

Exploring the costs of sea level rise: should we focus on 'means' or 'extremes'?

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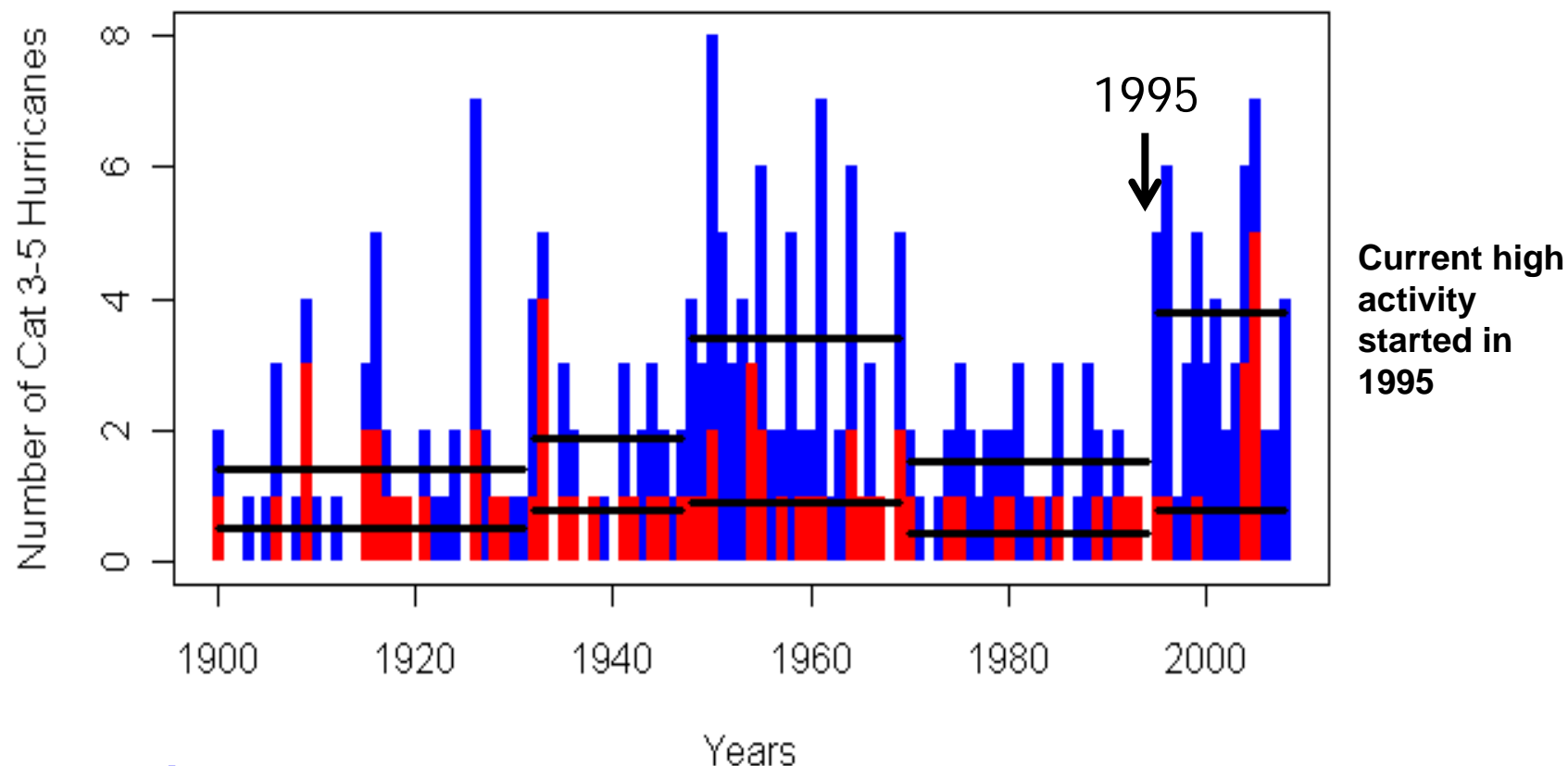
Chief Research Officer, RMS

AAAS
Chicago
Feb 16th 2009



Change Points in Cat 3-5 Hurricane Numbers (the drivers of major coastal storm surges)

Cat 3-5 Hurricanes

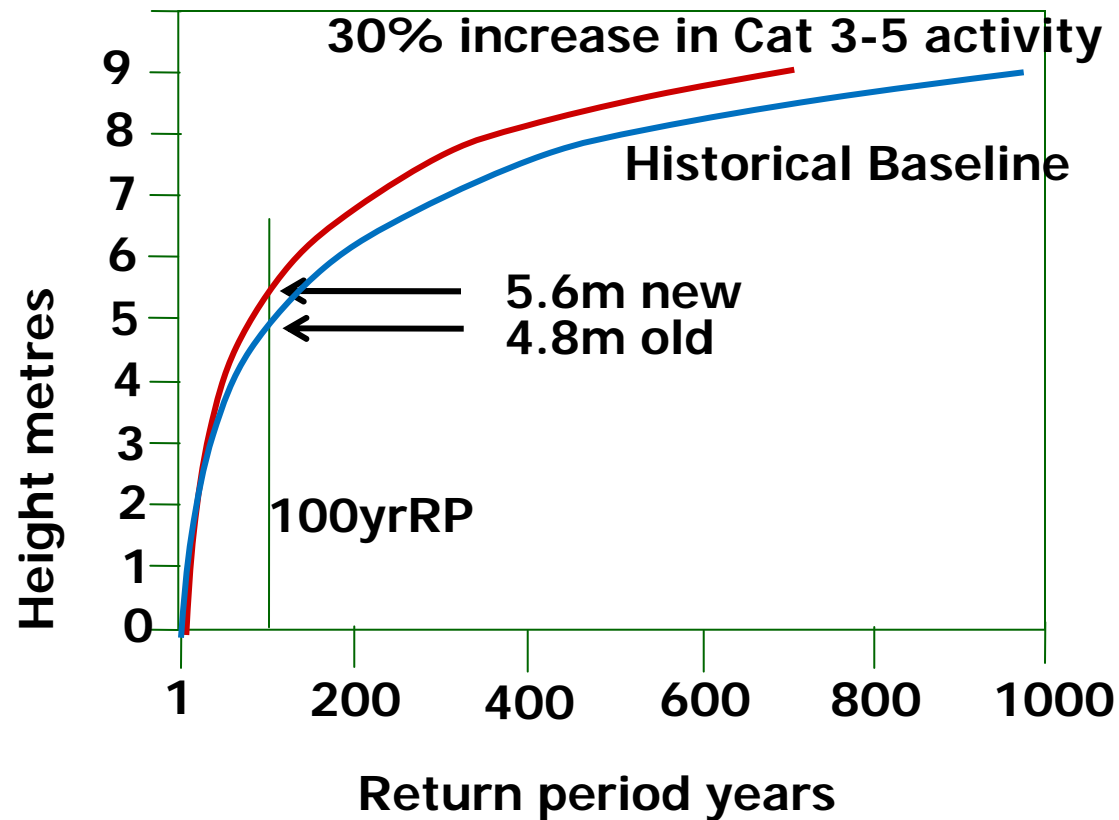


Basin Numbers

Landfall Numbers

Change points from *Jewson and Penzer, 2005*

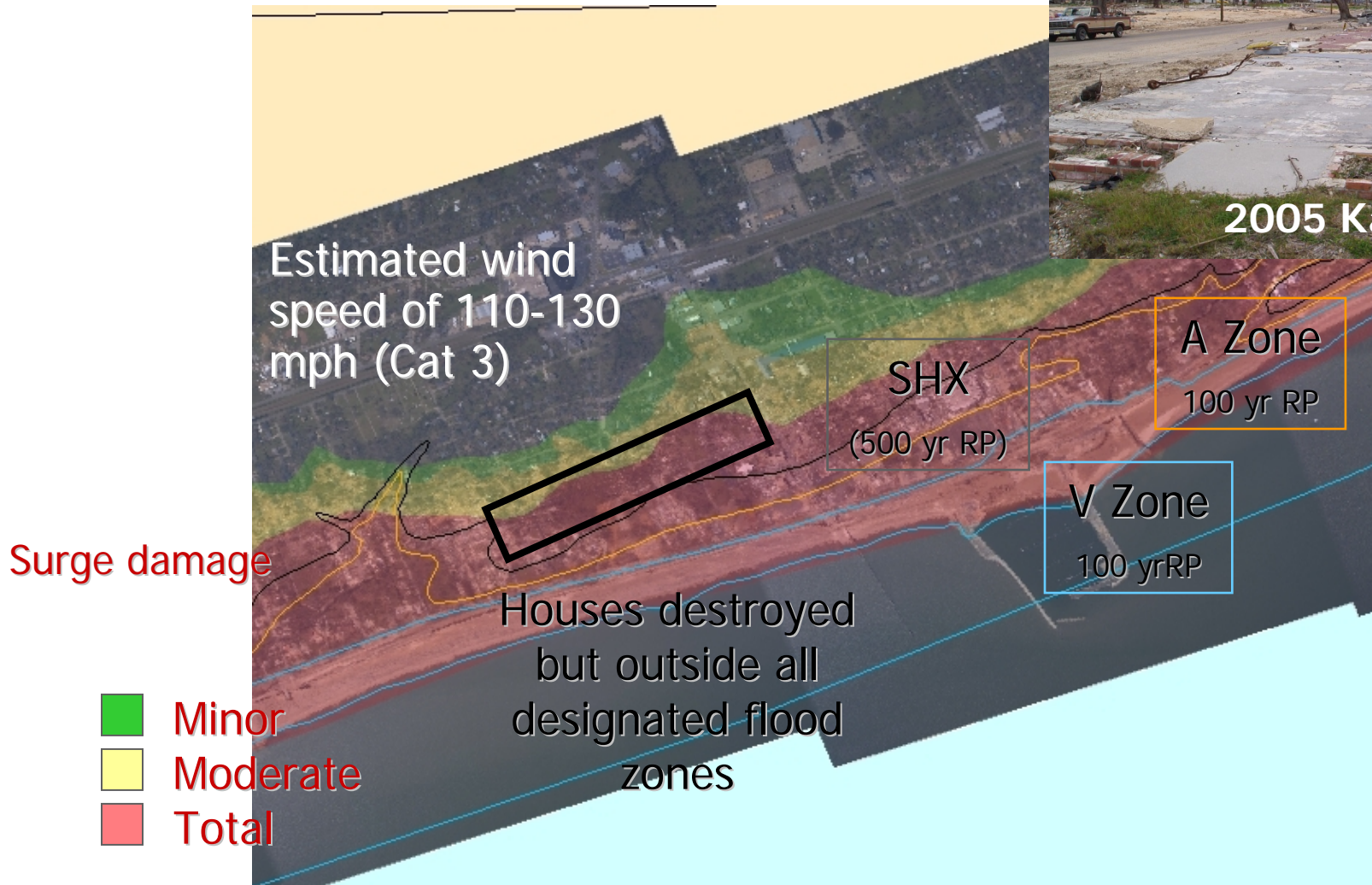
Implications of changes in activity of intense Hurricanes on extreme sea levels



Lessons for flood risk zoning Mississippi Coast

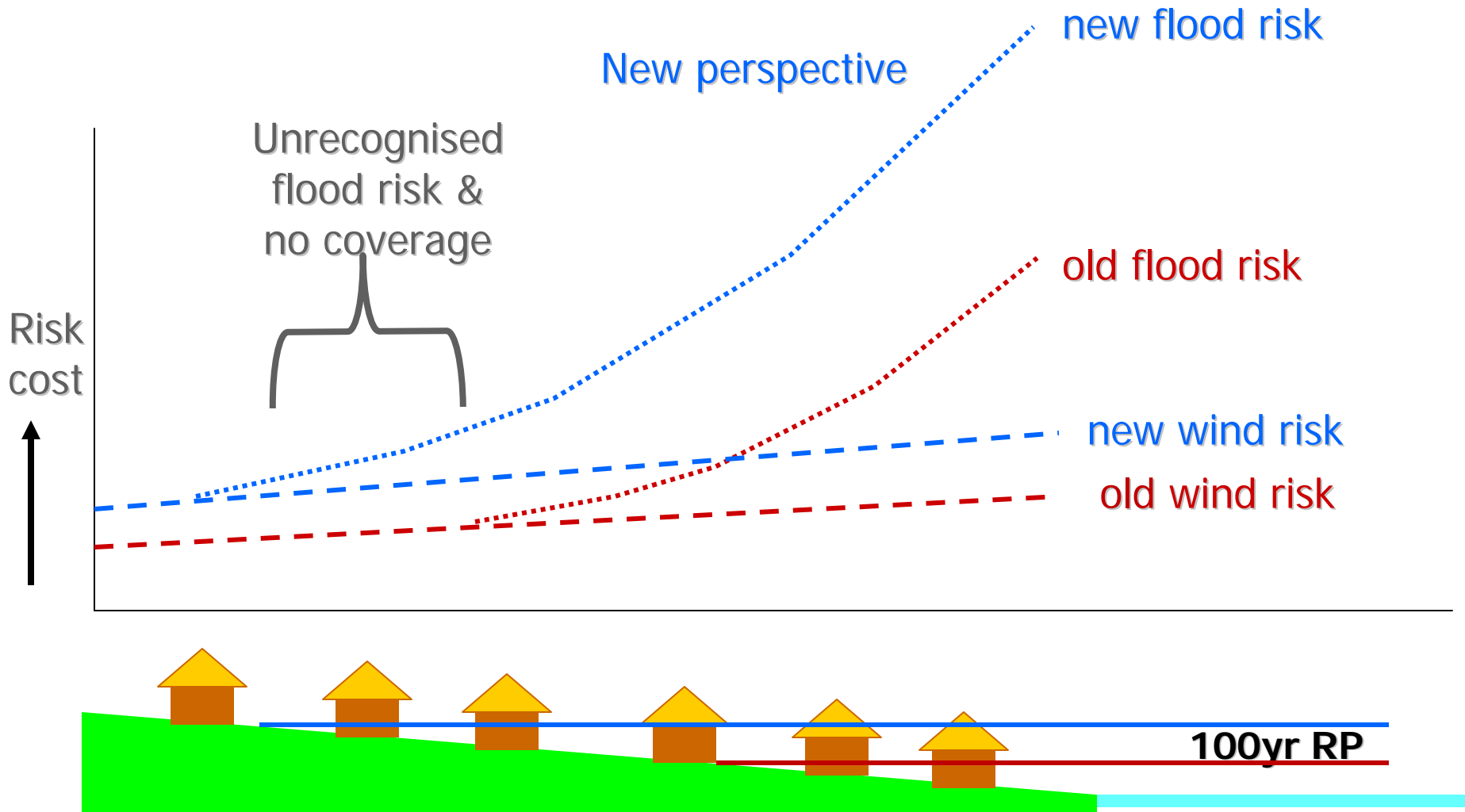


2005 Katrina



Confidential

Implications of an increase in Hurricane activity





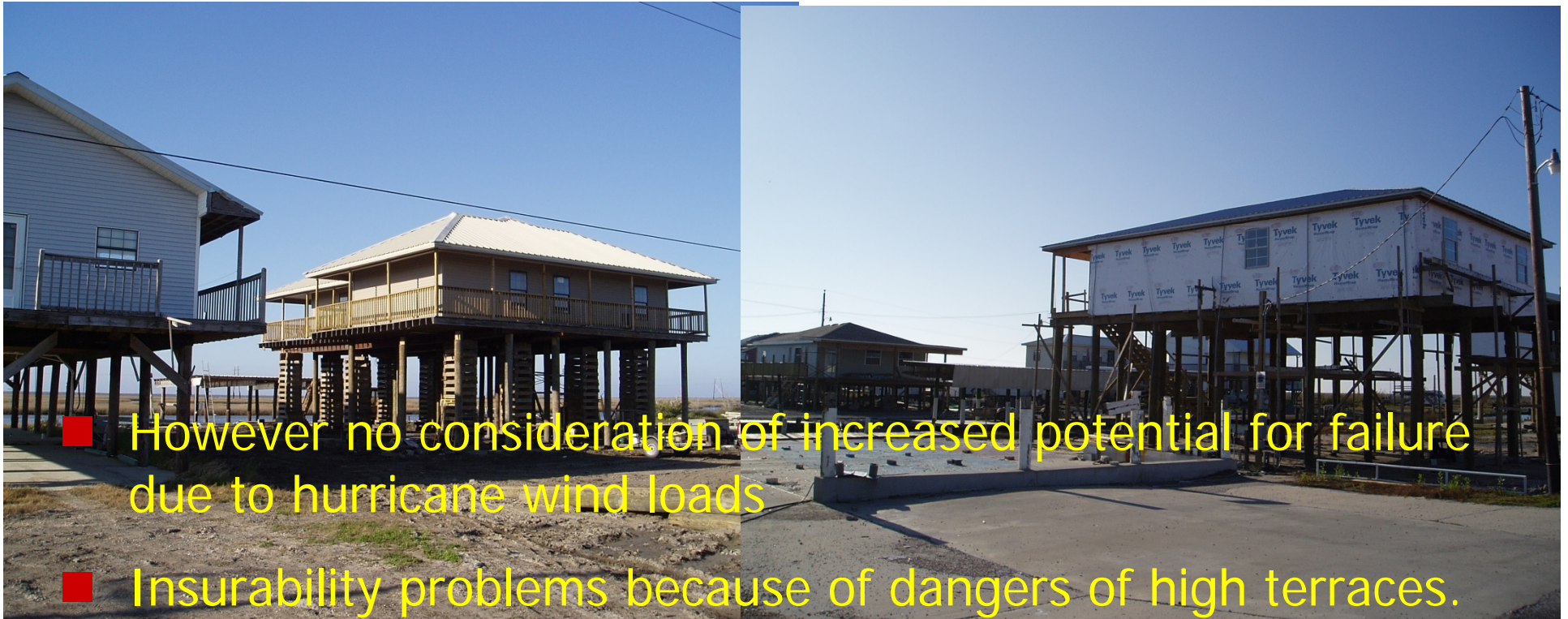
In Hancock County (Mississippi) – Nov 2005 - FEMA has admitted risk 'has increased' in the coastal Flood zone

- new and replacement buildings will need to be sited up to 10 feet higher
- V zone (high velocity flooding) extends to 12 feet higher

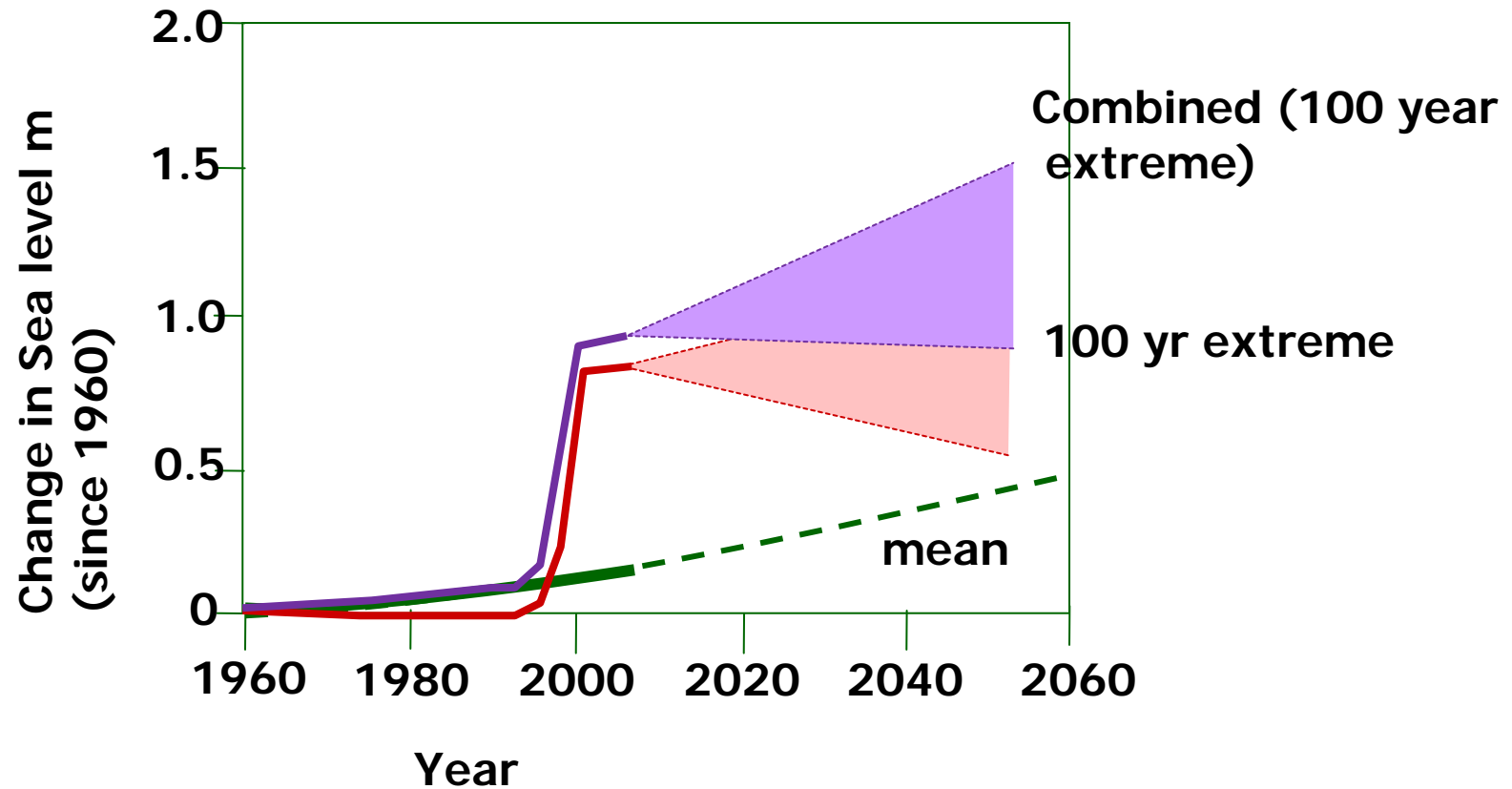
Q. However why haven't flood zones been expanded along all the hurricane coasts? A. Because this is politically unacceptable.

FEMA as a force of adaptation (Grand Isle LA, Feb 07)

- Buildings being raised 1.5m to achieve new FEMA base flood elevation (and therefore be eligible for NFIP)



Rates of sea level rise (US Gulf Coast)



Oil refineries around the Gulf Coast were sited during a period of lower hurricane activity and are very hard to relocate

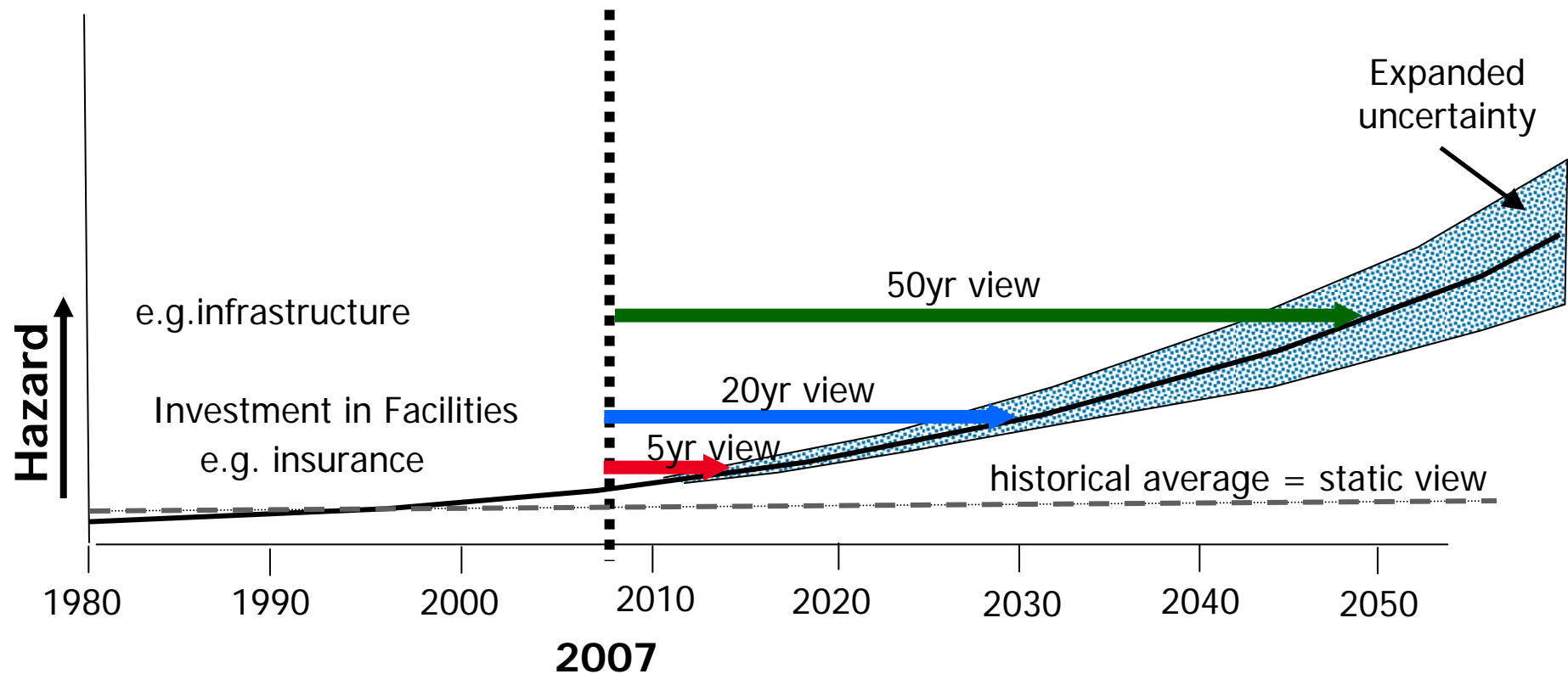


Many Critical assets are located close to sea level

- Le Blayais Nuclear Power Plant on the Gironde estuary SW France, 50km NW of Bordeaux
 - Site protection height of 5.02m
 - Protected by 5.2m dyke in front 4.75m at the side
 - Dec 27th 1999 Surge from Windstorm Martin
 - Reached c 5.3m
-
- Water entered the general gallery at 6-12m³per sec. – total of around 90,000m³ of water – 0.3m deep
 - Inundated and disabled the essential service water pumps to Unit 1
 - Level 2 onsite emergency Plan put into operation. Reactors all shut down.
 - Rising sea levels and storm surge heights will be an increasing problem for coastal Nuclear Power Plants.



Implications of changing hazards on investment horizon

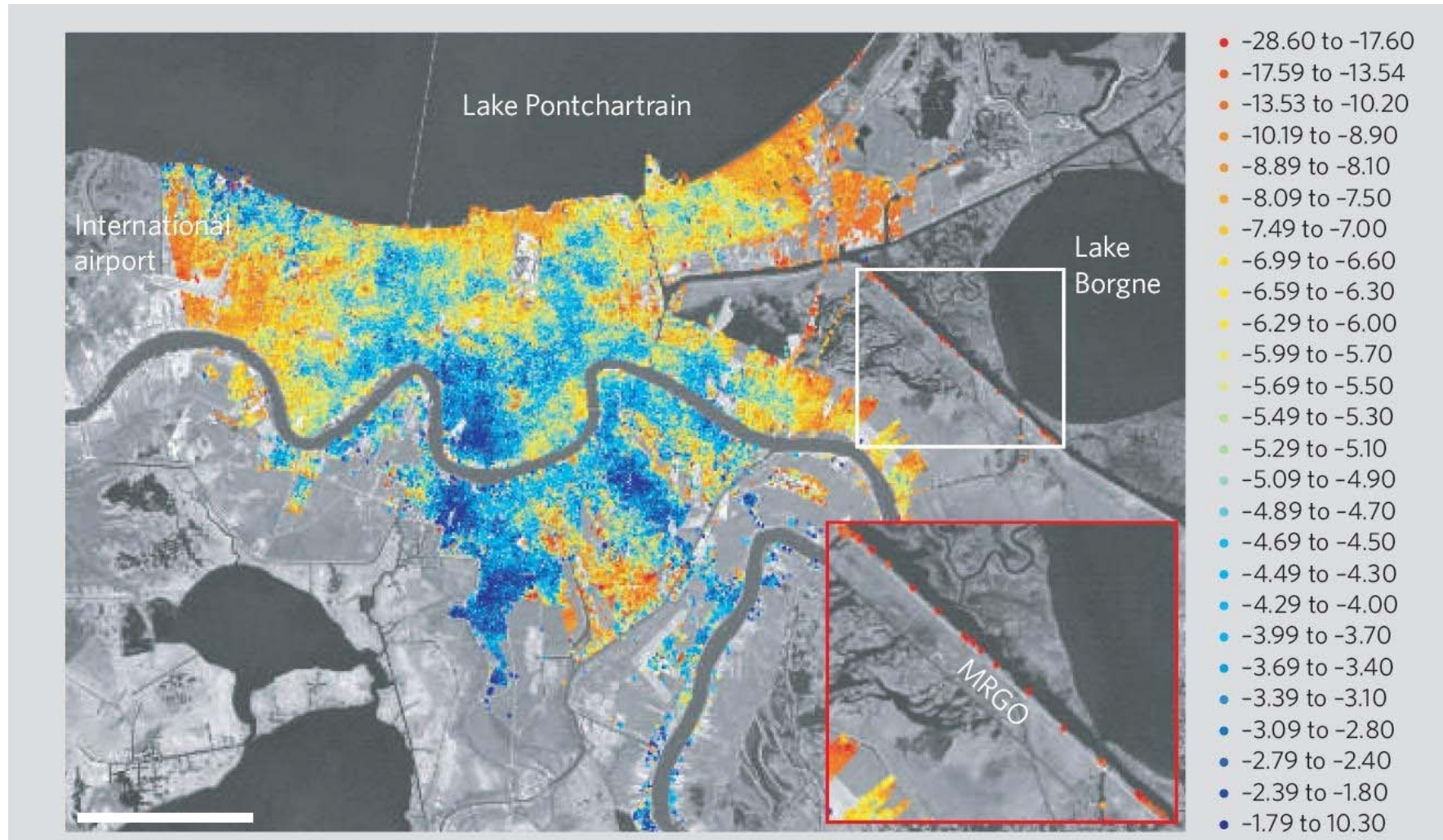


Each horizon gives a different perspective

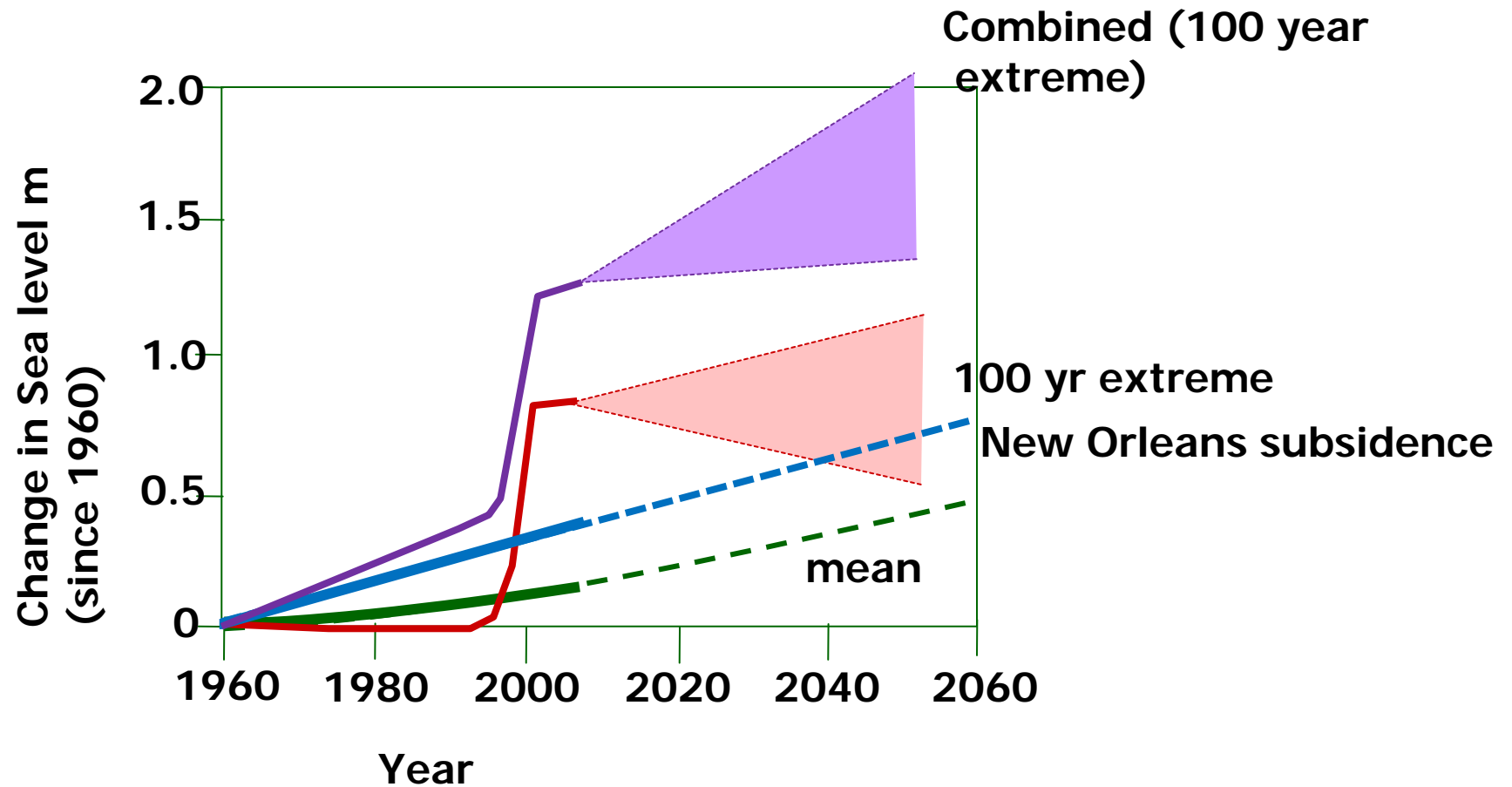
The future of New Orleans



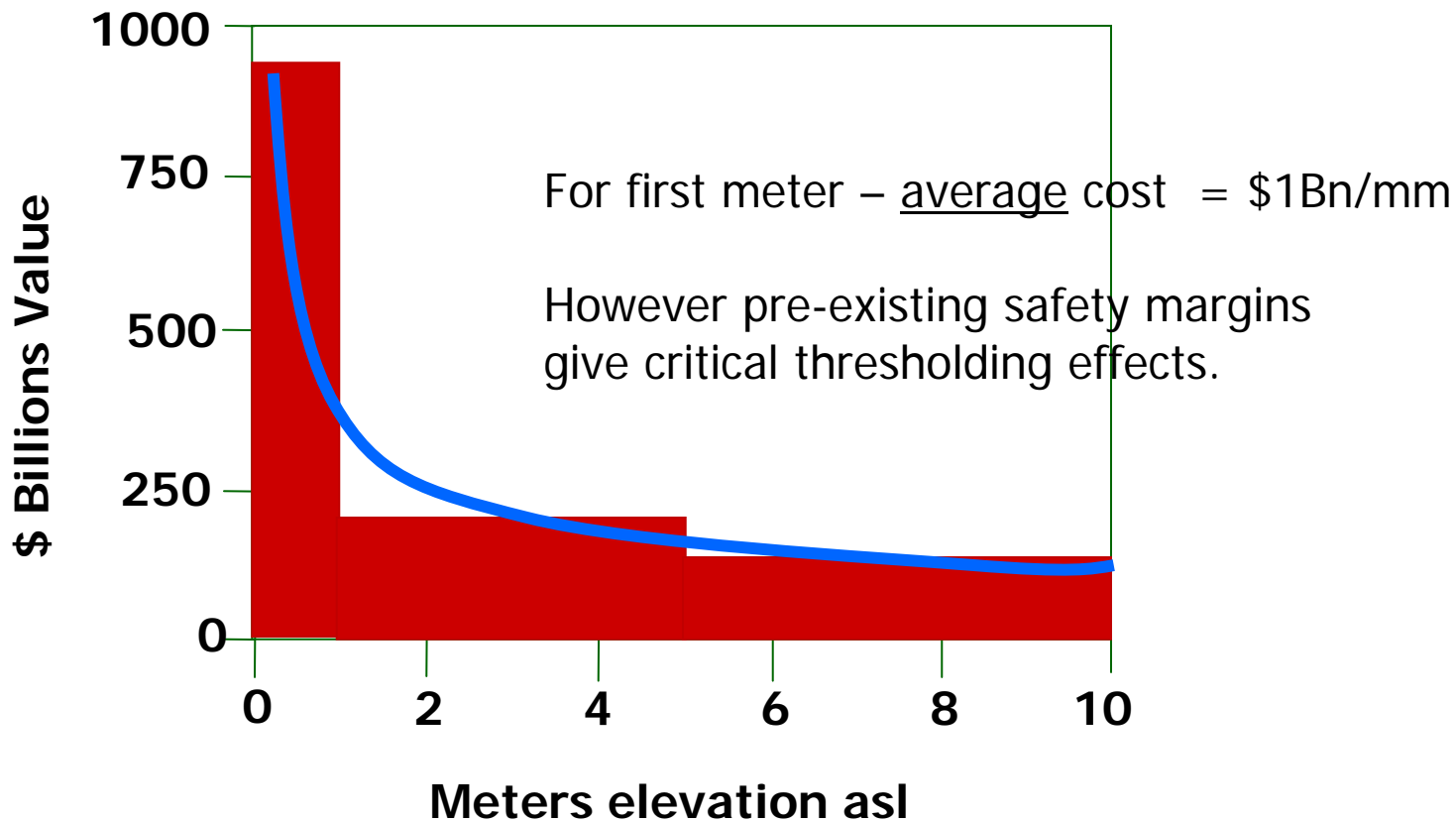
Subsidence from radar interferometry



Rates of sea level rise (New Orleans)

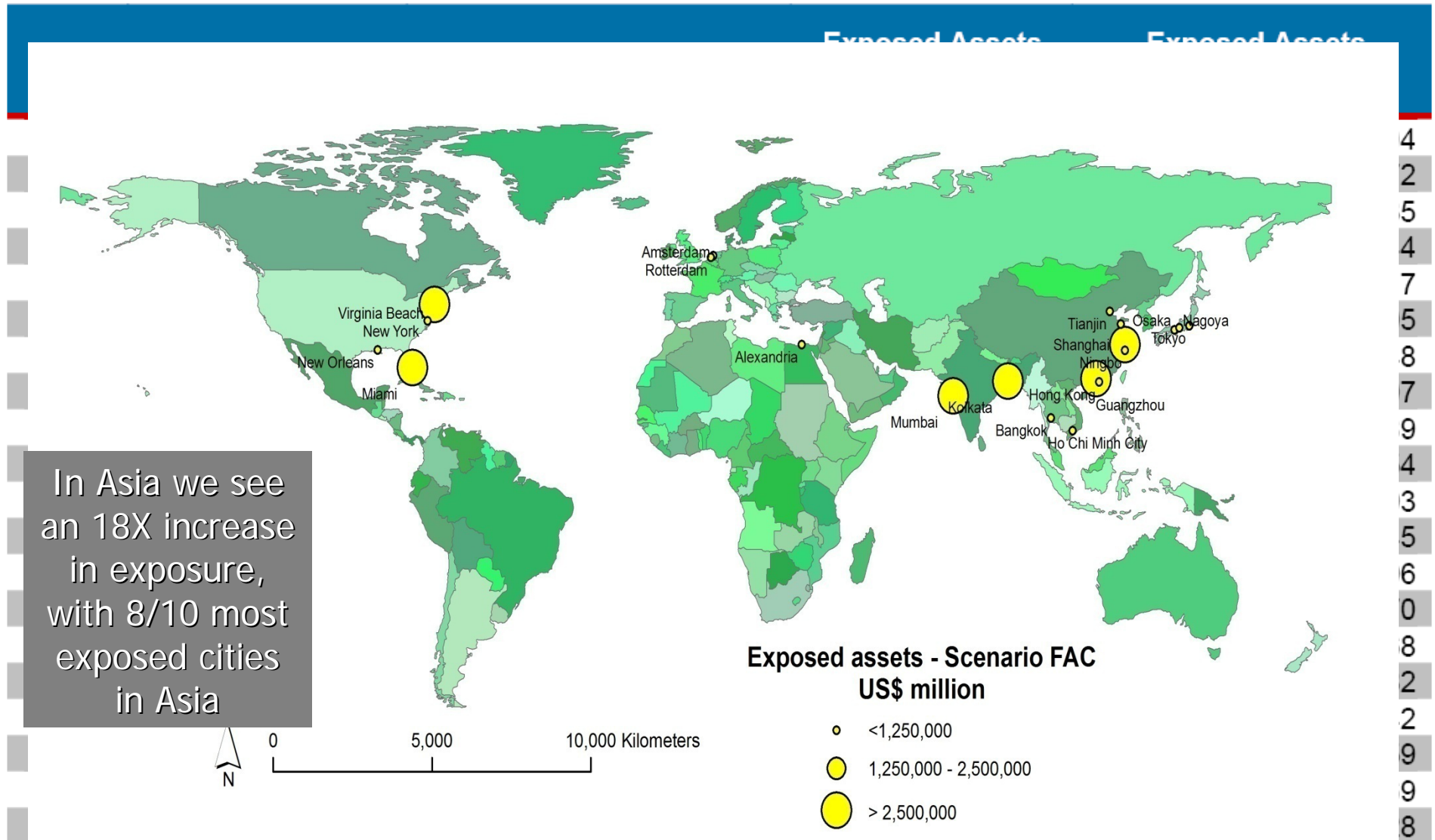


The PDF of global exposure value by elevation



Reconstructed from Anthoff et al., (2006)

Top 20 Cities for 'Exposed Assets' by 2070s



Retreat as a form of Adaptation



Dauphin Island, Alabama
(hit by Ivan, Dennis & Katrina)