



The Rising Tide in Boston: sea level rise and coastal flooding due to climate change

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IPCC (2007)

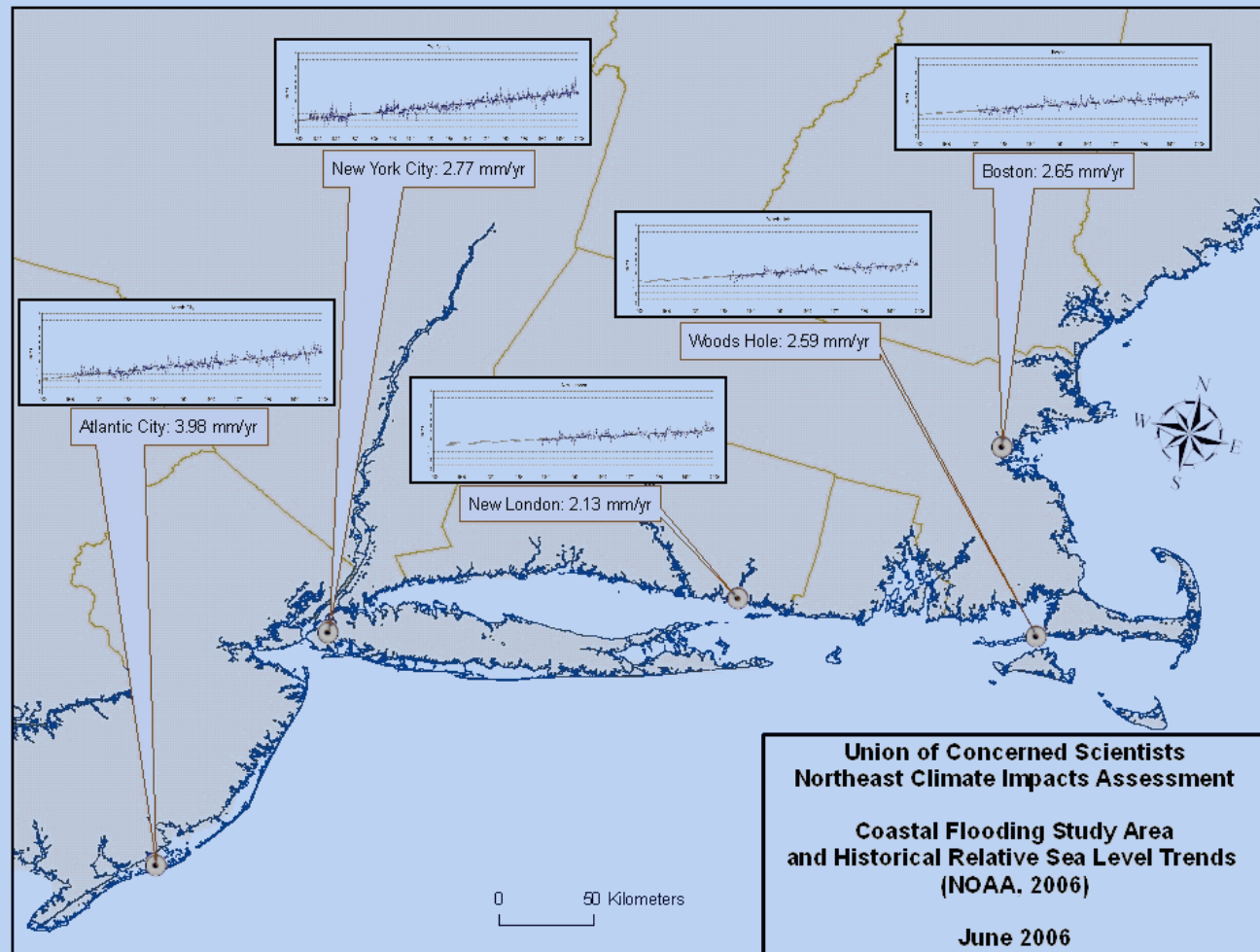
“Warming of earth is now **unequivocal**”

- Global sea level rise (SLR) is accelerating:
 - 1.8 mm/yr average 1961-2003
 - 3.1 mm/yr average 1993-2003
- Arctic sea ice decreased 2.7% / decade since 1978
- Greenland and Antarctic Ice Sheets are thinning
- Mountain glaciers receding at unprecedented rates

“Sea level rise under warming is **inevitable**.”

“There is **high confidence** that neither adaptation nor mitigation alone can avoid all climate change impacts; however, they can complement each other and together can significantly reduce the risks...”

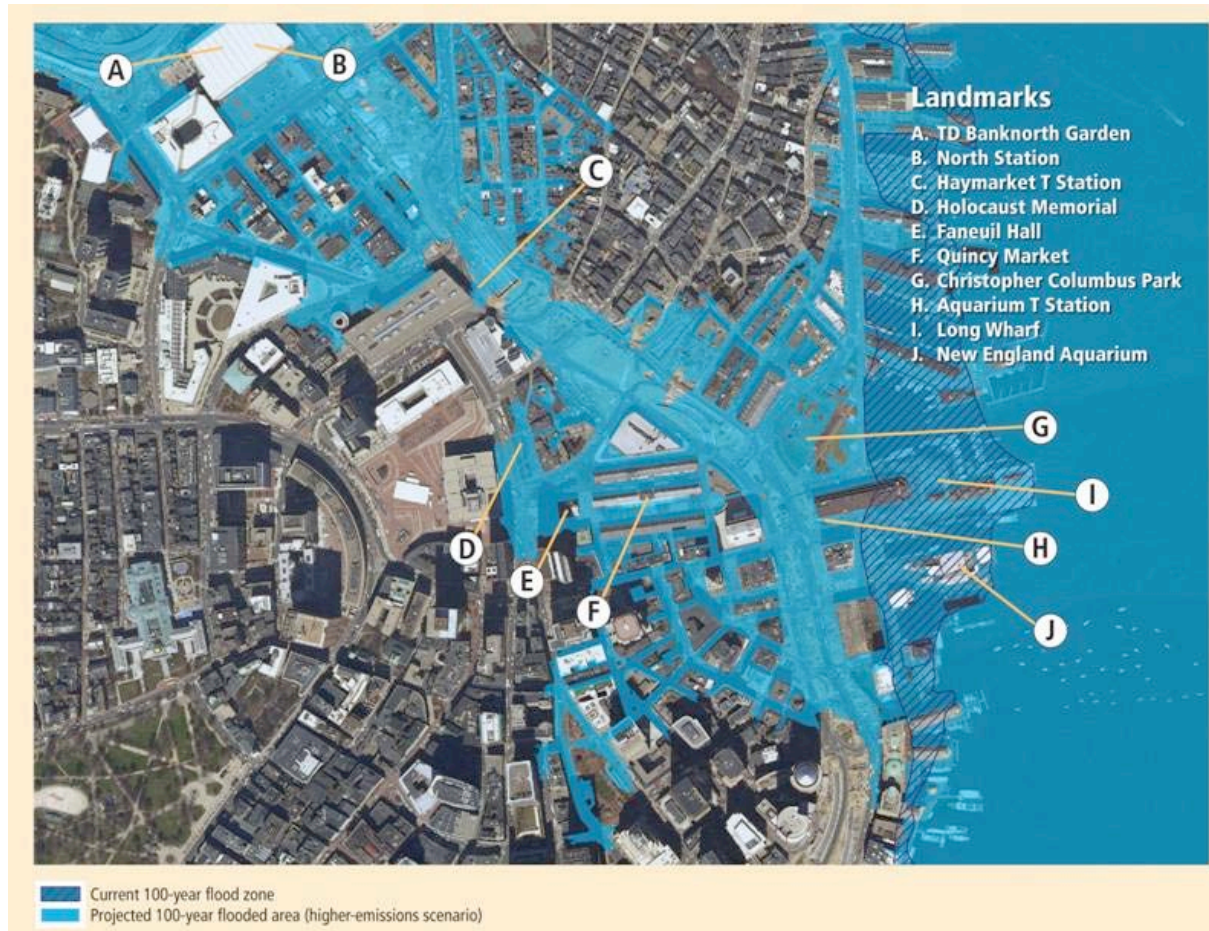
What have we already seen?



What might we expect?

- Katzman et al., 2008. Climatic Change, 19: 351-374.
 - Sea level rise in 2100: 30-55 cm (moderate ΔT) and 40-80 cm (high ΔT)
 - Ice melt contribution: 6.7-38.6cm (moderate ΔT) and 6.2-66.1 cm (high ΔT). **Largest uncertainty in Antarctic Ice Sheet response.**
- Pfeffer et al., 2008. Science, 321: 1340-1343.
 - Sea level rise in 2100: ~ 80 cm (most likely) to 2 m (physically possible but less plausible).
 - Ice melt contribution: ~ 30 cm (most likely) to 1.2 m (physically possible but less plausible).

What might we expect?



Current 100-yr coastal flood elevation could occur every 2-5 years.

Timeframes and uncertainties

- 2050 and 2100 typical timeframes.
 - Historical emissions affect mid-century.
 - Emissions scenarios affect late century.
 - **We still can have an impact.**
- SLR uncertainty due to:
 - Uncertainty in model and emissions scenarios
 - Ice melt contributions (Antarctic ice could increase OR decrease)
 - Interactions and unintended consequences.