

Sea level forecast

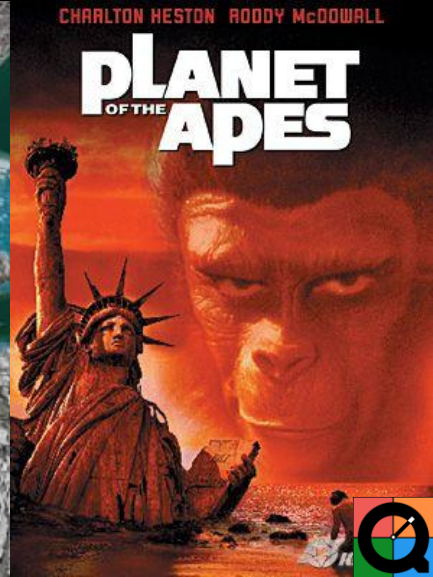
“Prediction is very difficult, especially if it's about the future.” Niels Bohr



Climate catastrophe

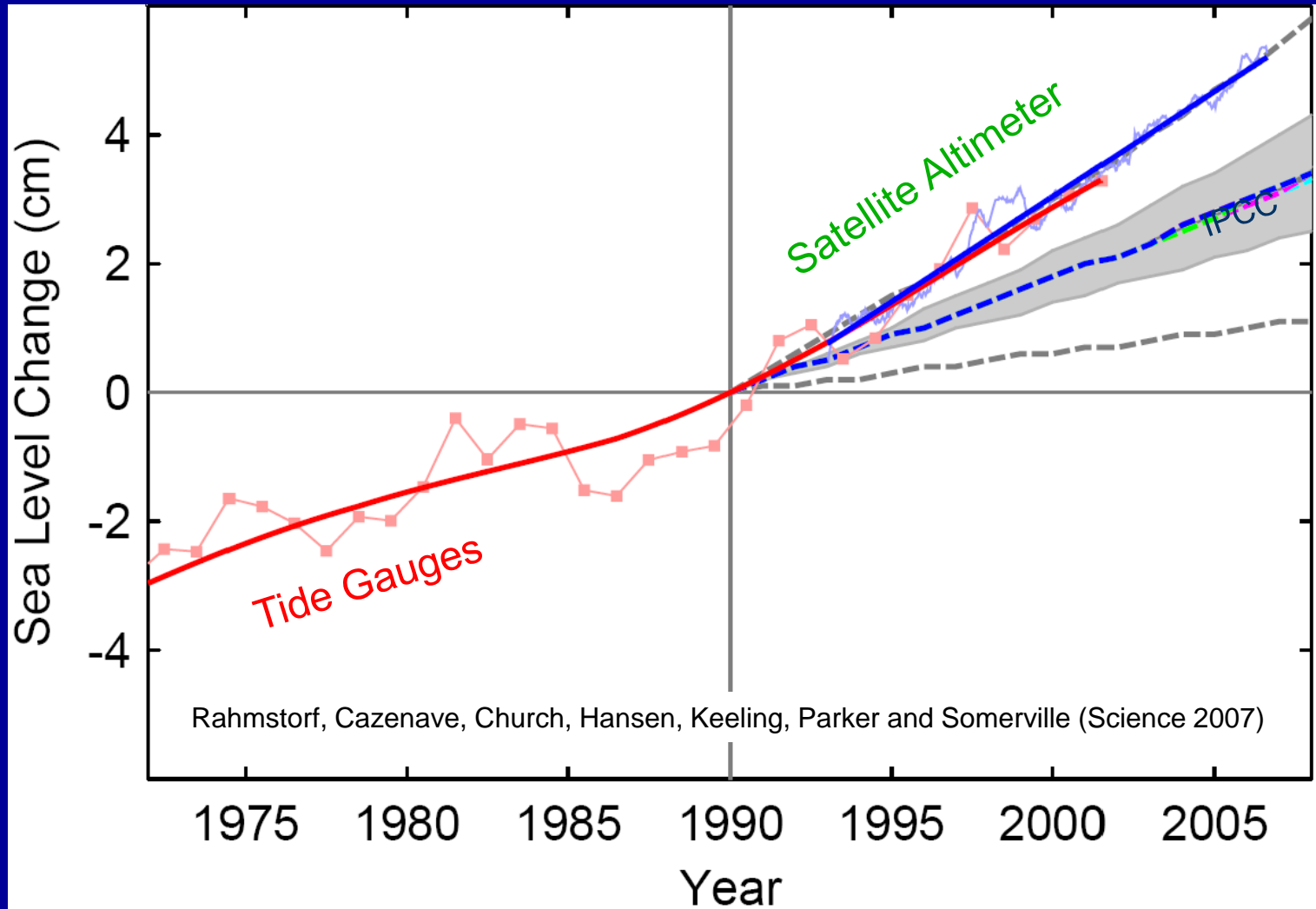
NASA physicist James Hansen explains why he thinks a sea level rise of several metres will be a near certainty if greenhouse gas emissions keep

2107?

A map of Florida and the surrounding Gulf of Mexico coastline. The map is color-coded to show projected sea level rise by the year 2107. Darker blue areas indicate areas that would be submerged. Labels on the map include TAMPA BAY, TALLAHASSEE, Ocala, and FLORIDA. A small text box on the right side of the map reads: "If the sea level rises by 5 metres, large areas of Florida will disappear".

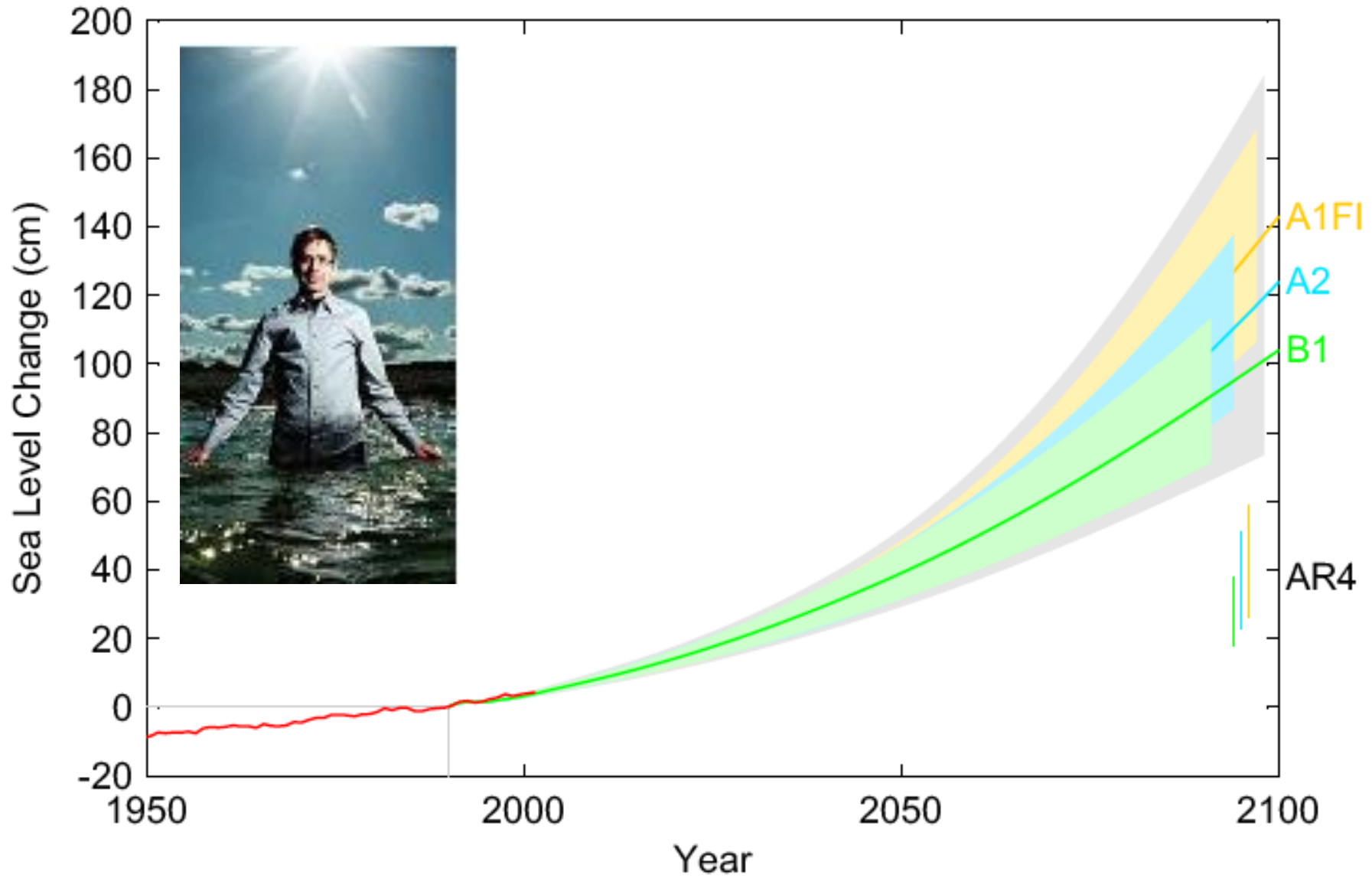
We are tracking high end predictions

Not a Gorian 5 m, but not IPCC2007 40 ± 20 cm
Best estimate **>80 cm** global; Rahmsdorf et al. (2007)
max. 1 m? 2m?? MWP1a maximum 20-40 mm/yr



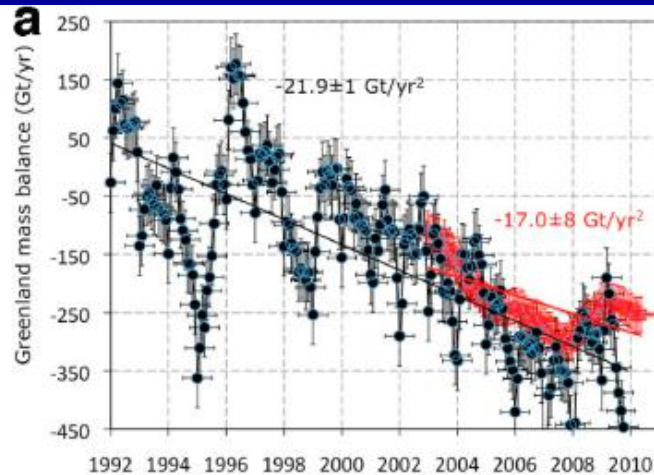
Semi-empirical techniques of prediction

Vermeer and Rahmstorf: 1.4 m for A1F1 emissions scenario



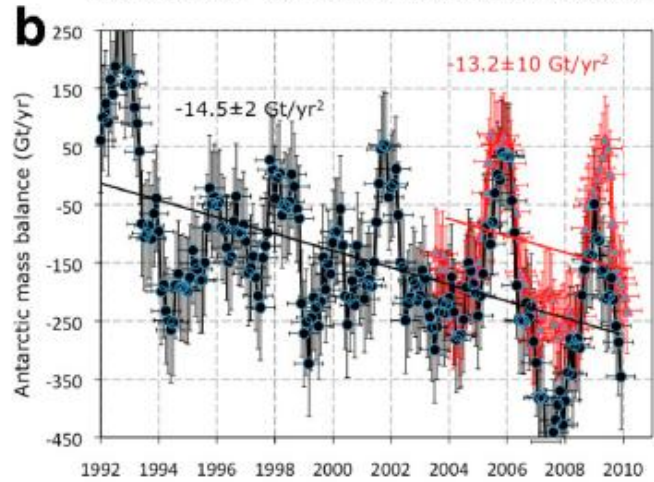
New record of melting: Rignot et al. (2011)

Two independent techniques: 1) mass budget estimates; 2) GRACE



Left: Greenland

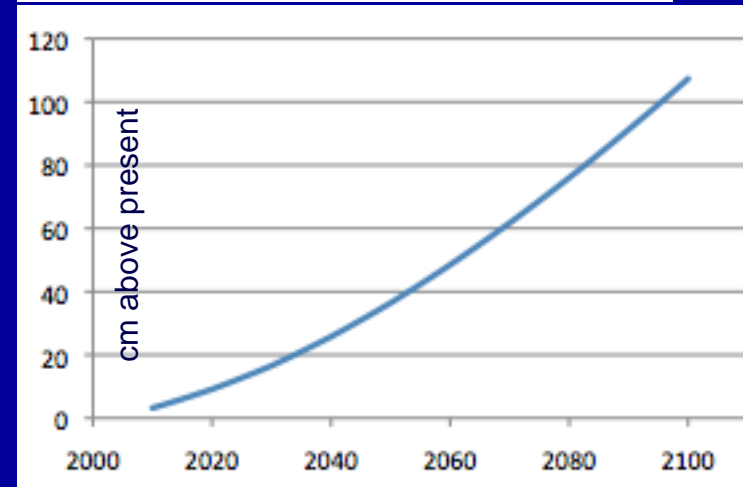
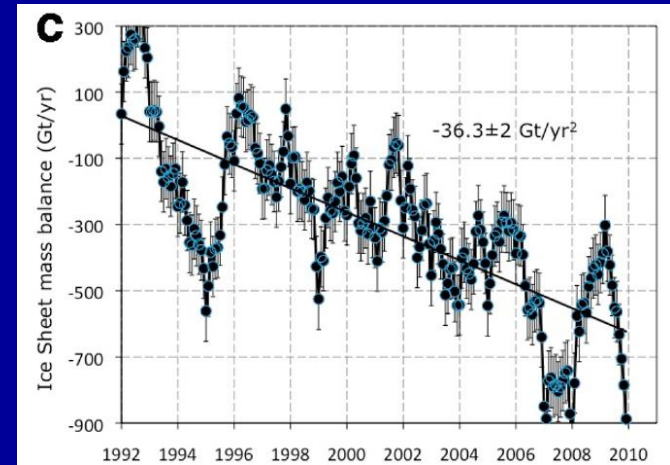
Right: Greenland & Antarctica



Left: Antarctica

Right: projection using Rignot's rates and IPCC steric + "alpine" contribution (Miller, unpublished)

Estimate ~1 m



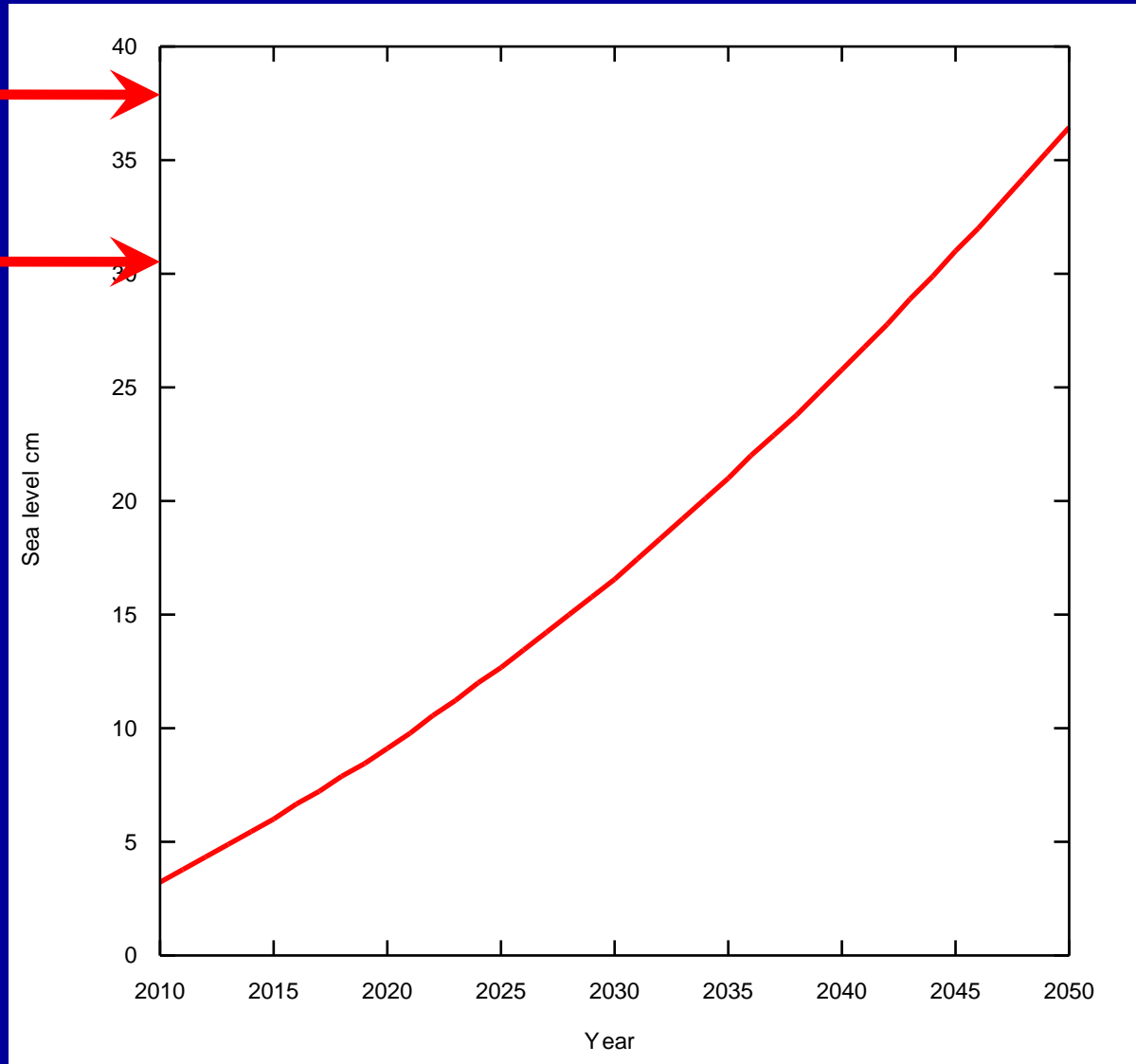
Acceleration of the contribution of the Greenland and Antarctic ice sheets to sea level rise

E. Rignot,^{1,2} I. Velicogna,^{1,2} M. R. van den Broeke,³ A. Monaghan,⁴ and J. Lenaerts³

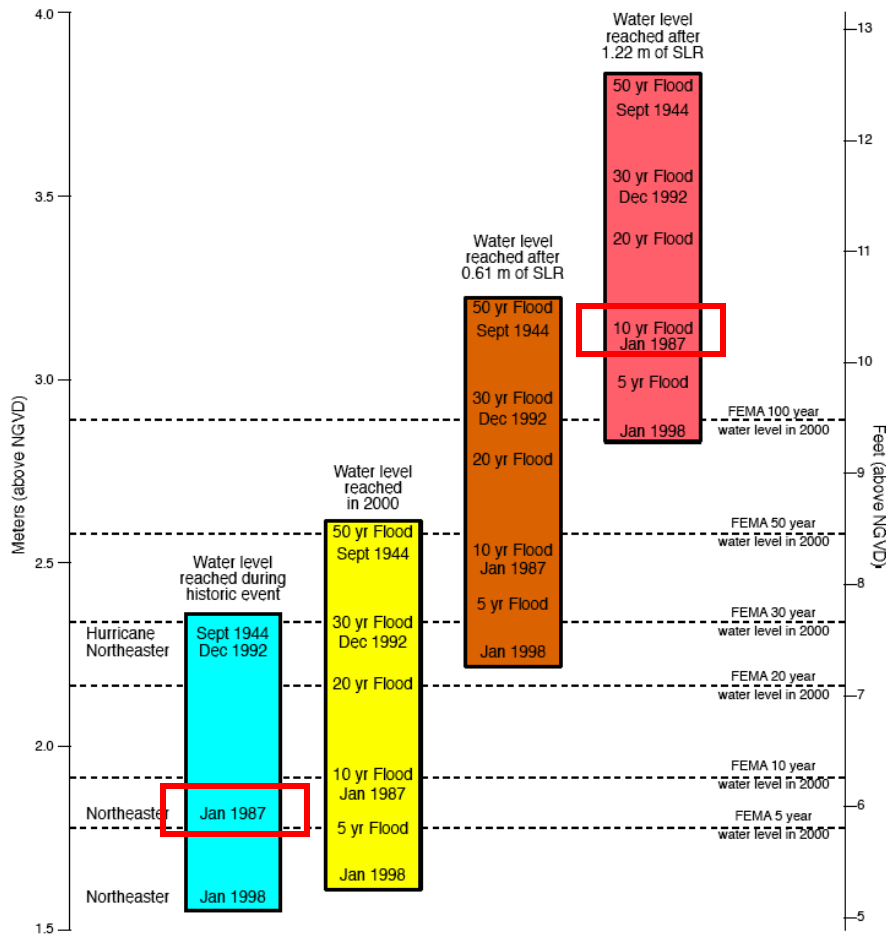
Global rise by 2050

20th century
relative rise at
Atlantic City

1 foot



Effects of sea-level rise: Coastal flooding



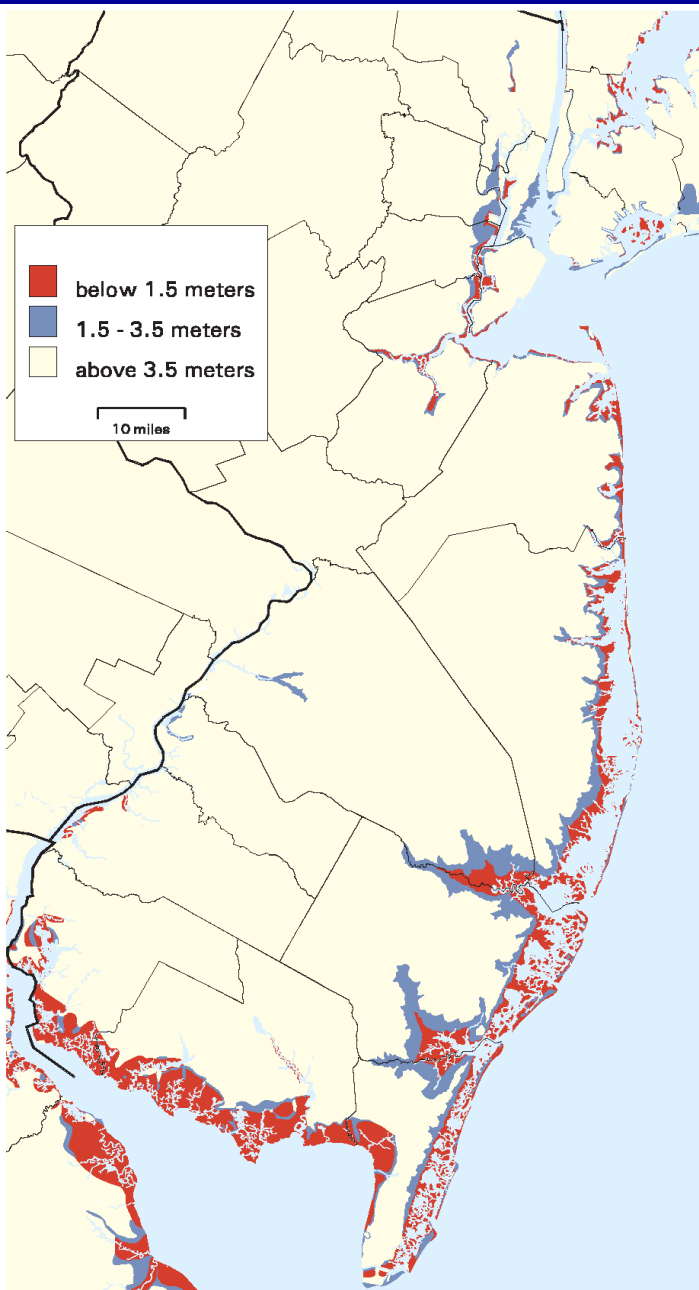
Potential impact of sea level rise on tidal surge frequency and flood water levels in Atlantic City, New Jersey.

Increased effects of storm surges

By 2100, the equivalent of the moderate 1/87 storm (“5-year flood”) will have the flooding of a “100 year storm”

After Cooper et al. (2005)
derived from Psuty

Sea-level impacts



Atlantic City: 1.0 m rise
Red/yellow = Atlantis

0.61 m: ~170 km² (1% land area)
1.22 m: ~442 km² (3% land area)

Titus and Richman,
Climate Research,
CR 18:205-228 (2001)