



Sea Level Rise Predictions

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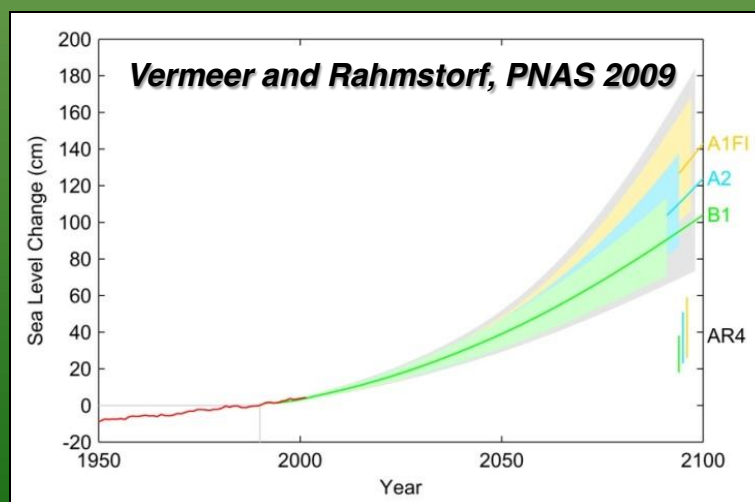


Global Trends

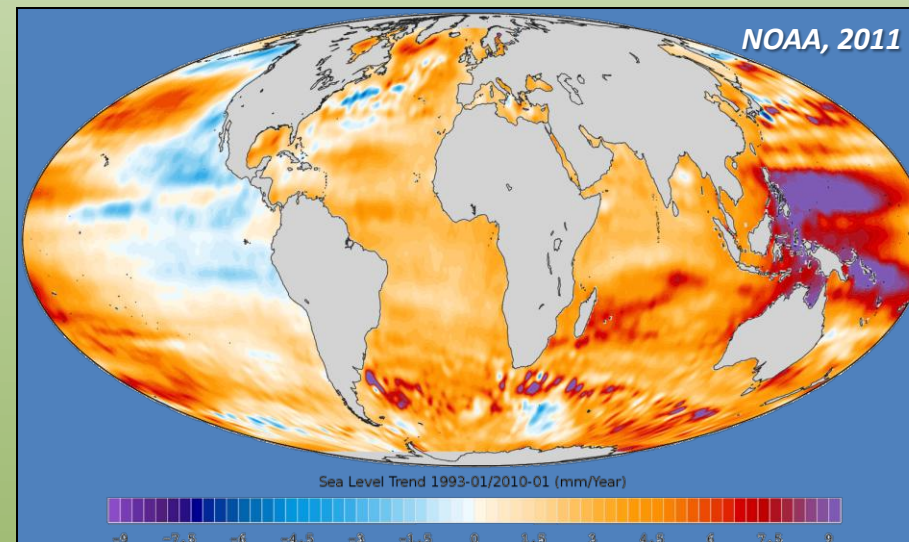
- 20th century (tide gauges) = 2 mm/yr (e.g., Church et al., *JOC* 2004)
- 1993-present (satellite altimetry) = 3 mm/yr (e.g., Merrifield and Merrifield, *JOC* 2009)

Global Predictions (by 2100)

- 0.18 to 0.59 m** Intergovernmental Panel on Climate Change (*IPCC*, 2007)
 - does not include ice sheet contributions from Greenland (7 m stored) and Antarctica (60+ m stored)
- 0.5 to 1.9 m** Rahmstorf (*Science*, 2007)/ Vermeer and Rahmstorf (*PNAS*, 2009)
 - relates sea level rise to mean surface temperature
- 0.8 to 2 m** Pfeffer et al. (*Science*, 2008)
 - constrained by observations of ice sheet dynamics
- 5 m** Hansen (*Environ. Res. Lett.*, 2007)
 - non-linearity, amplifying polar feedbacks- 'albedo flip'
 - sea level was 75 m higher at ~50 Ma
 - at 5 Ma, sea level was ~25 m higher, but only 2-3°C warmer (A2 emissions scenario is 4.5 °C warmer)



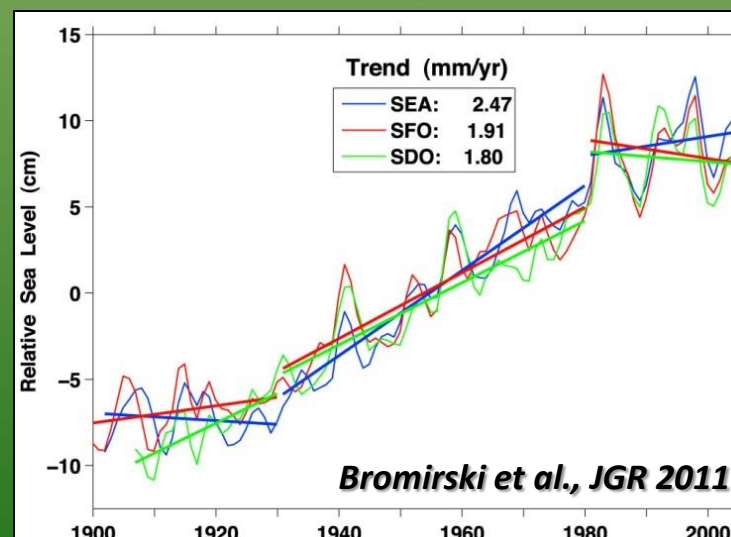
Regional Patterns



Primary factors:

- Ocean circulation patterns
- Isostasy
- Tectonics

West Coast sea level rise has been suppressed for the last thirty years! BUT wind pattern changes may signal return to global or higher rates of SLR (Bromirski et al., *JGR* 2011).



National Research Council study (due Summer 2012) will provide guidance on West Coast SLR.

Local Effects

Land movement:

- Subsidence due to sediment compaction and fluid withdrawal (up to order of magnitude higher than Global SLR)
- Tectonics

Storm impacts (short-term):

- Waves and storm surge*
- River discharge
- *Likely to increase throughout 21st century



Local Data Needs

- High res topography (lidar) - flood extents
- High res bathymetry (multibeam) - model input
- Periodic lidar or IfSAR - spatial variations in regional land movement (subsidence and uplift)
- Pressure sensors / aerial photography - flood event validation for model improvement
- Fluvial discharge projections

SLR Flood Modeling Studies

- Adapting to Rising Tides (ART Project- BCDC, NOAA)
- Our Coast-Our Future (OCOF- USGS, NOAA, NPS, PRBO)
- USGS CASCaDE - Noah Knowles
- NOAA Sea Level Rise Viewer (coming soon)