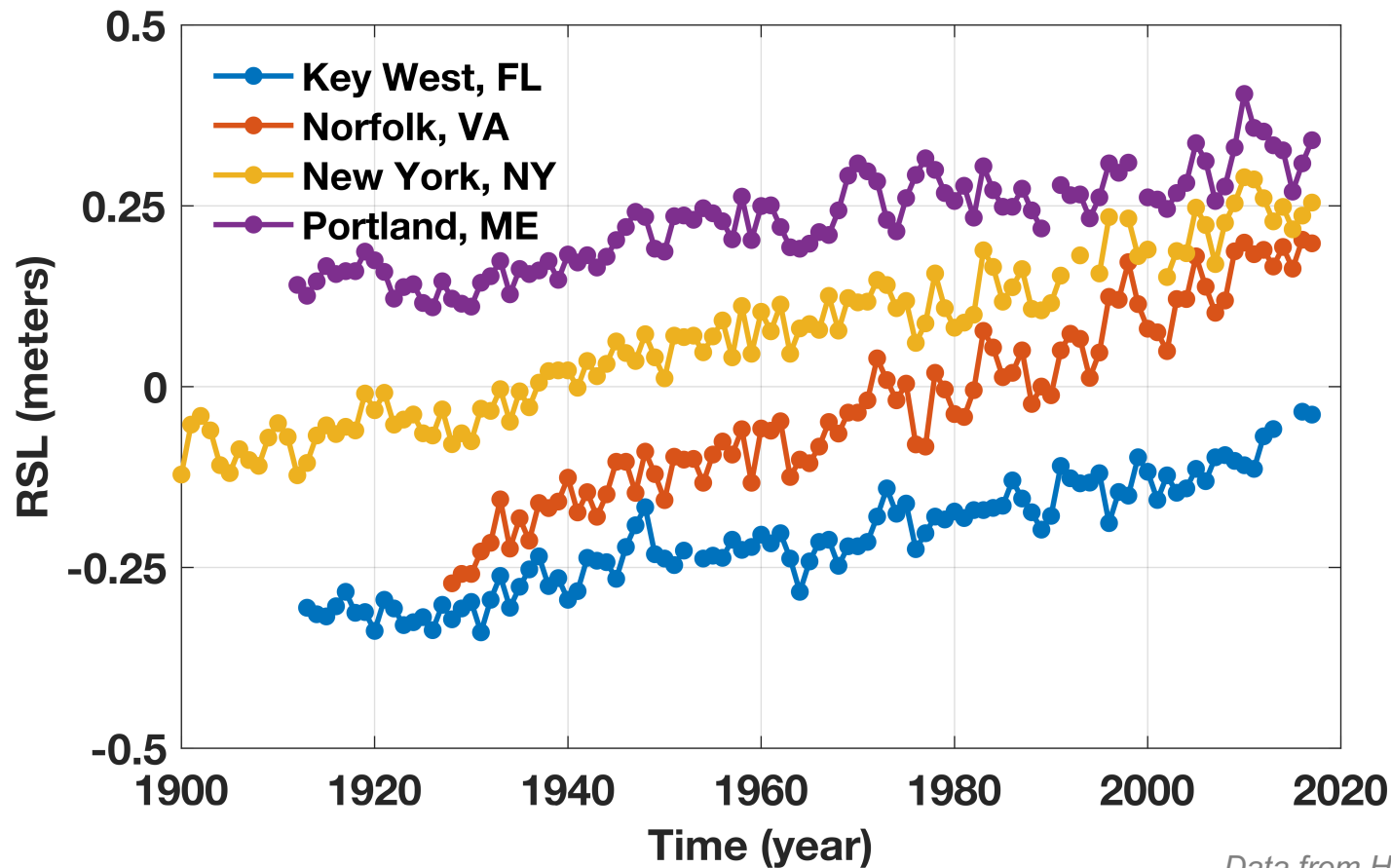
What Does Sea-Level Change “Look Like”?

Longterm Rates of Regional Coastal RSL Change



Data from Holgate et al. (2013)

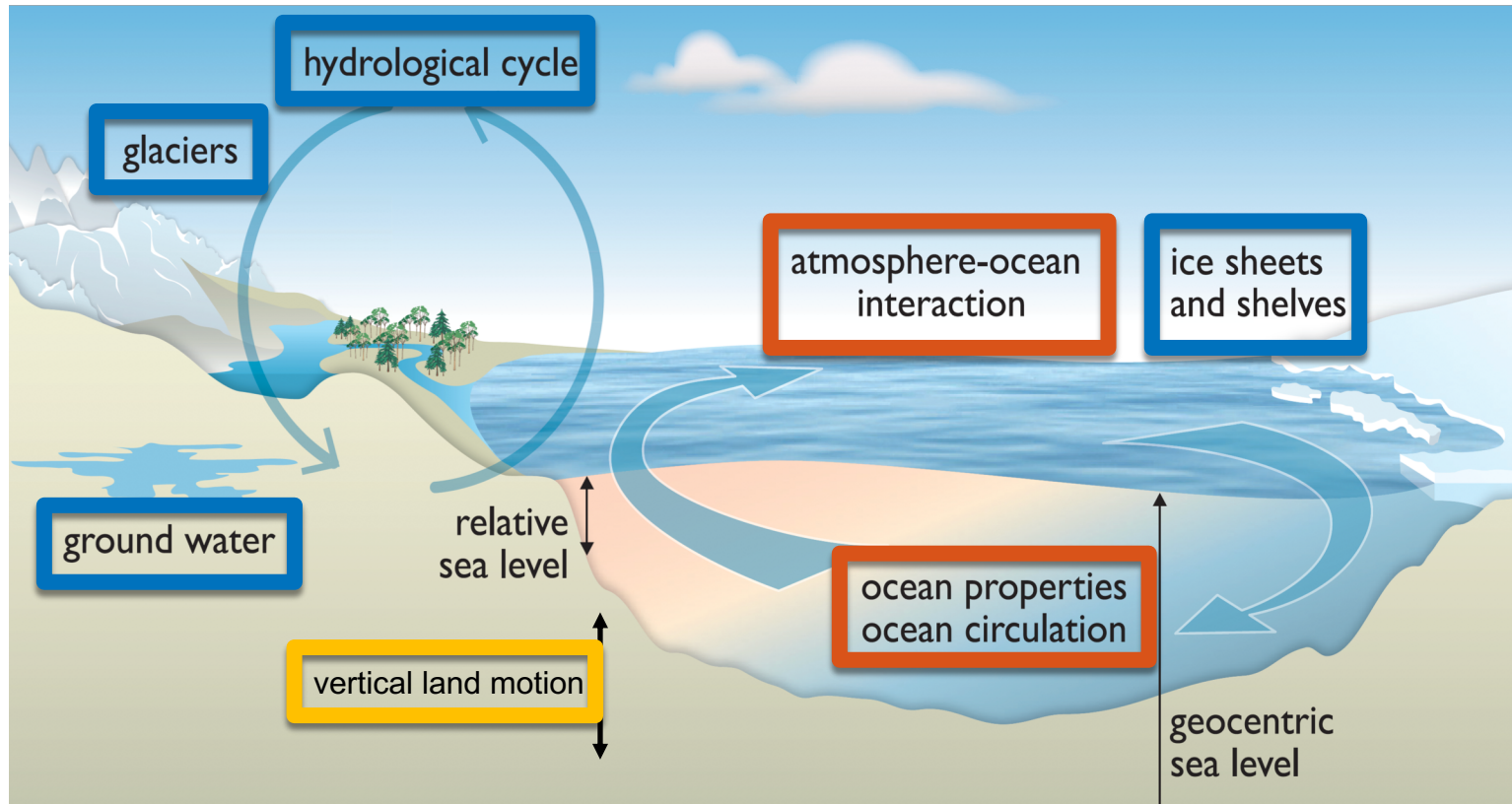
Year-to-Year Changes in Sea Level on the U.S. East Coast



Data from Holgate et al. (2013)

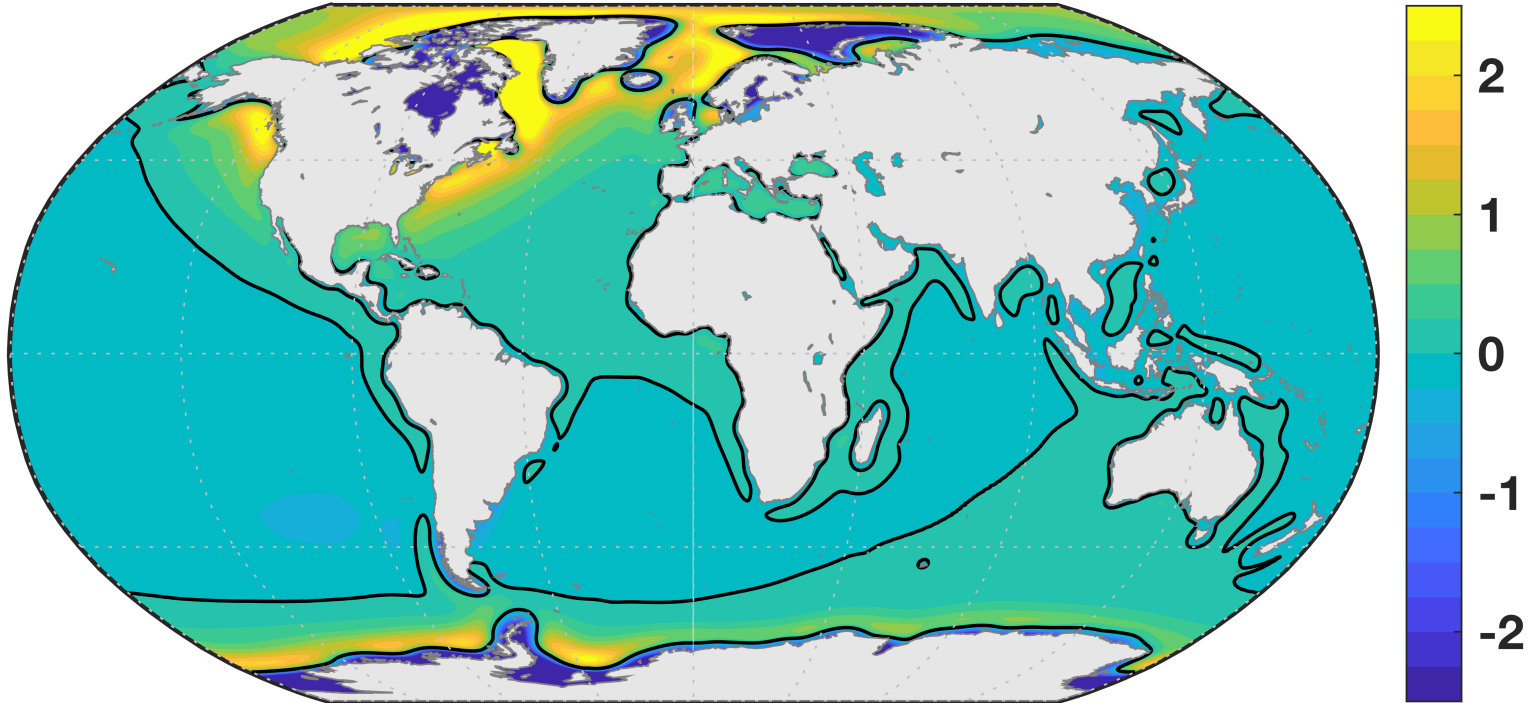
What Causes Changes in Sea Level?

Sea-Level Science 101



Glacial Isostatic Adjustment (GIA)

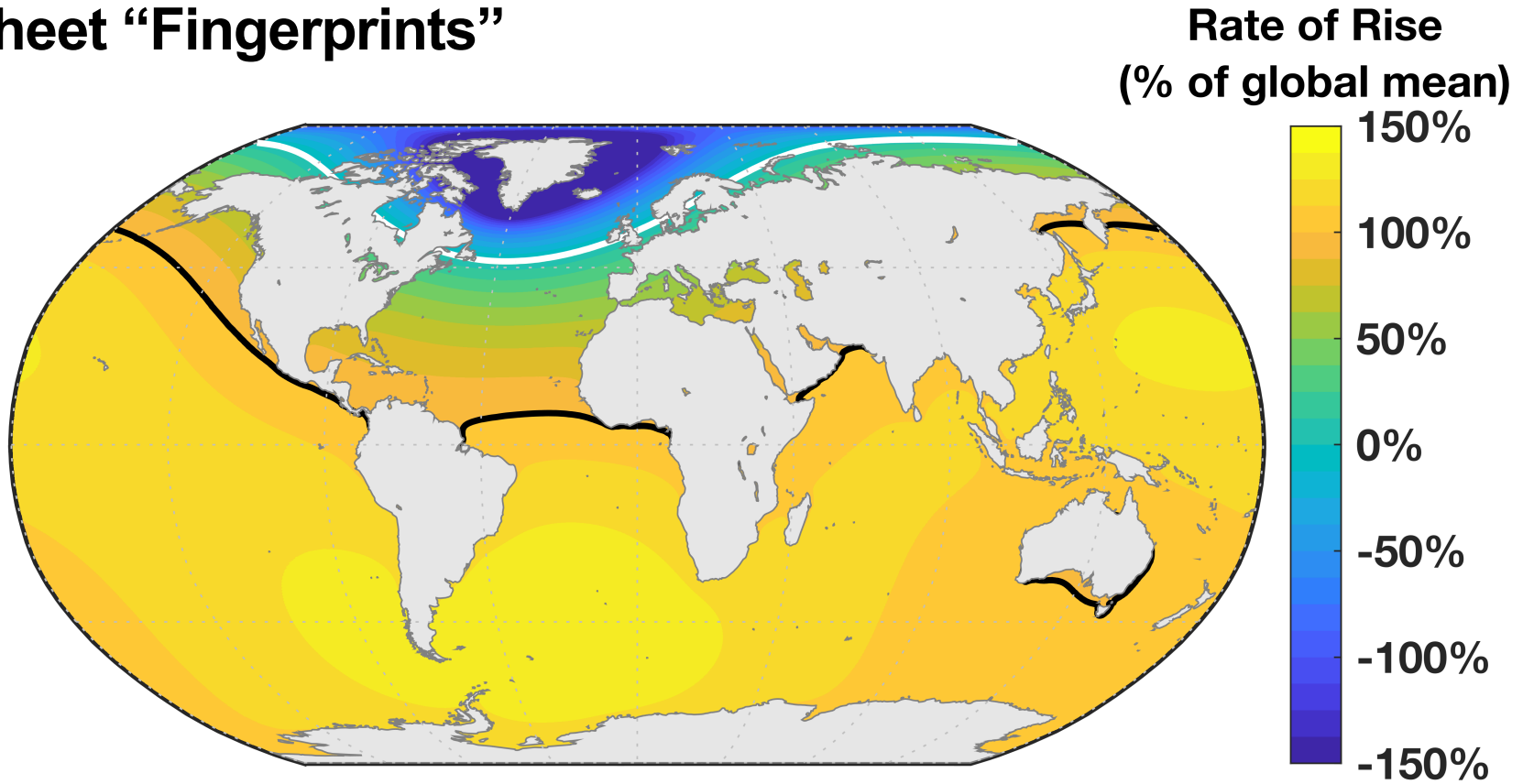
Rate of Rise
(mm/yr)



Farrell and Clark (1976); Gornitz and Seeber (1990), Peltier and Tushingham (1991), Davis and Mitrovica (1996), Engelhart et al. (2009), Kopp (2013), Miller et al. (2013), Kemp et al. (2014), Peltier et al. (2015), Piecuch et al. (2018), ...

Based on Peltier et al. (2015)

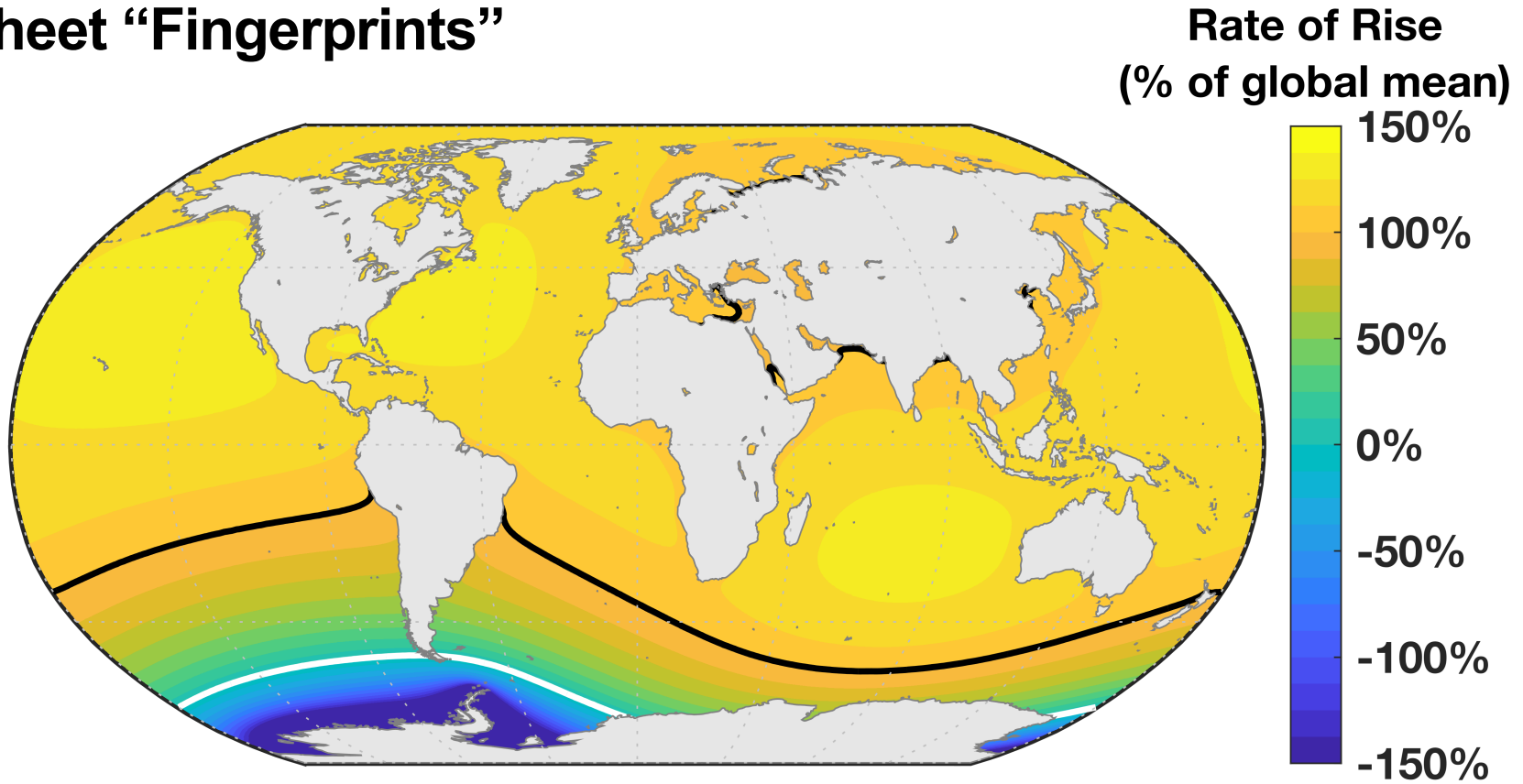
Ice Sheet “Fingerprints”



Engelhart et al. (2009), Kopp et al. (2014), Golledge (2015), Hay et al. (2015); DeConto and Pollard (2016), Bakker et al. (2017), Davis and Vinogradova (2017), Frederikse et al. (2017), Kopp et al. (2017), Wong et al. (2017)

Based on Hay et al. (2015)

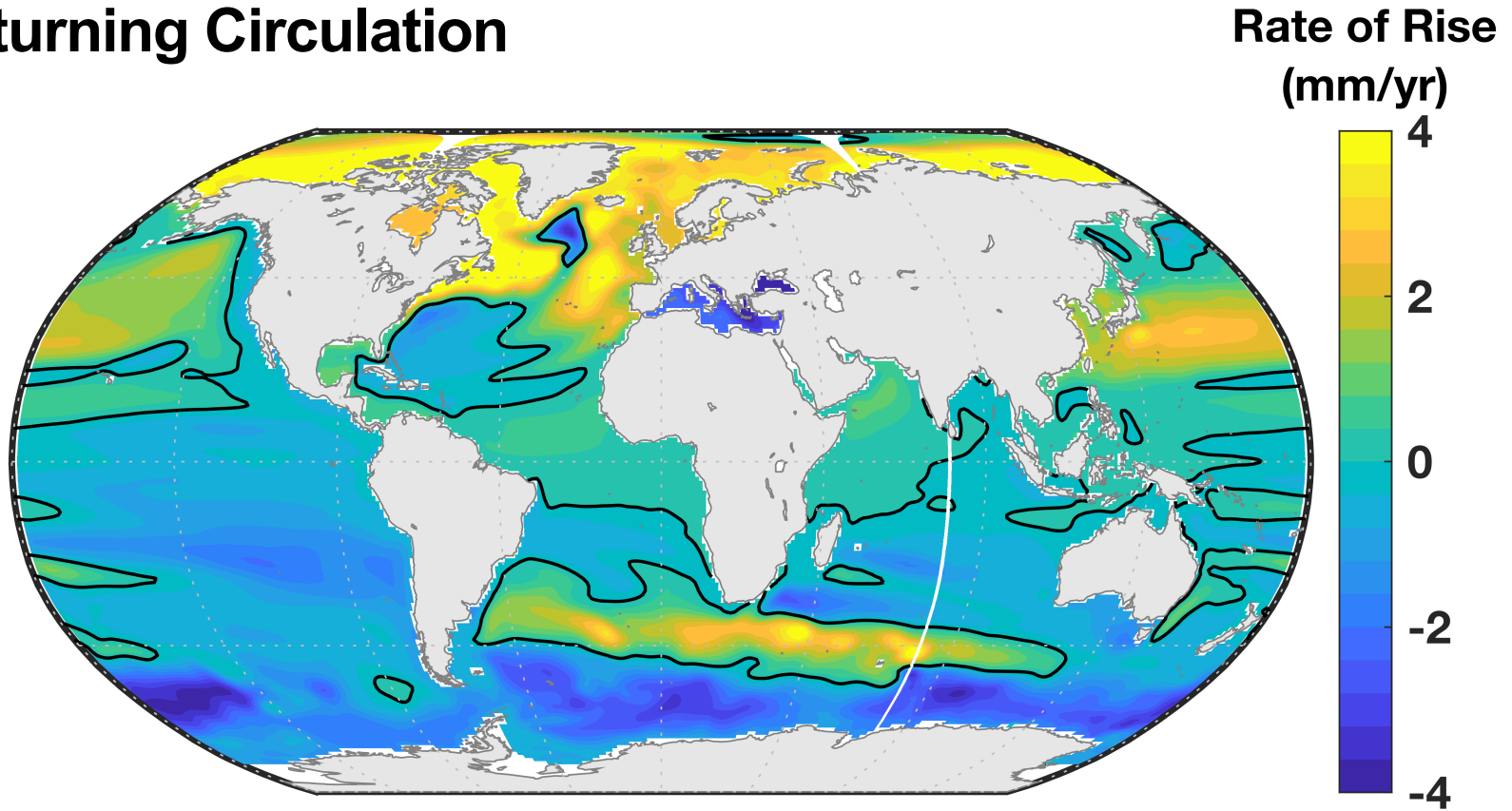
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Based on Hay et al. (2015)

Overturning Circulation

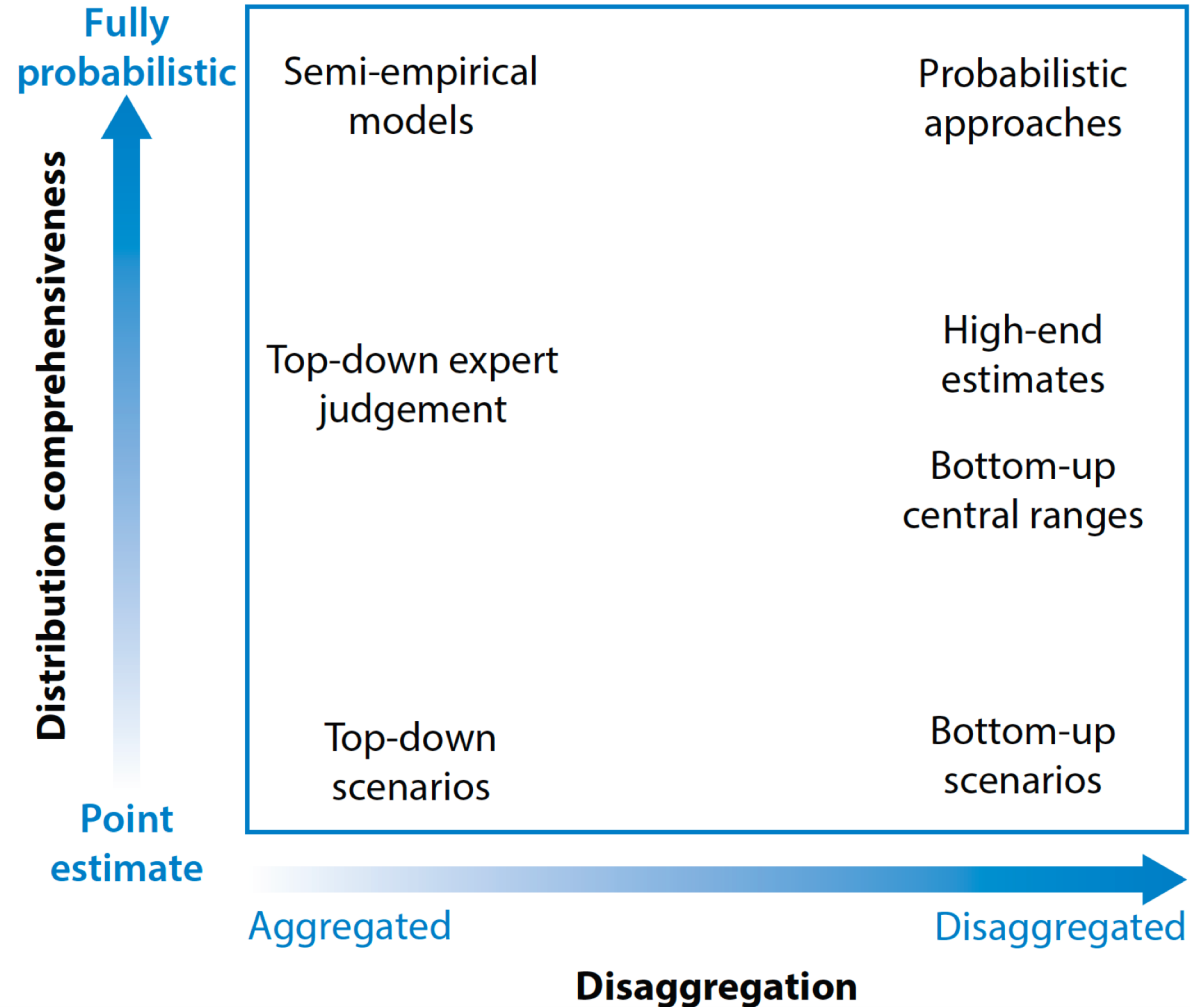


Levermann et al. (2015), Landerer et al. (2007), Bingham and Hughes (2009), Yin et al. (2009), Kienart and Rahmstorf (2012), Goddard et al. (2015), Little et al. (2017), Hu and Bates (2018), Piecuch et al. (in press), Little et al. (submitted) ...

Griffies et al. (2011)

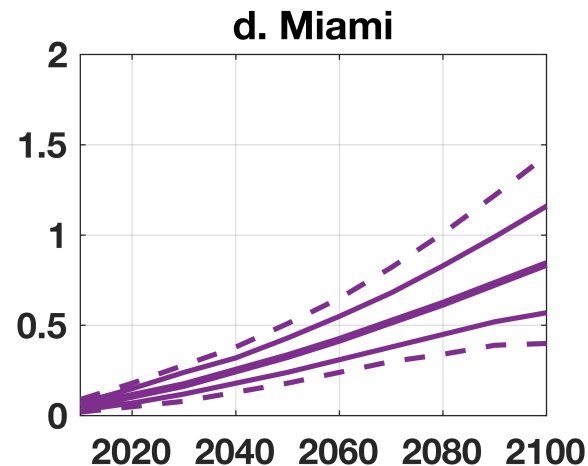
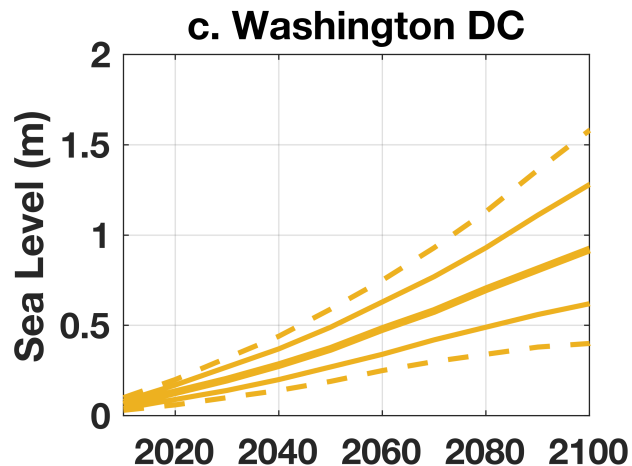
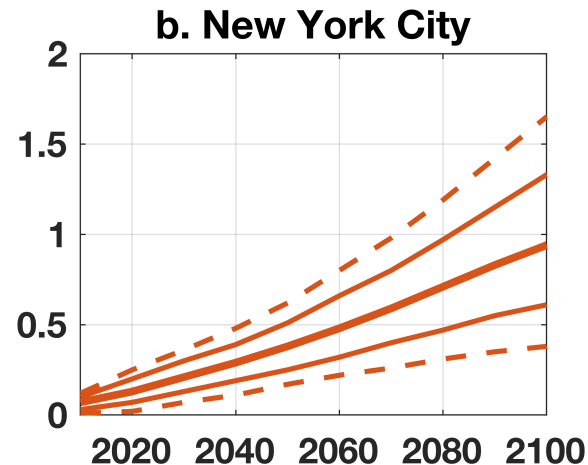
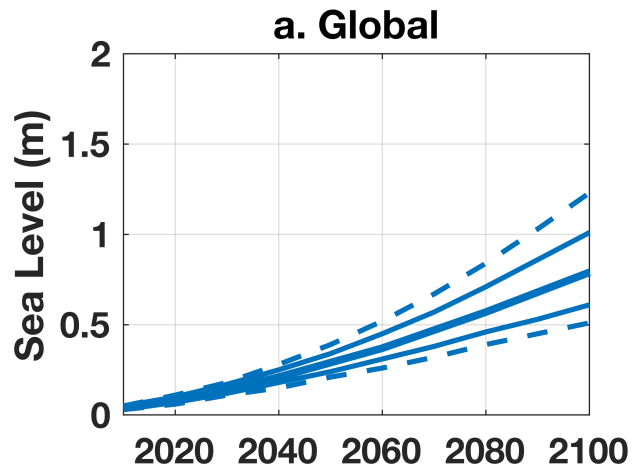
What Can We Say About the Future?

Prediction



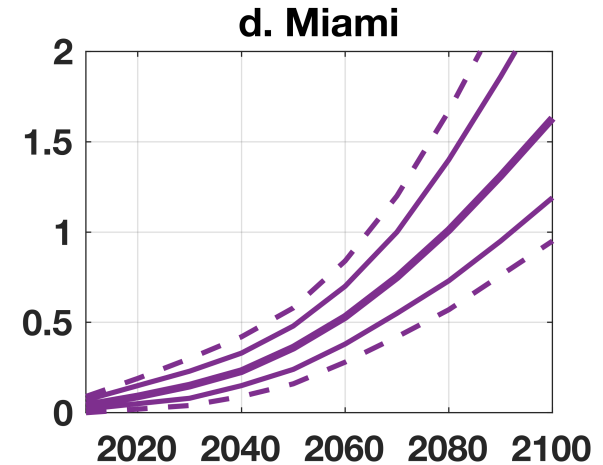
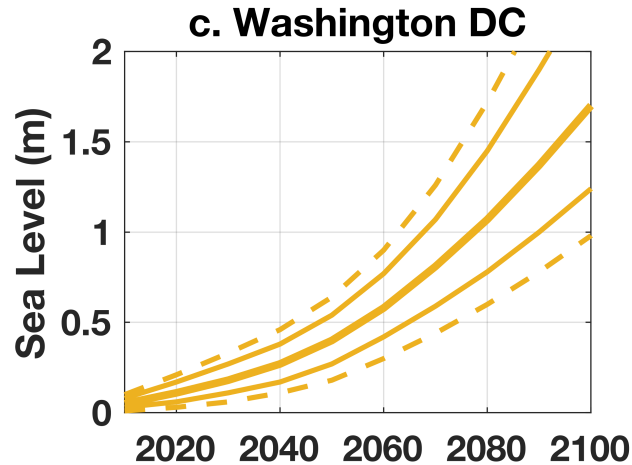
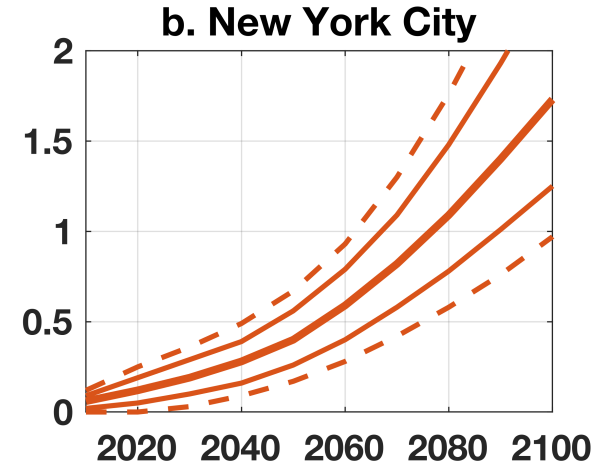
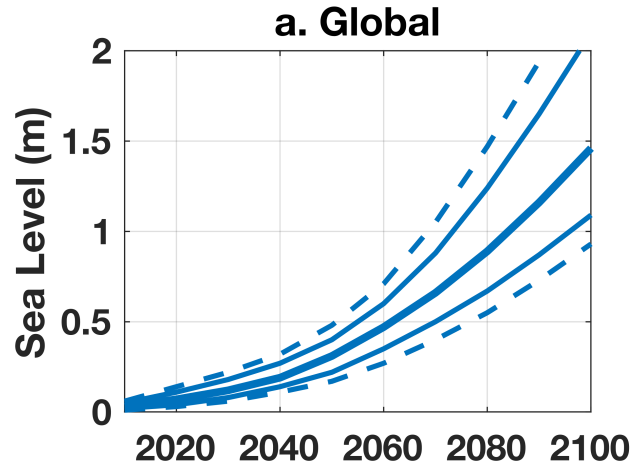
Prediction

Thick Solid: Median
Thin Solid: 67% Range
Thin Dash: 90% Range
[Values based on RCP8.5]



Prediction

Thick Solid: Median
Thin Solid: 67% Range
Thin Dash: 90% Range
[Values based on RCP8.5]



Summary

- Sea level varies over a range of timescales, from minutes to millennia
- Sea level at any site is affected by local, regional, & global processes
- Changes in sea level can arise from any & all Earth-system components
- Prediction is to some extent possible, depending on process & time horizon

A long, straight asphalt road stretches from the foreground into the distance, flanked by calm water on both sides. The road has a dashed yellow center line and solid white edge lines. The water reflects the soft, colorful light of a sunset or sunrise, with the sky showing hues of blue, orange, and pink. Several utility poles with power lines are visible along the left side of the road. The overall mood is peaceful and serene.

Thank you.