

Miami–Dade & Sea Level Rise

- Facts v Myths
- ‘Big Picture’ clarity
- Certainties and uncertainties
- Challenges and Opportunities

Dade County Sea Level Rise Task Force 3–19–14

© John Englander

Not a Future Problem

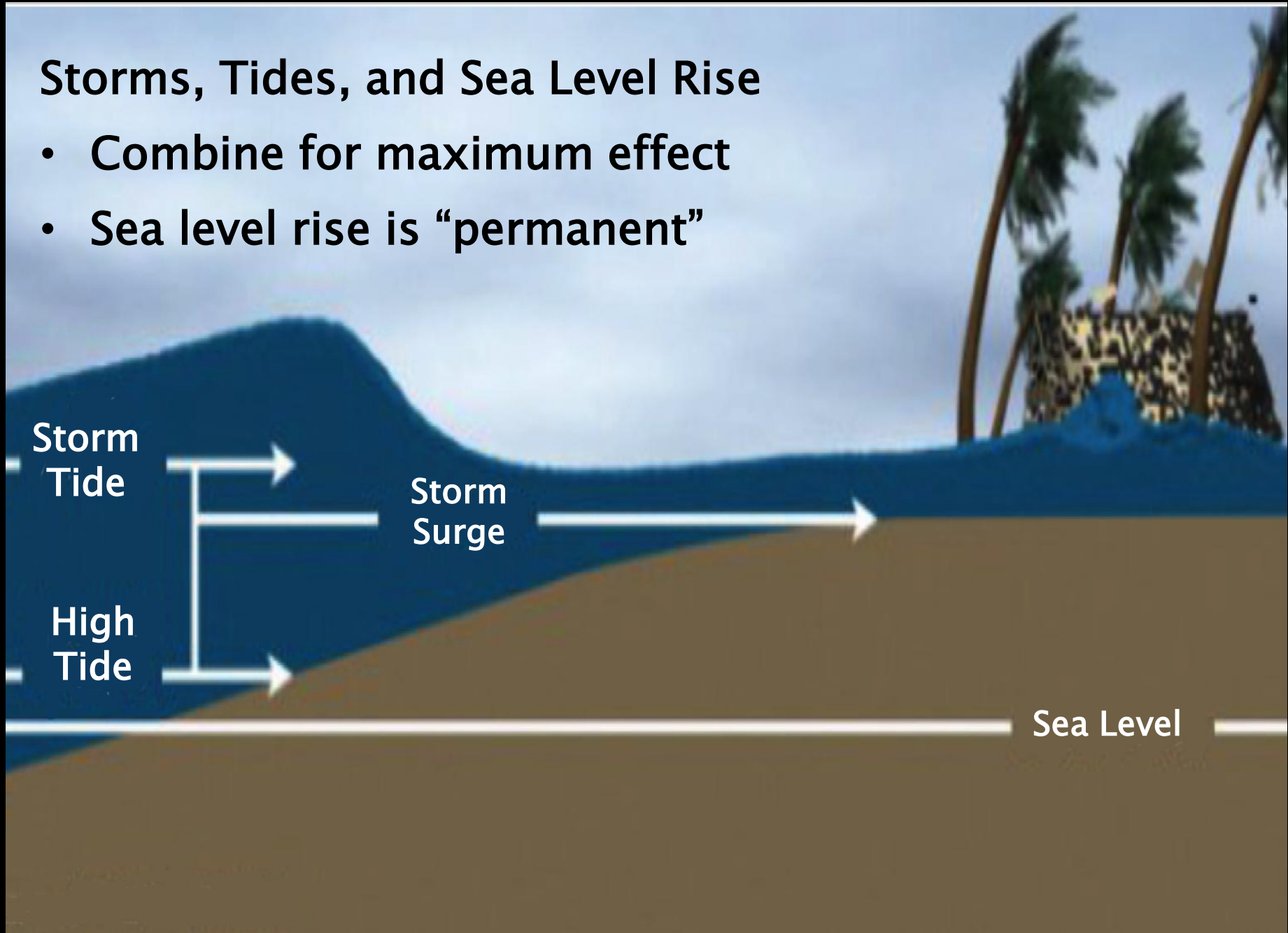
High Tide on Alton Road

saltwater on the streets
every month at peak tide



Storms, Tides, and Sea Level Rise

- Combine for maximum effect
- Sea level rise is “permanent”





New Jersey - October 29, 2012

- Storm Surge
- Moderate Extreme Tide
- Topographic Amplification
- Minor subsidence
- Global ocean redistribution
- Rising Sea Level – EARLY stage









Rising Seas & Shifting Shorelines

John Englander

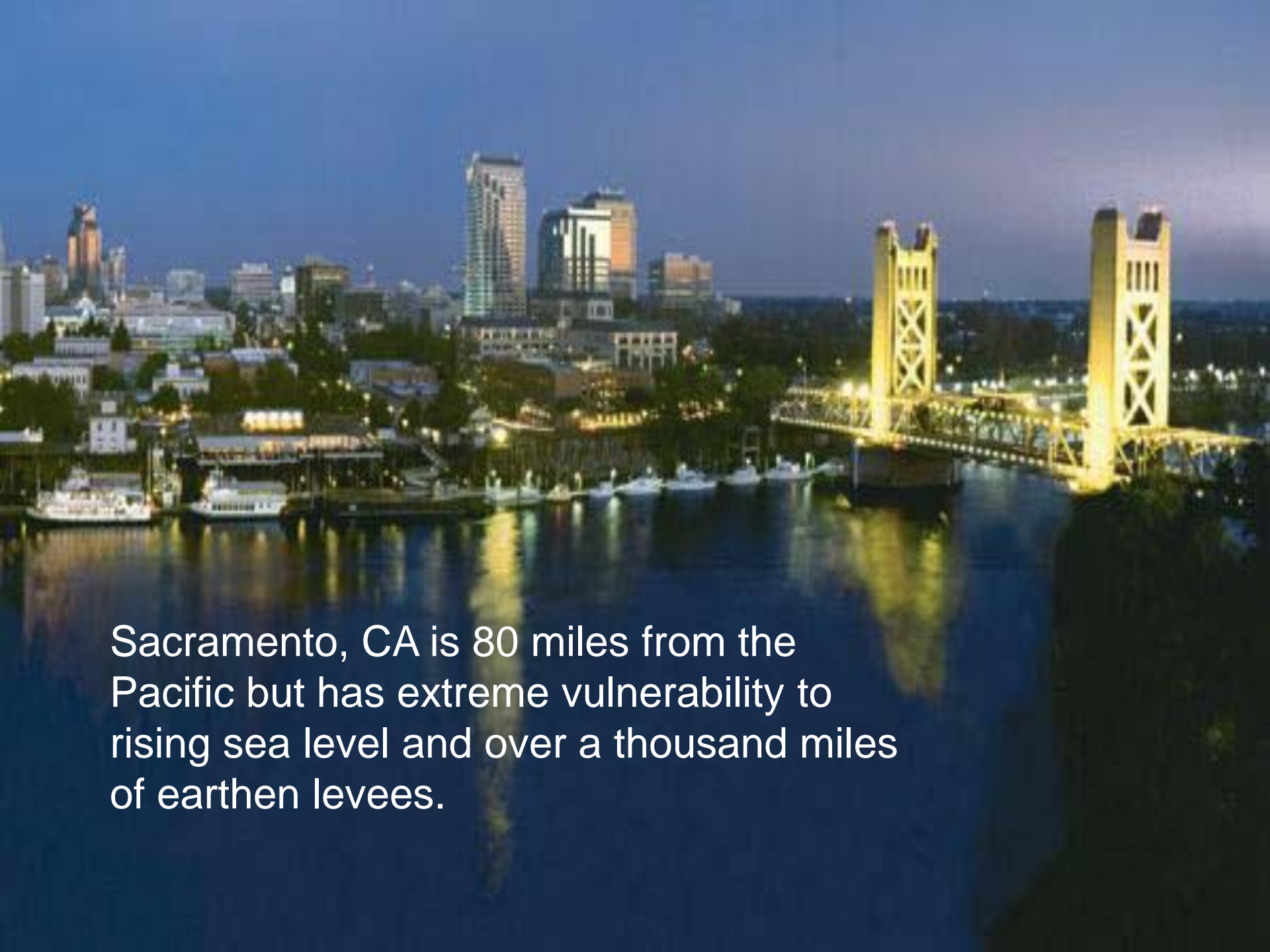
@ Google HQ

2-13-14









Sacramento, CA is 80 miles from the Pacific but has extreme vulnerability to rising sea level and over a thousand miles of earthen levees.



Myths about sea level rise (“SLR”)

1. Melting polar ice cap (North) big factor
2. “Being green” & sustainable can stop SLR
3. Technology could stop all sea level rise
4. Sea walls can protect south Florida
5. “Just a natural cycle”; humans no effect
6. Similar to storm surge and extreme tides





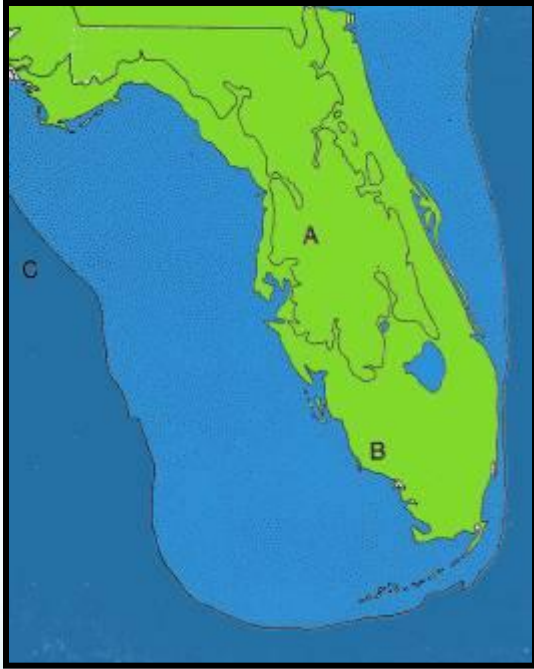


Sea level facts

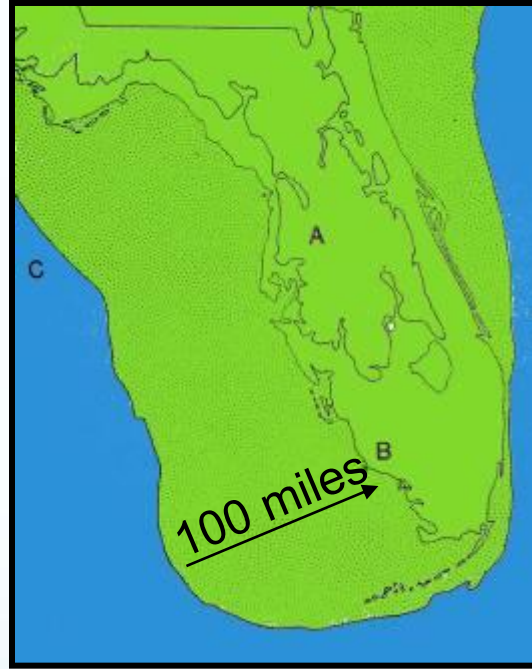
1. SL reflects long-term temperature and ice.
2. Changed little in 6,000 years.
3. 100,000 year natural cycle (the ice ages) moves SL approx. 350 feet up & down
4. Now moving slowly up; will continue for centuries, eventually rising ten feet and more.
5. We have not just accelerated, but have now changed the direction of the natural cycle.

FLORIDA THROUGH TIME

Today

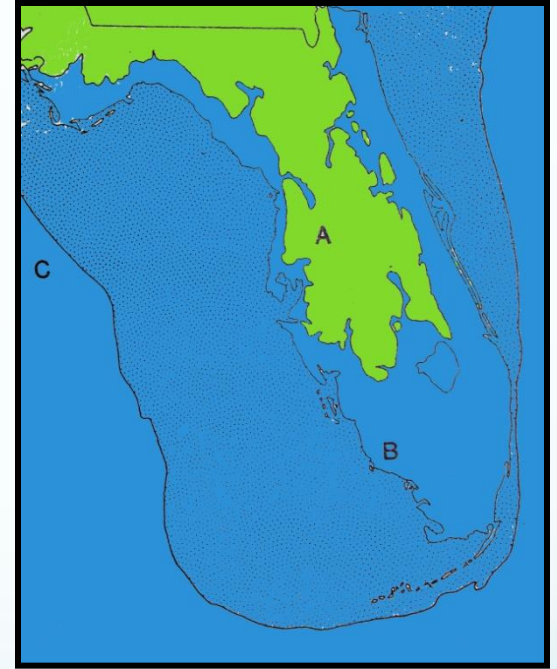


18,000 yrs ago



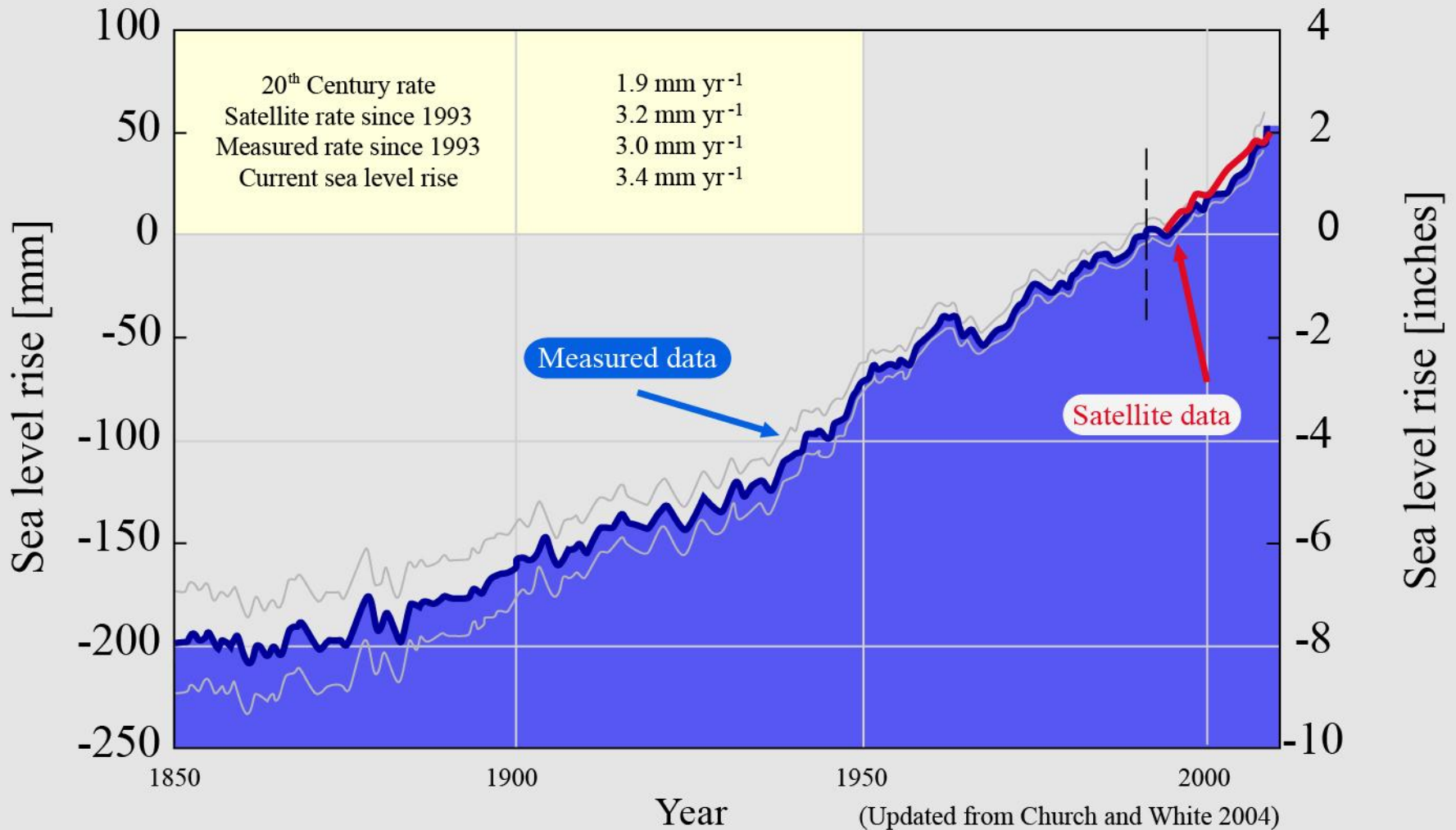
- 120 meters (- 390')

120,000 yrs ago

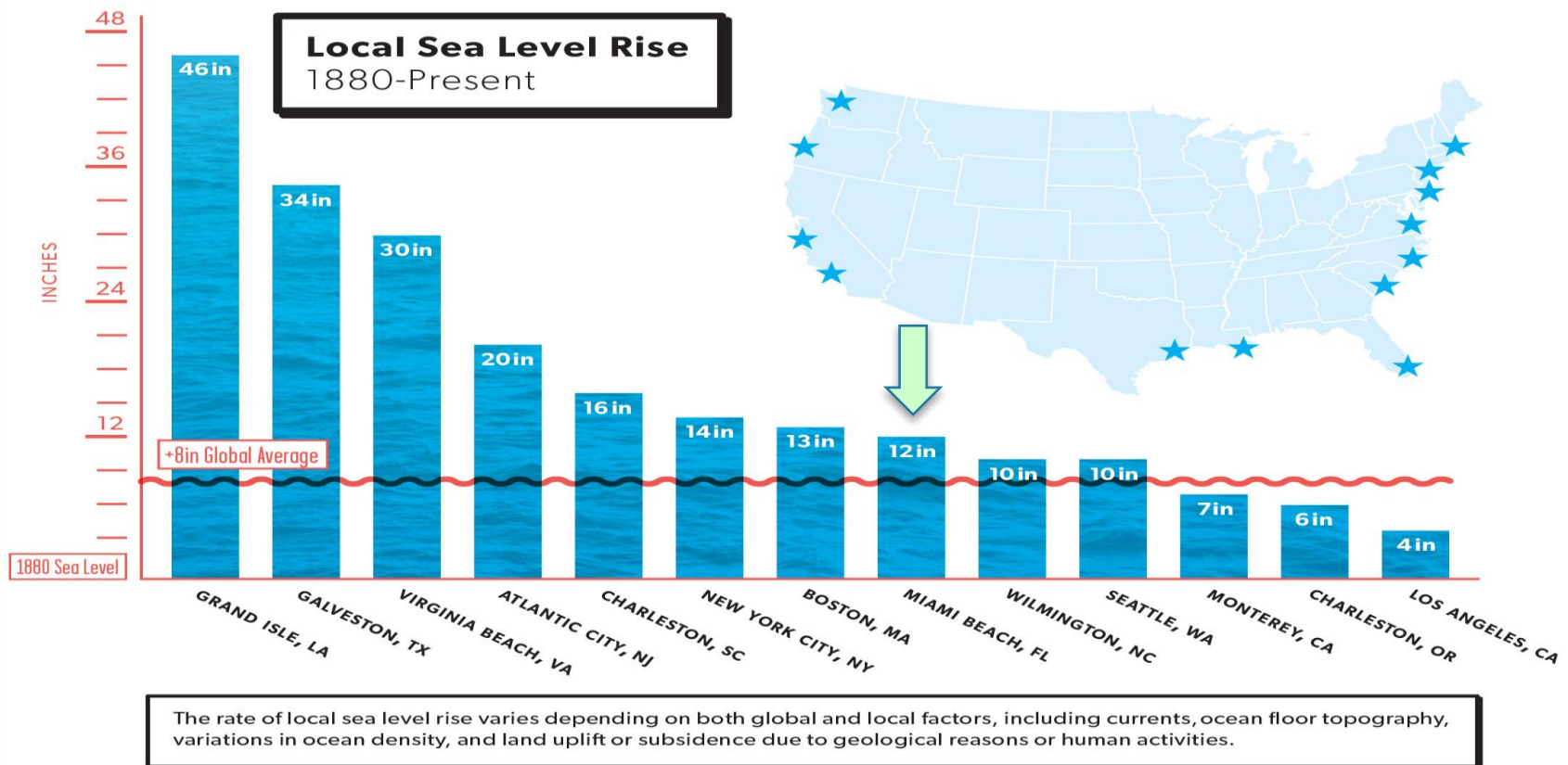


+ 8 meters (+ 25')

Sea Level Rise: 20th Century



Global average sea level has increased 8 inches since 1880. Sea levels along the U.S. East Coast and Gulf of Mexico are rising **much faster**.



Sea level – primary factors

- Amount of Ice frozen ***on land***
 - Natural Cycles, e.g. Ice Ages
 - Warming beyond cycles
- Thermal expansion of seawater
- Land uplift / subsidence
- Currents, e.g. Gulf Stream

- Soil retention, dams, groundwater

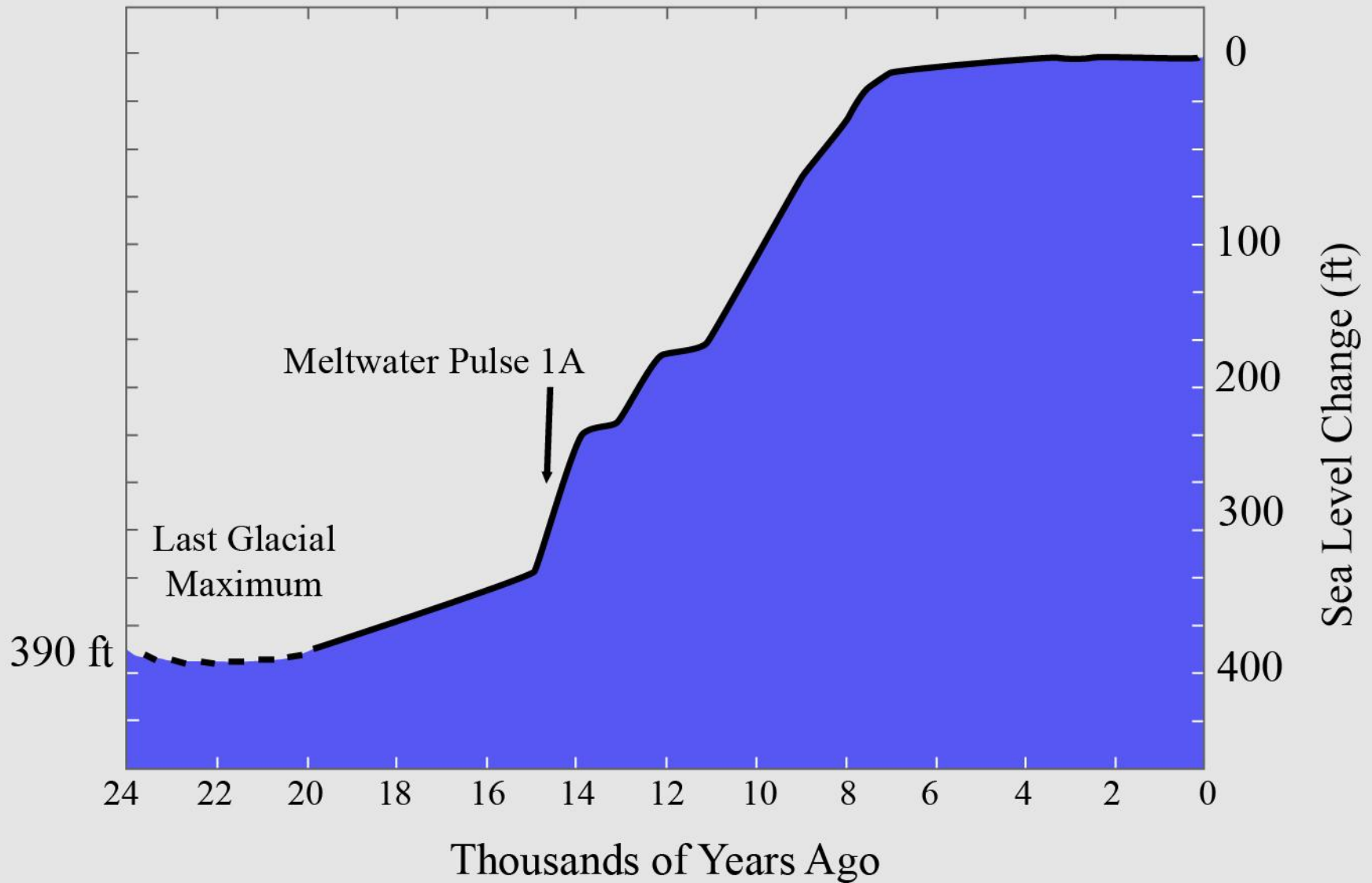


ICE AGE: THE MELTDOWN

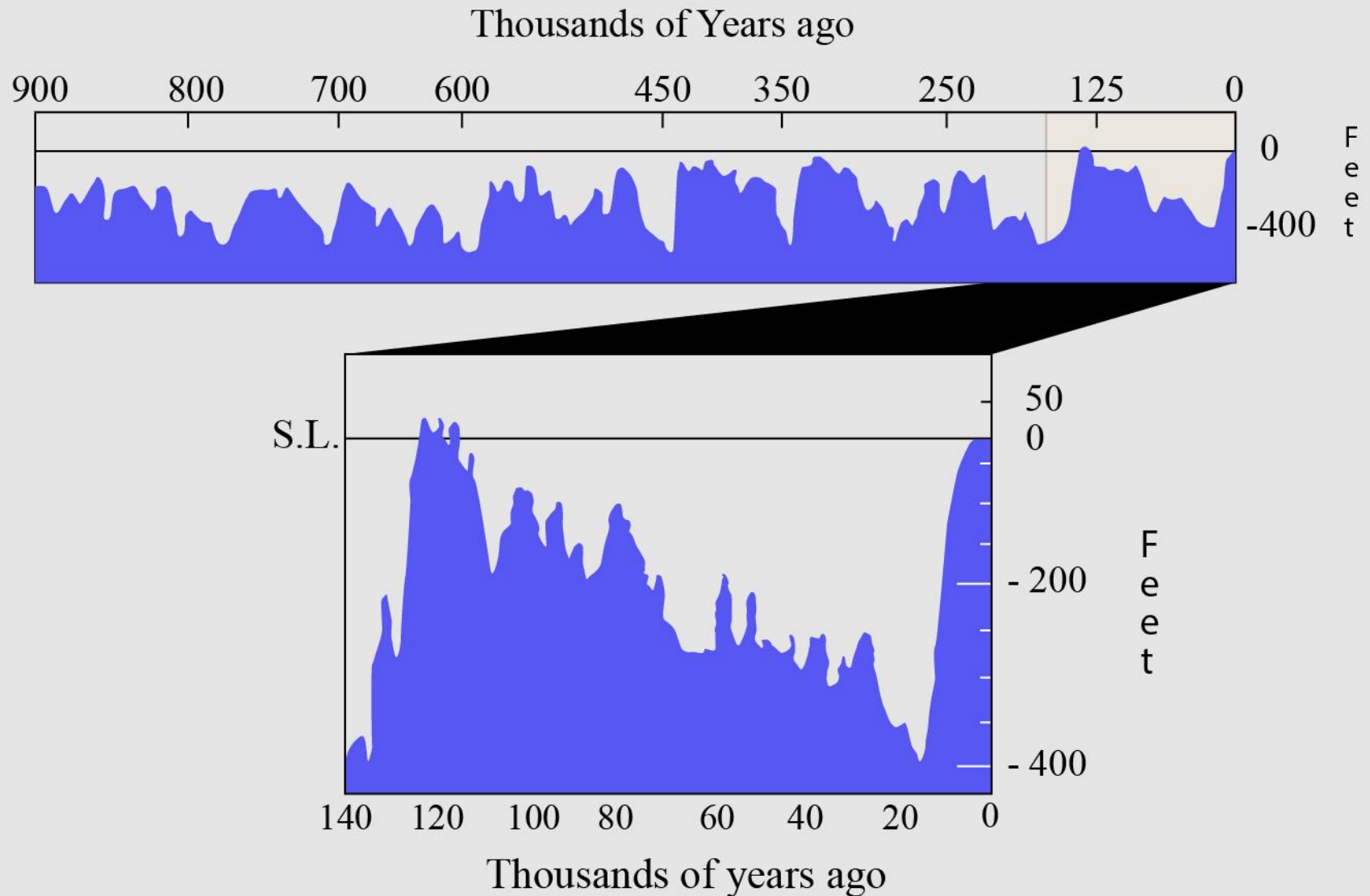
ICE AGE

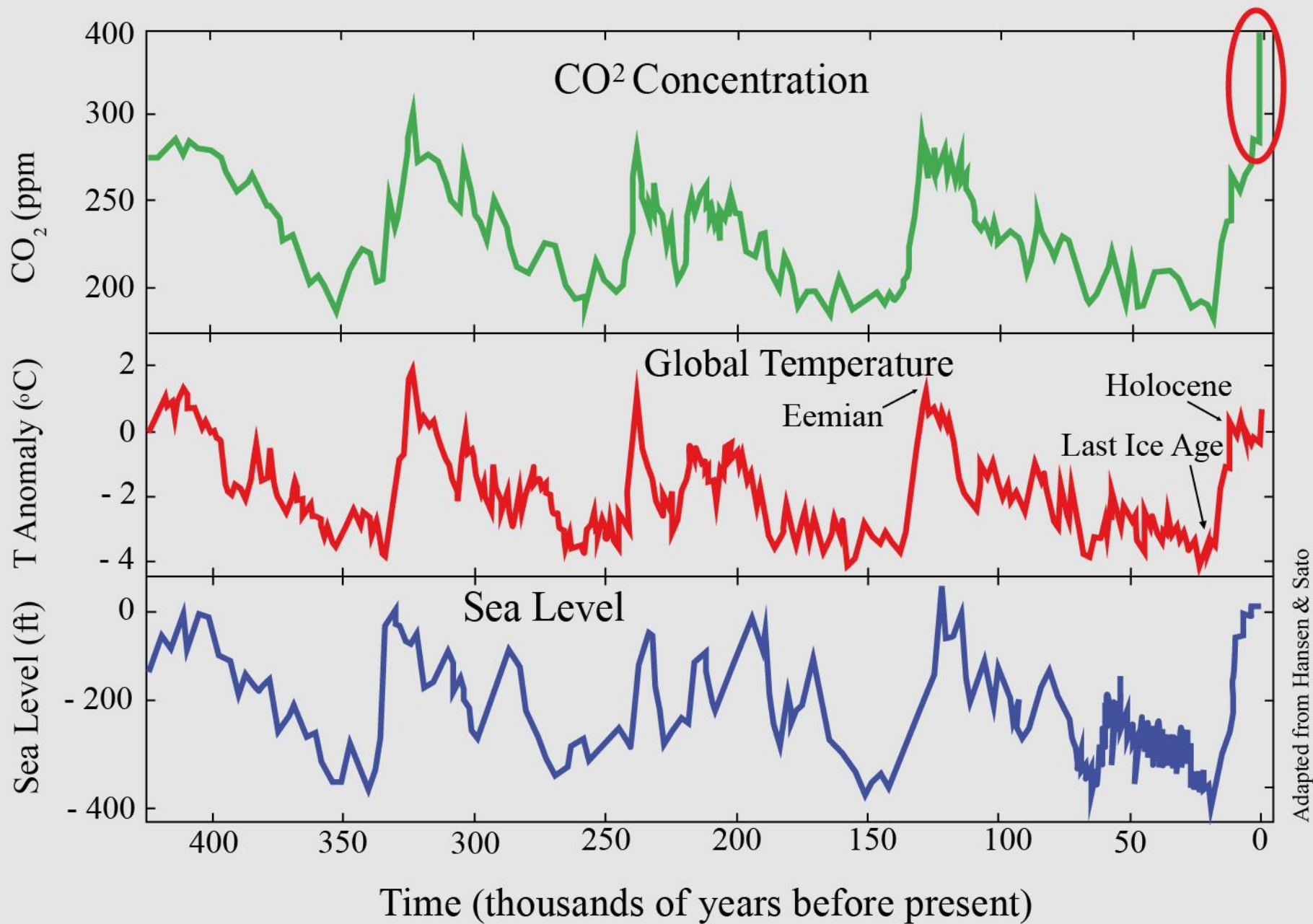
THE MELTDOWN

Post-Glacial Sea Level Rise

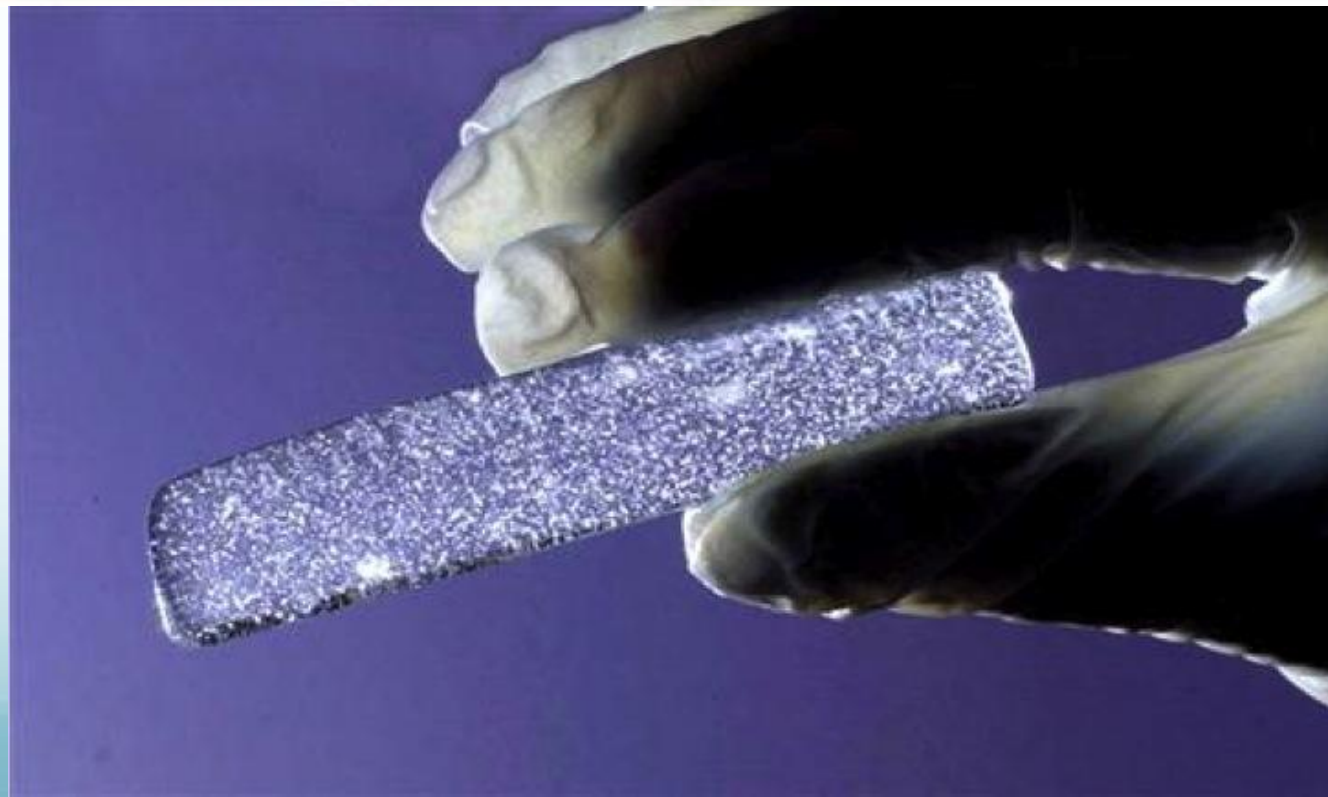
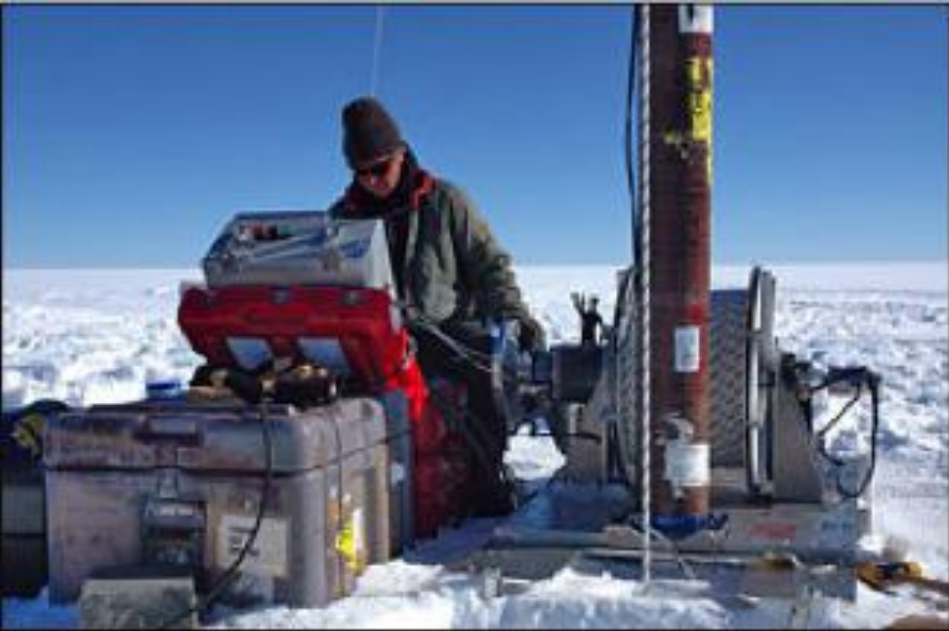


900,000 Year Sea Level Record

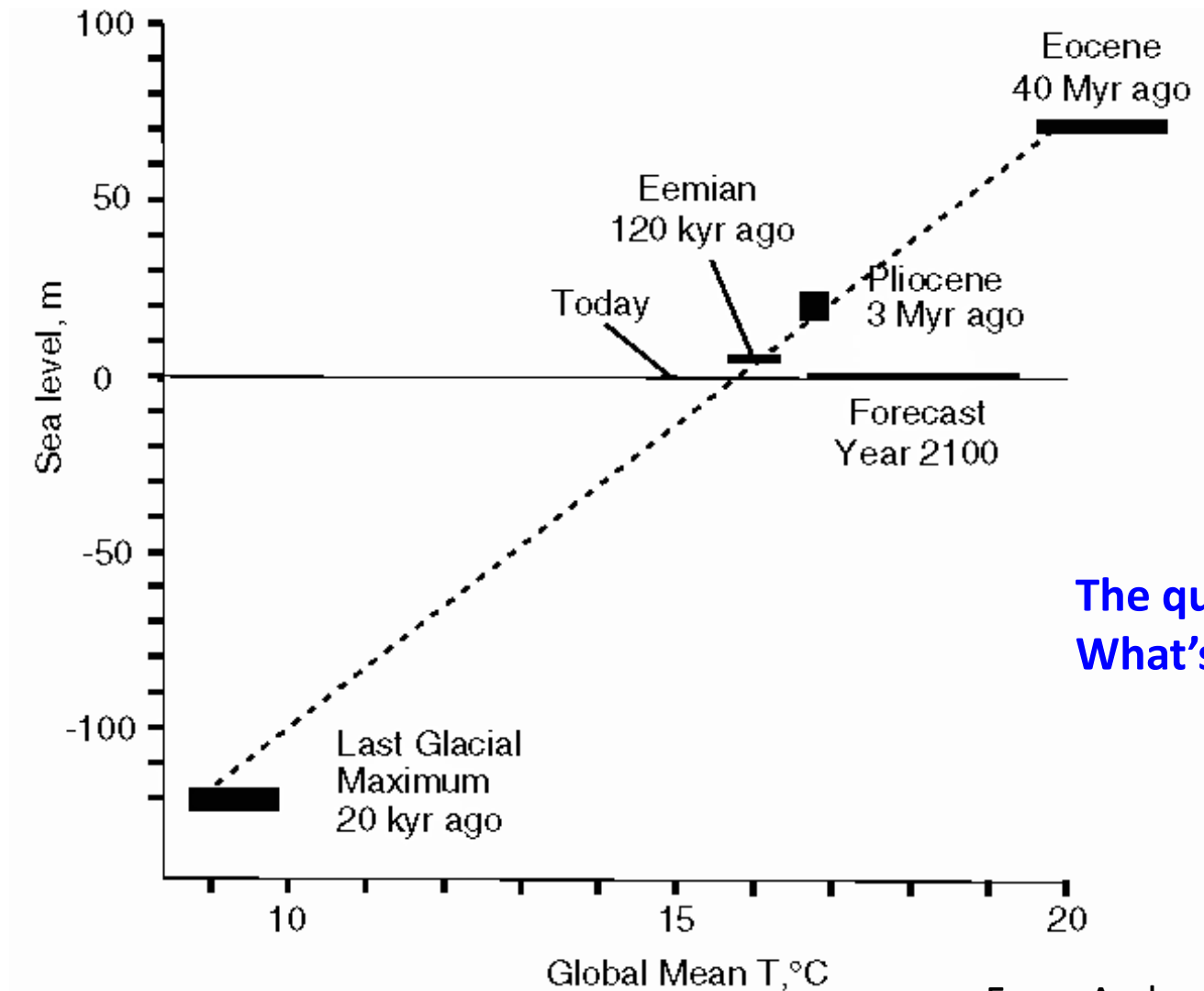




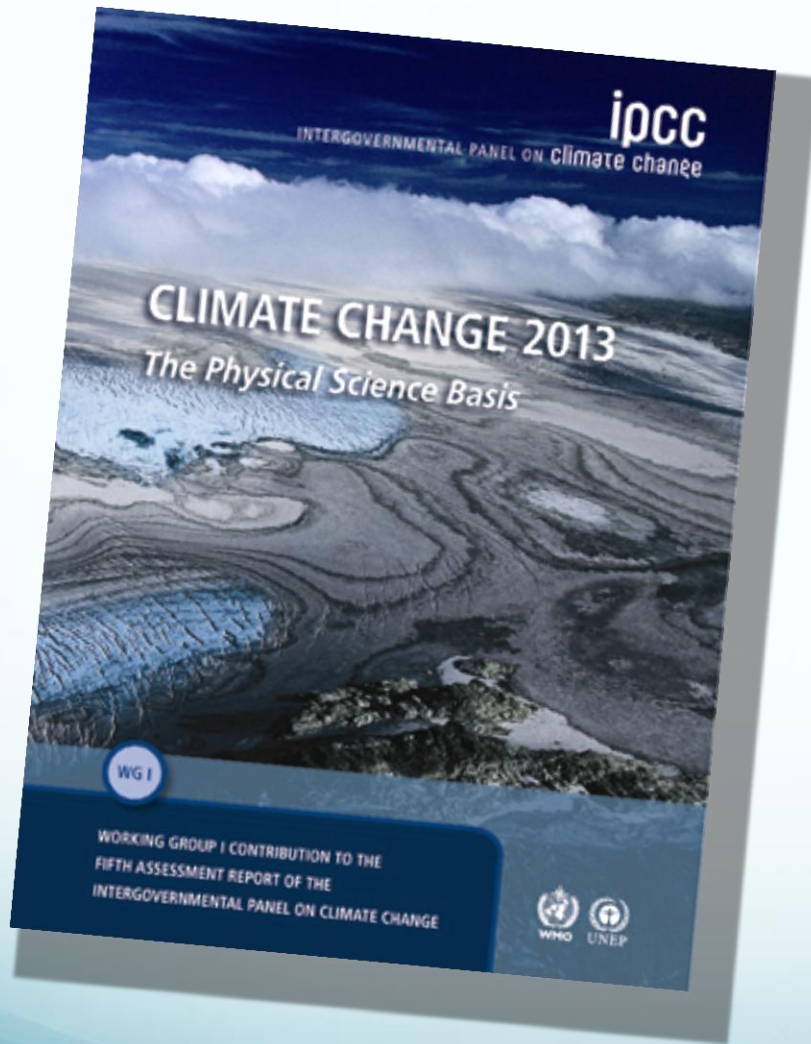
Adapted from Hansen & Sato



The very long term correlation of sea level and global average temperature



The question is:
What's the lag time?

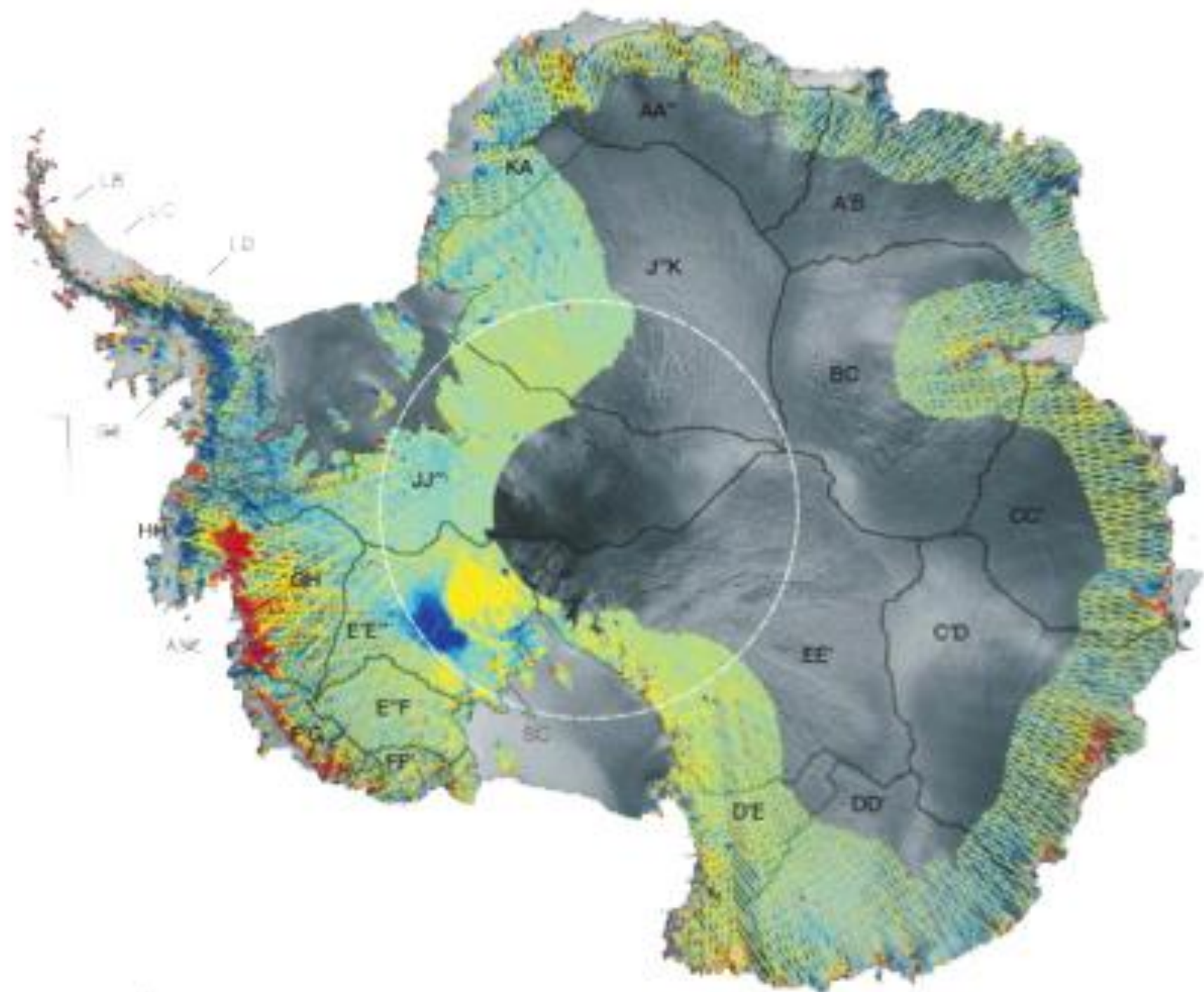


By 2100,
new IPCC Projections:

“10 – 32 Inches of SLR”

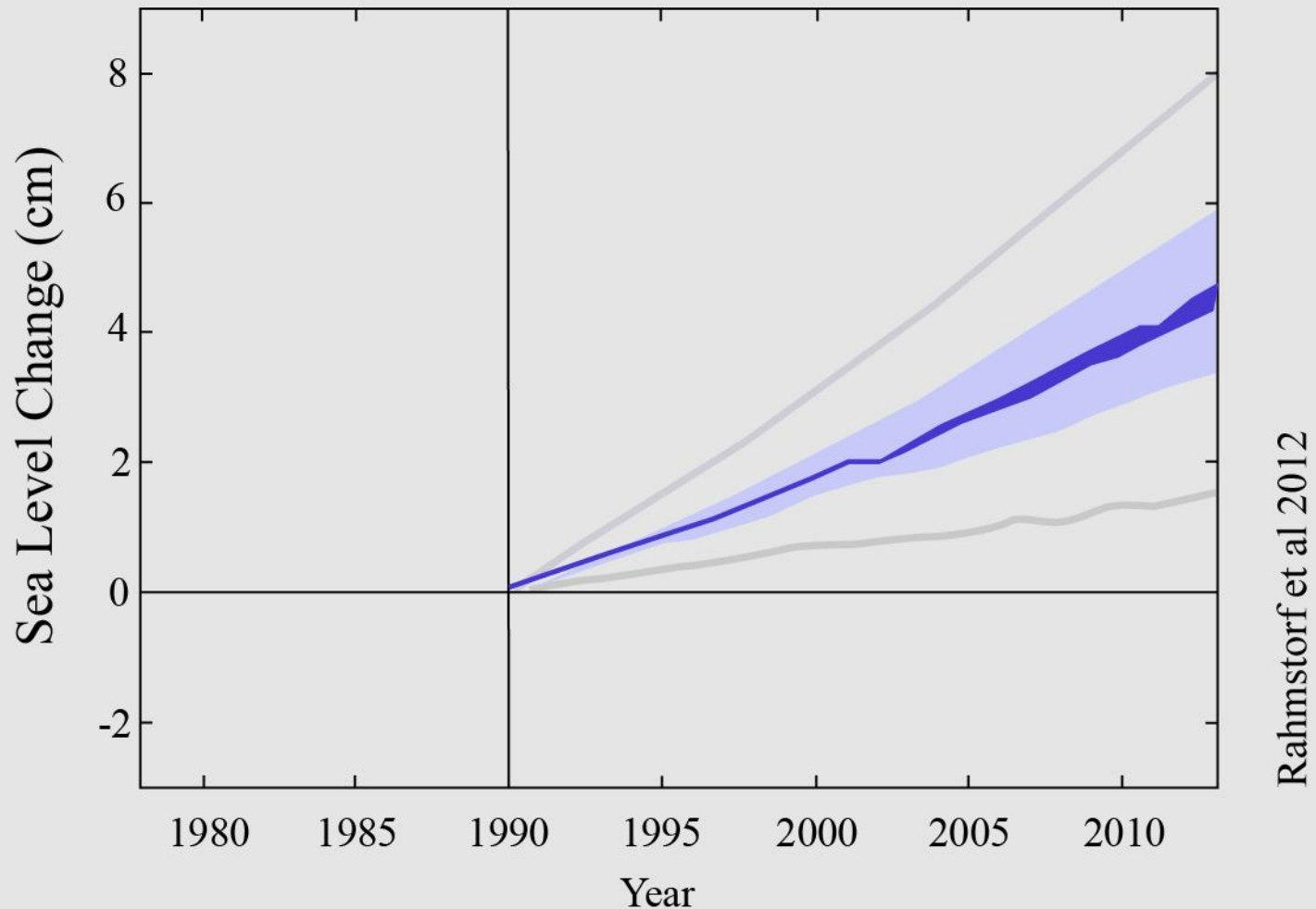
#’s do not include the
“wild card” amplifiers:

- Methane
- West Antarctic glaciers



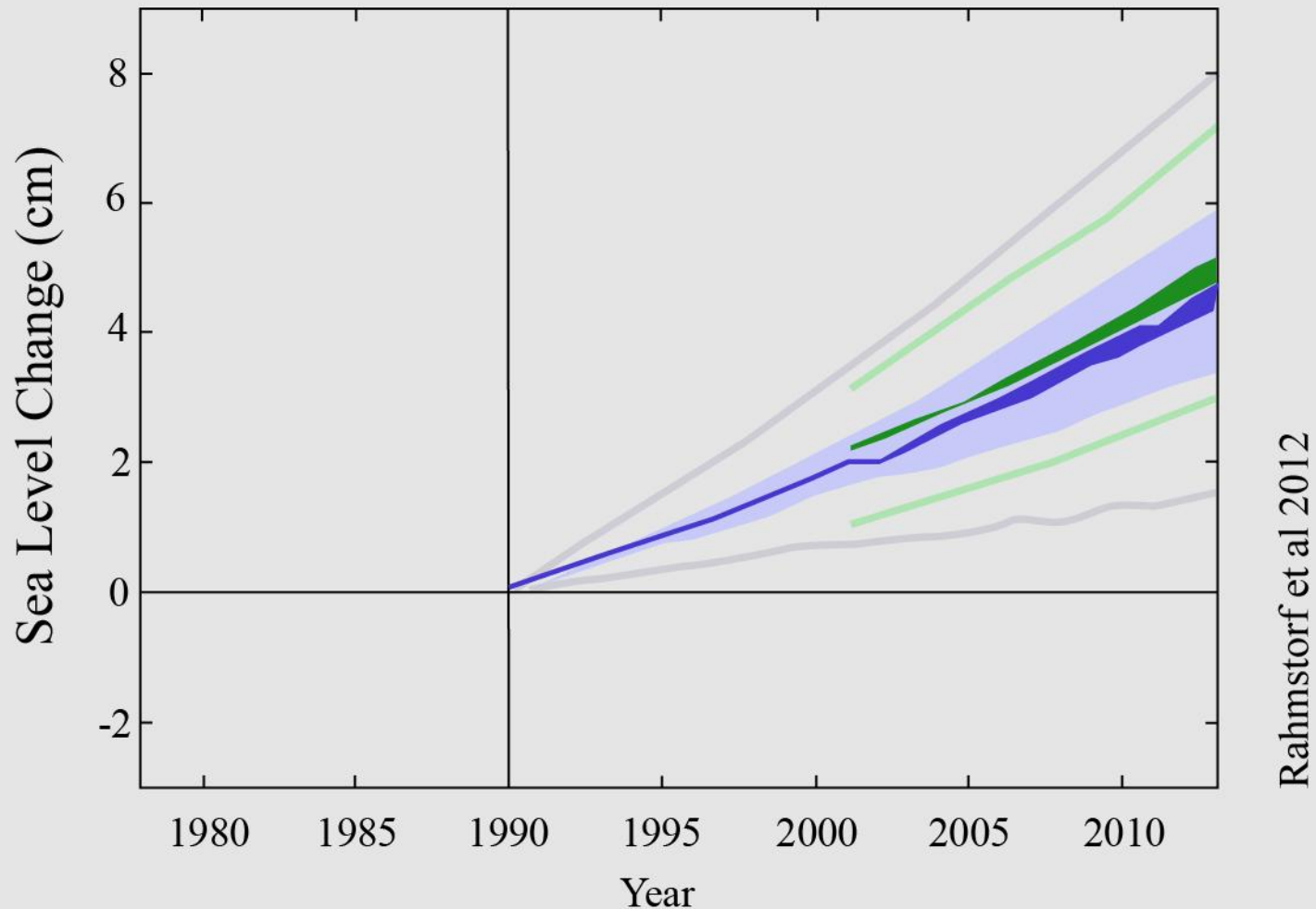


Actual SL Exceeding Projections



Blue – 1990 Projections

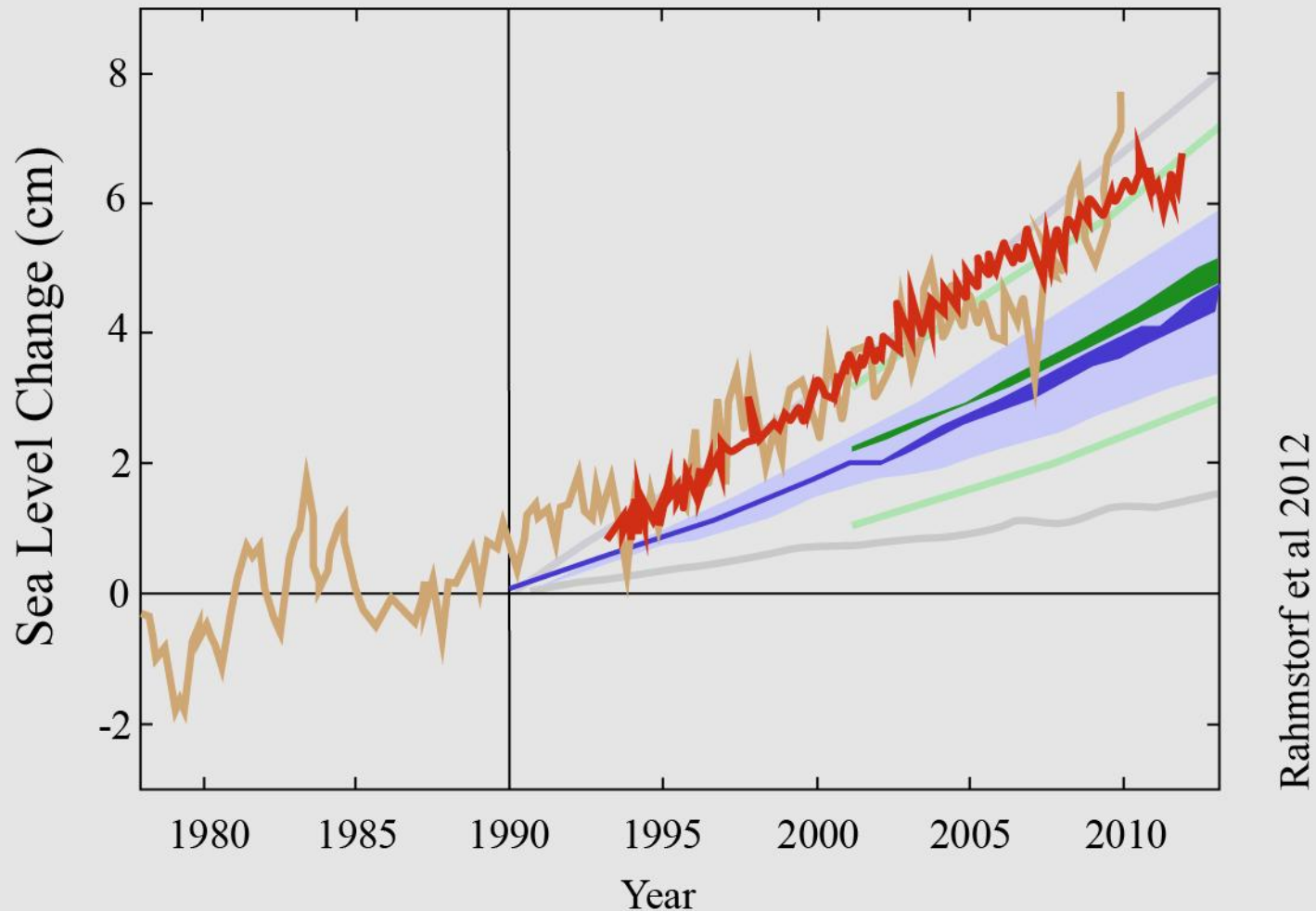
Actual SL Exceeding Projections



Blue – 1990 Projections

Green – 2002 Projections

Actual SL Exceeding Projections



Blue – 1990 Projections

Gold – Actual Sea level

Green – 2002 Projections

Red - SL with trend line smoothing

**How high will
sea level rise
in 30 years?**





Takeaways

- 1. Storms + tides + SLR = vulnerability now**
- 2. After years of stability, SL is rising and will continue for centuries**
- 3. We can slow SLR, but not stop it**
- 4. Inches matter**
- 5. Know your risk; plan and adapt**
- 6. Plan for 3 ft, - official estimates are low**

the silver lining

- 1. Provides decades of notice**
- 2. We do best when challenged**
- 3. Could transform our priorities**

Time to think of future generations.



My recommendations

1. Inform. Build Support: Businesses + voters for 30 year plan
2. Confront squarely. Don't hide from it. **Adapt to three feet.**
3. Have a “risk assessment” done to guide your priorities. Some assets can be protected with engineering or be elevated; some will eventually have to be abandoned.
4. Initiate a carefully tiered series of engineering studies & plans to lay out the realistic options and how to phase them in. Critical is to know what questions to ask and of whom.
5. Establish an Institute to be a global center of excellence, working WITH local universities. This would attract ideas, tourism, and business. Creates confidence and leadership.

Intentionally blank

For more information:
www.johnenglander.net

“High Tide On Main Street”
2nd Edition

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