

# Projecting Sea-level Rise for Maryland

**Coast Smart Council**

July 22, 2014



**Donald F. Boesch**



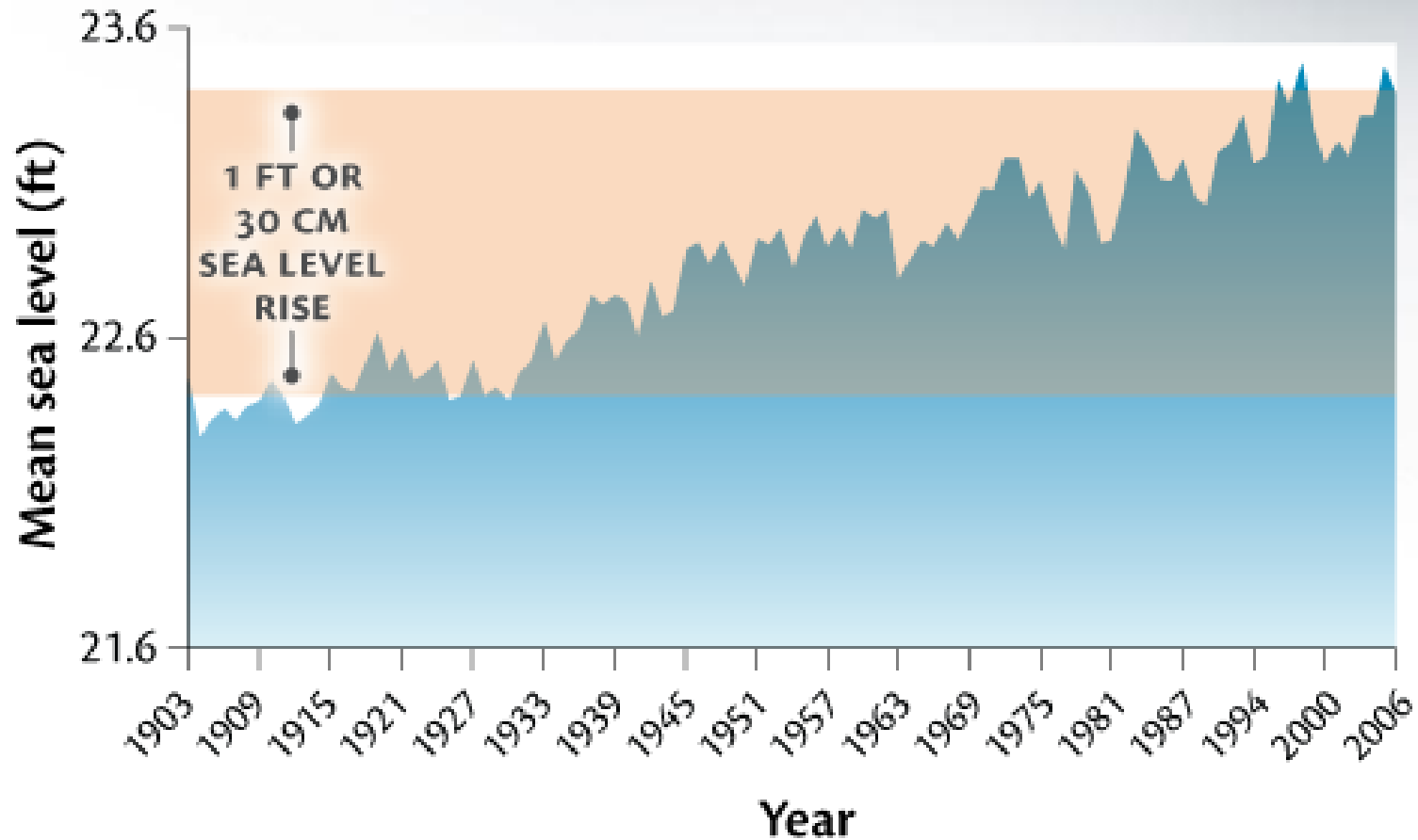
University of Maryland

CENTER FOR ENVIRONMENTAL SCIENCE

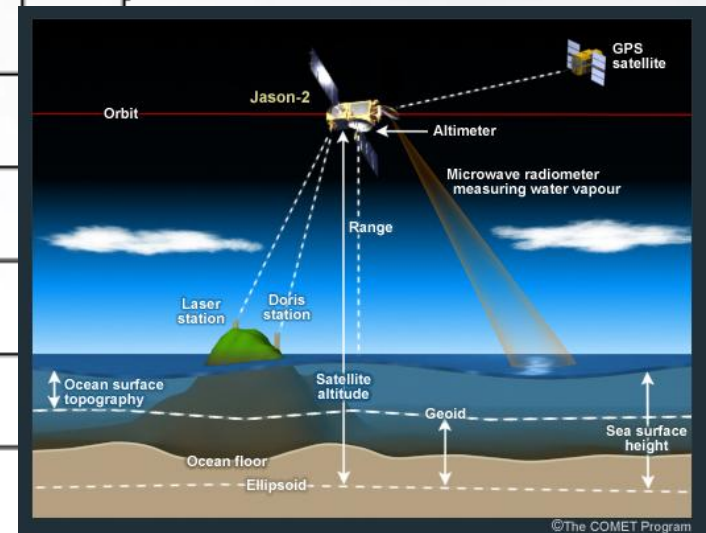
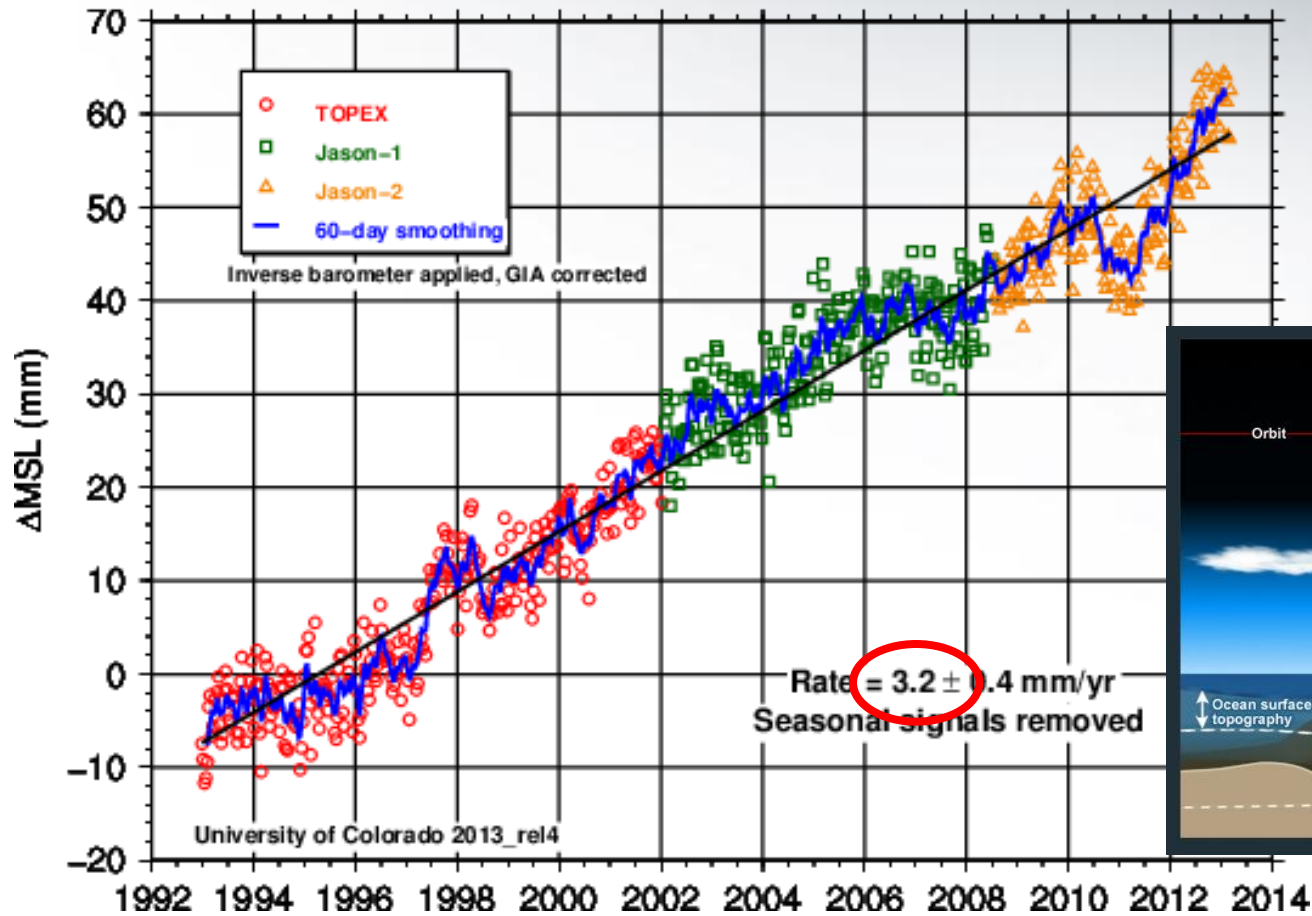
# The Sea Has Been Rising in Maryland



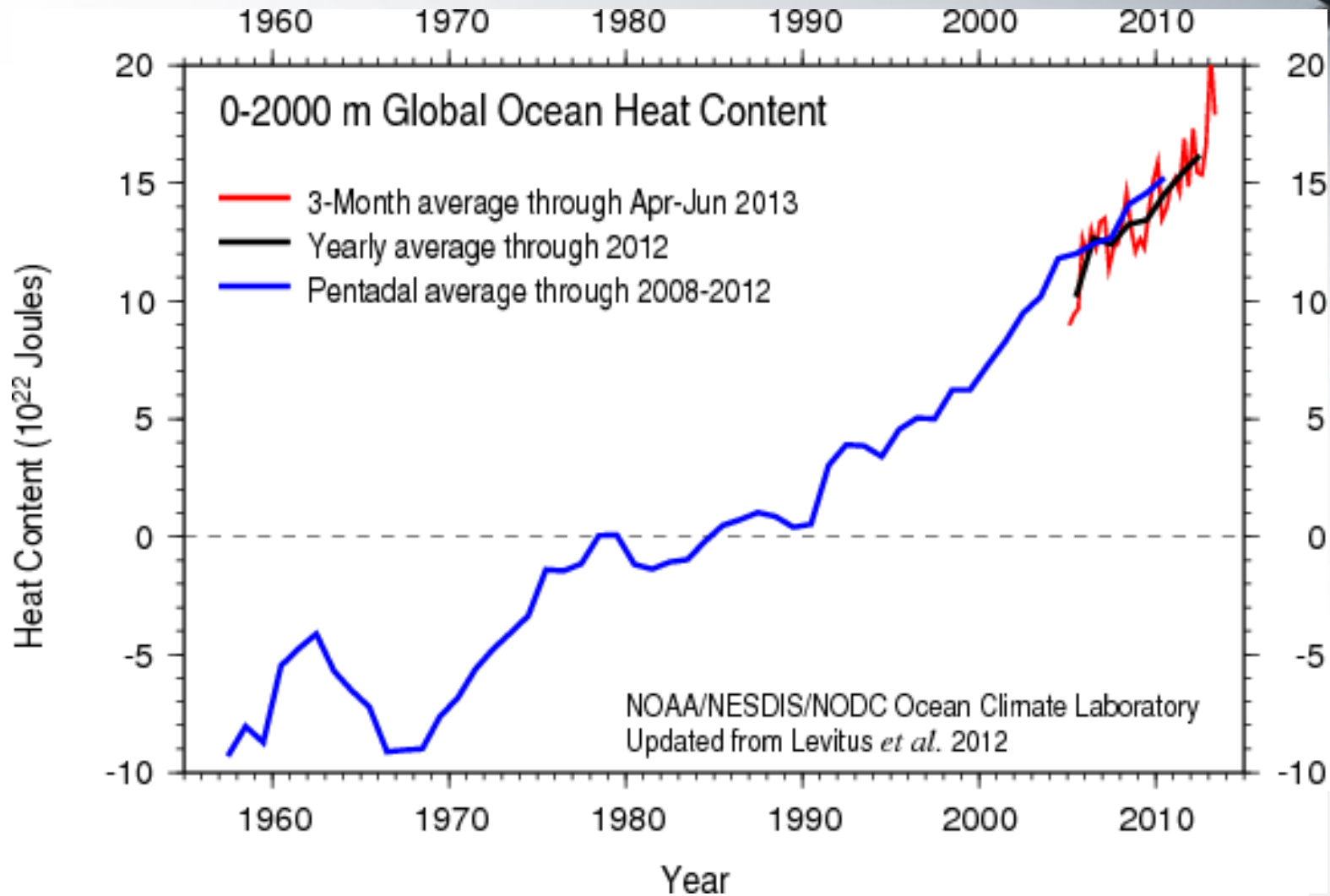
**Mean sea level in Baltimore, 1903–2006**



# Global Mean Sea Level by Satellite Altimeter



# World Ocean is Heating Up

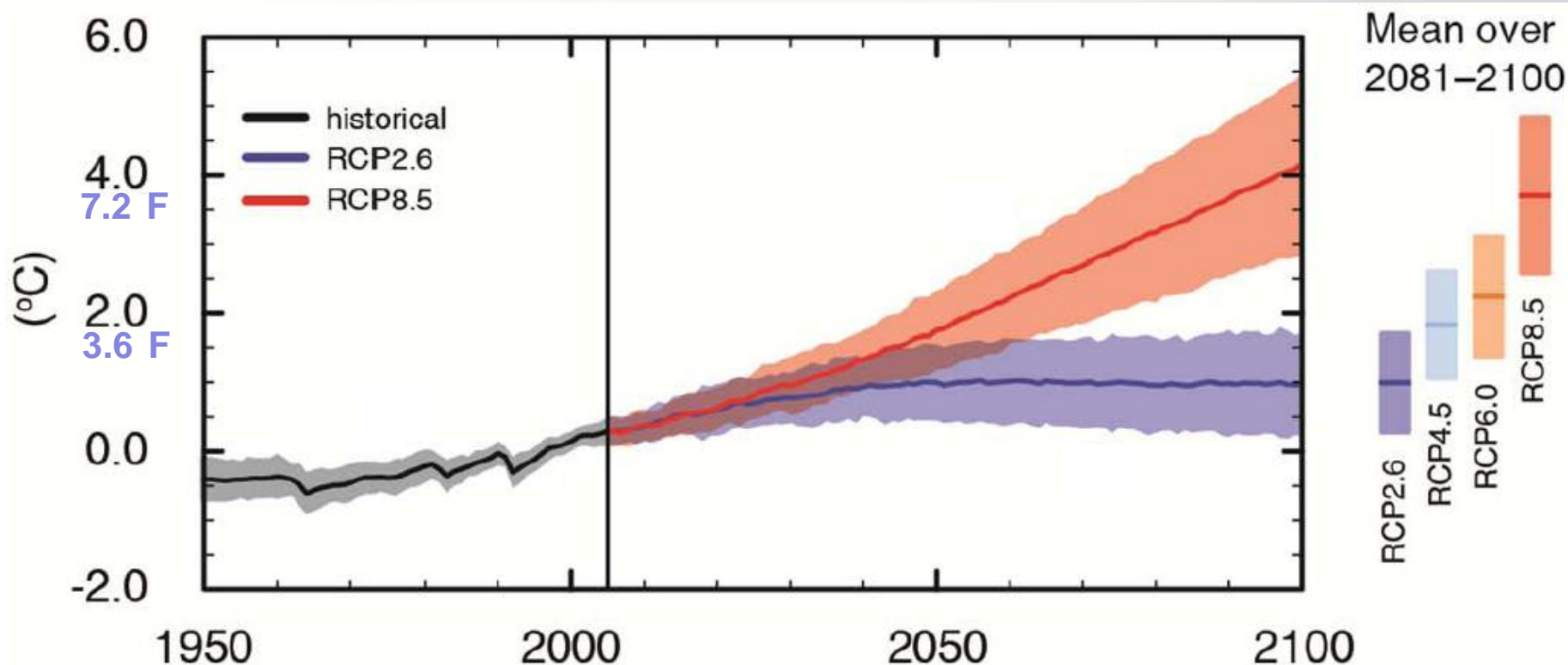


# How Much Will it Warm?

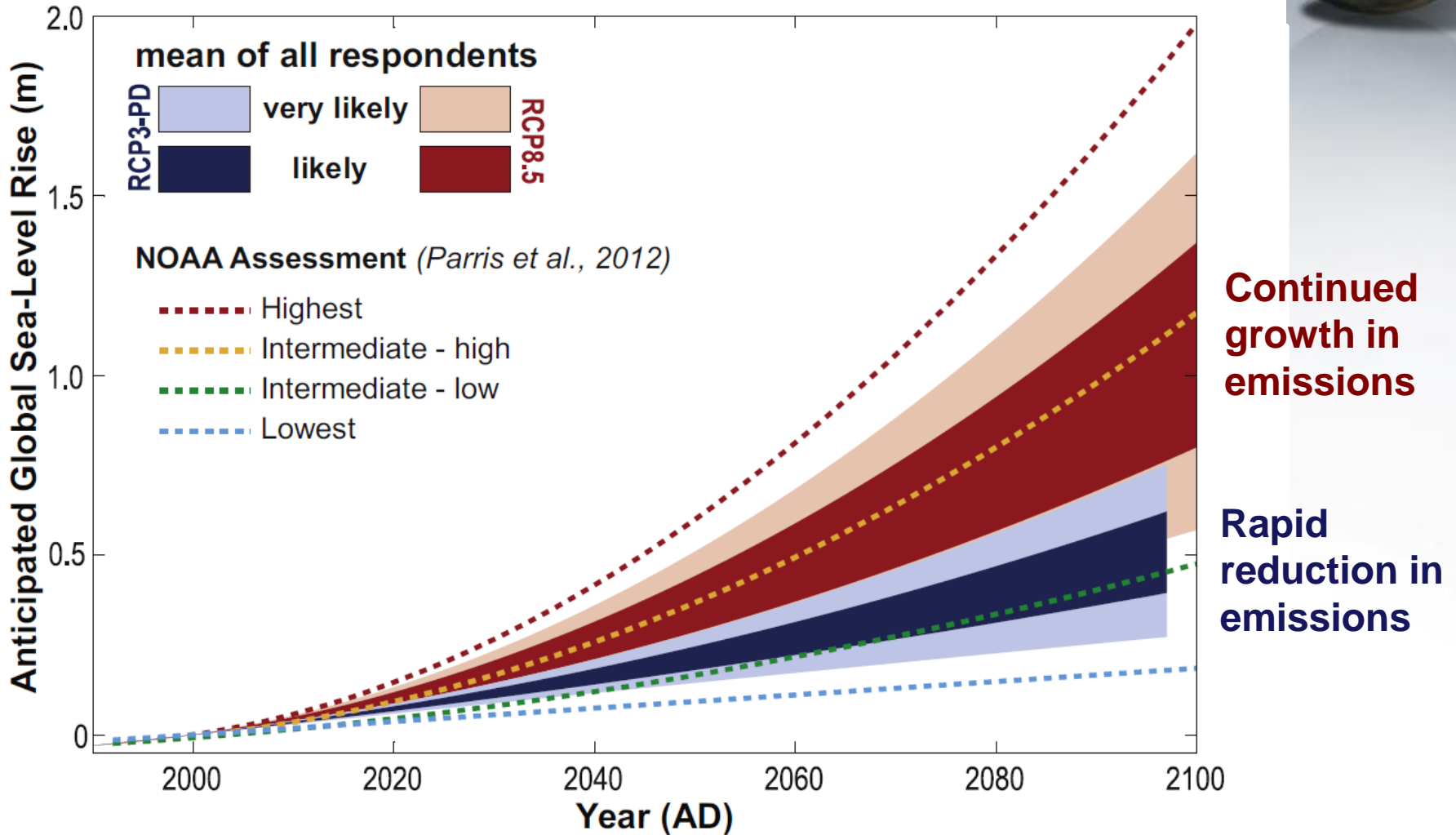


It mainly depends on how much greenhouse gases we emit.


Global average surface temperature



# How Much Will the Seas Rise?



# Updating SLR Projections



Updating Maryland's  
**Sea-level Rise  
Projections**

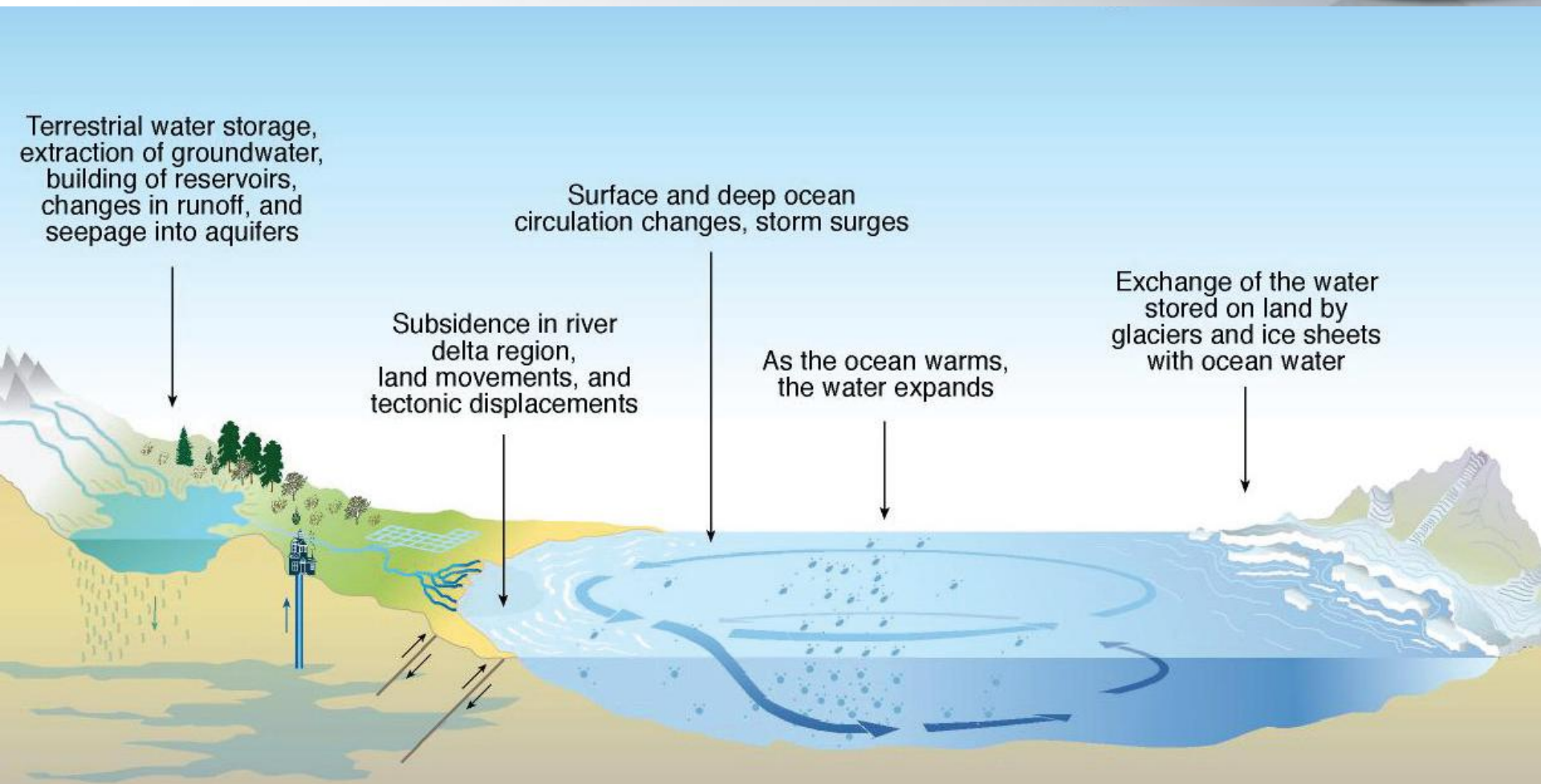
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*Scientific and Technical Working Group  
Maryland Climate Change Commission*

*June 26, 2013*

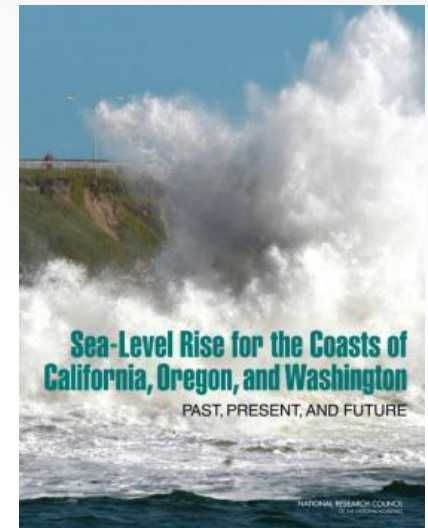
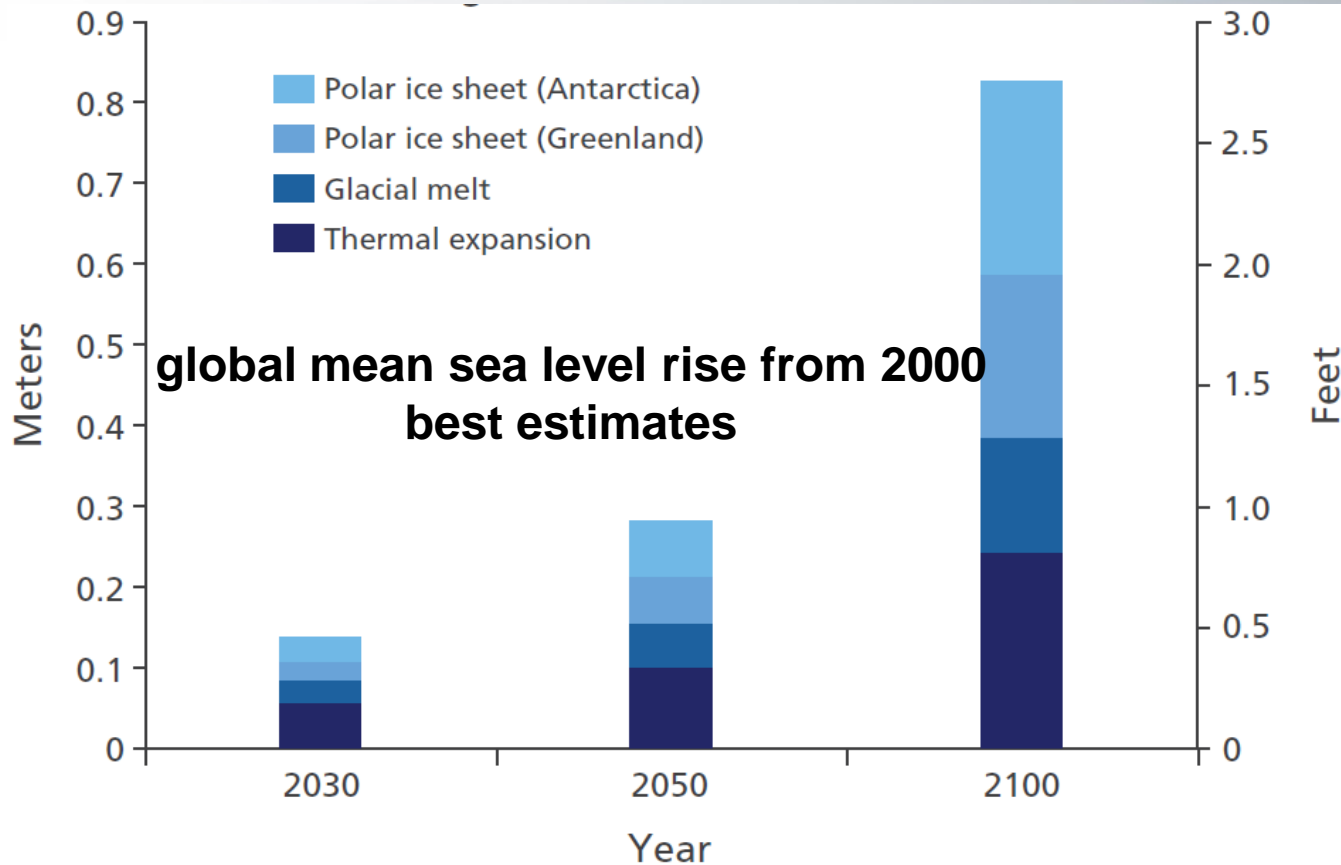


# Factors Causing Sea Level To Change





# We Used National Academy of Sciences Global Sea-Level Rise Projections



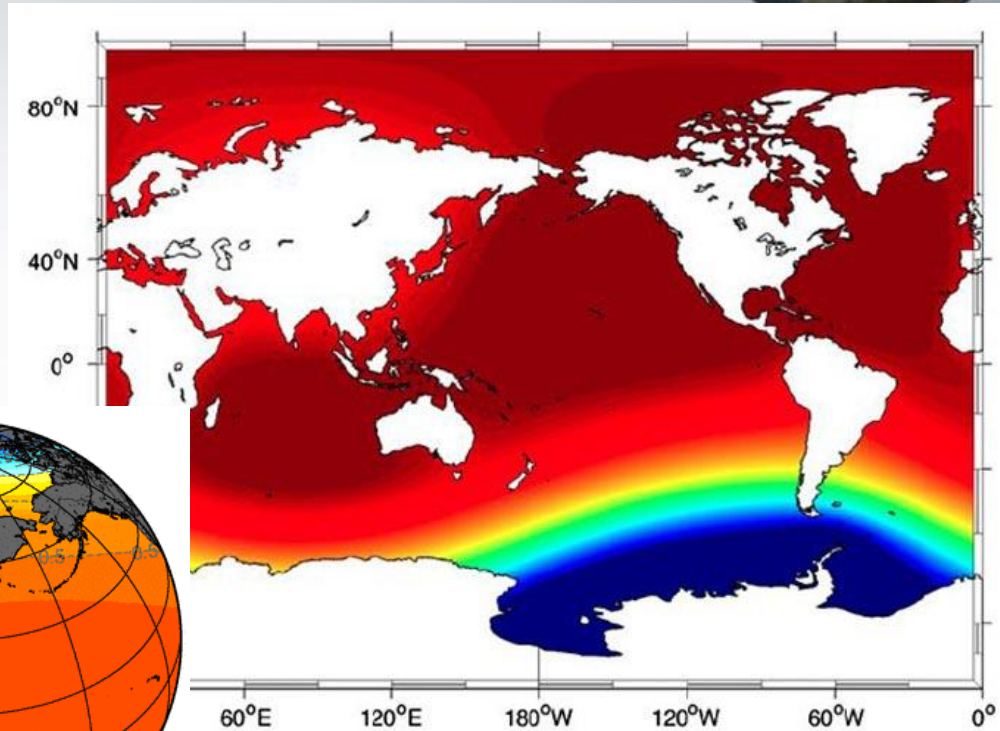
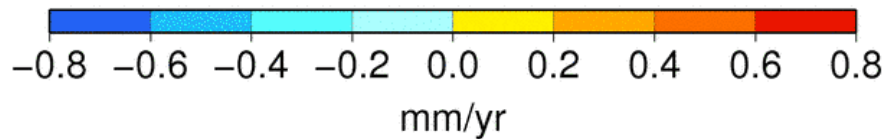
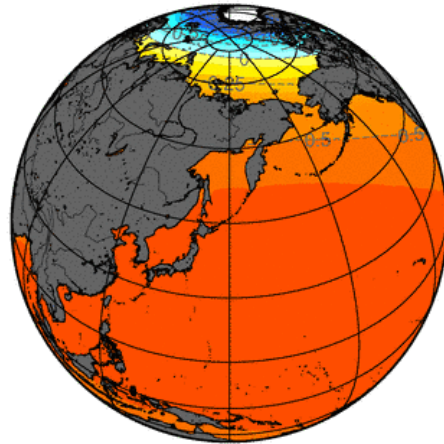
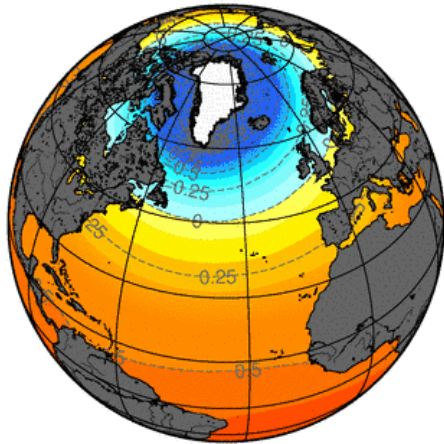
National Research Council. 2012. *Sea-Level Rise for the Coasts of California, Oregon and Washington: Past, Present and Future*.

# Effects of Polar Ice Sheet Melting



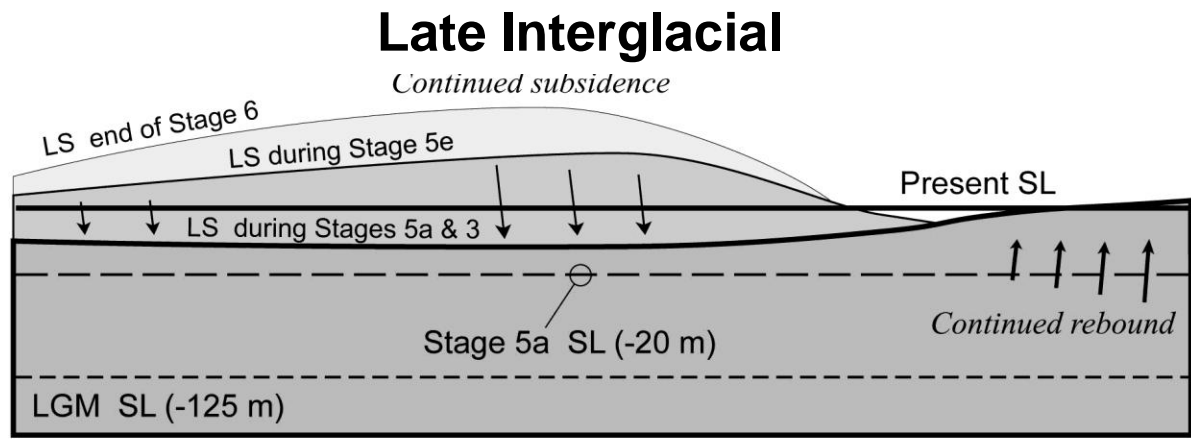
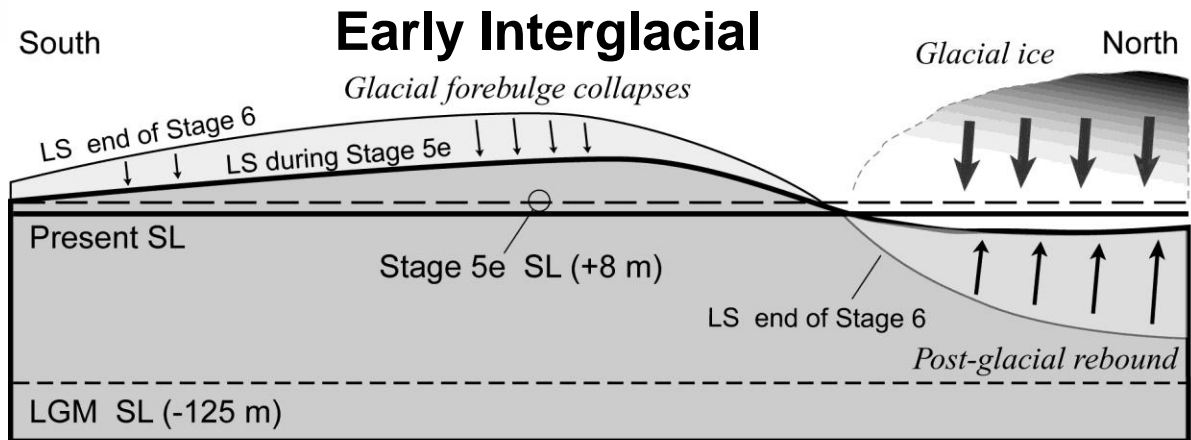
Expected change in sea level  
for a given loss of ice mass  
from Greenland and Antarctica.

## Greenland



## West Antarctica

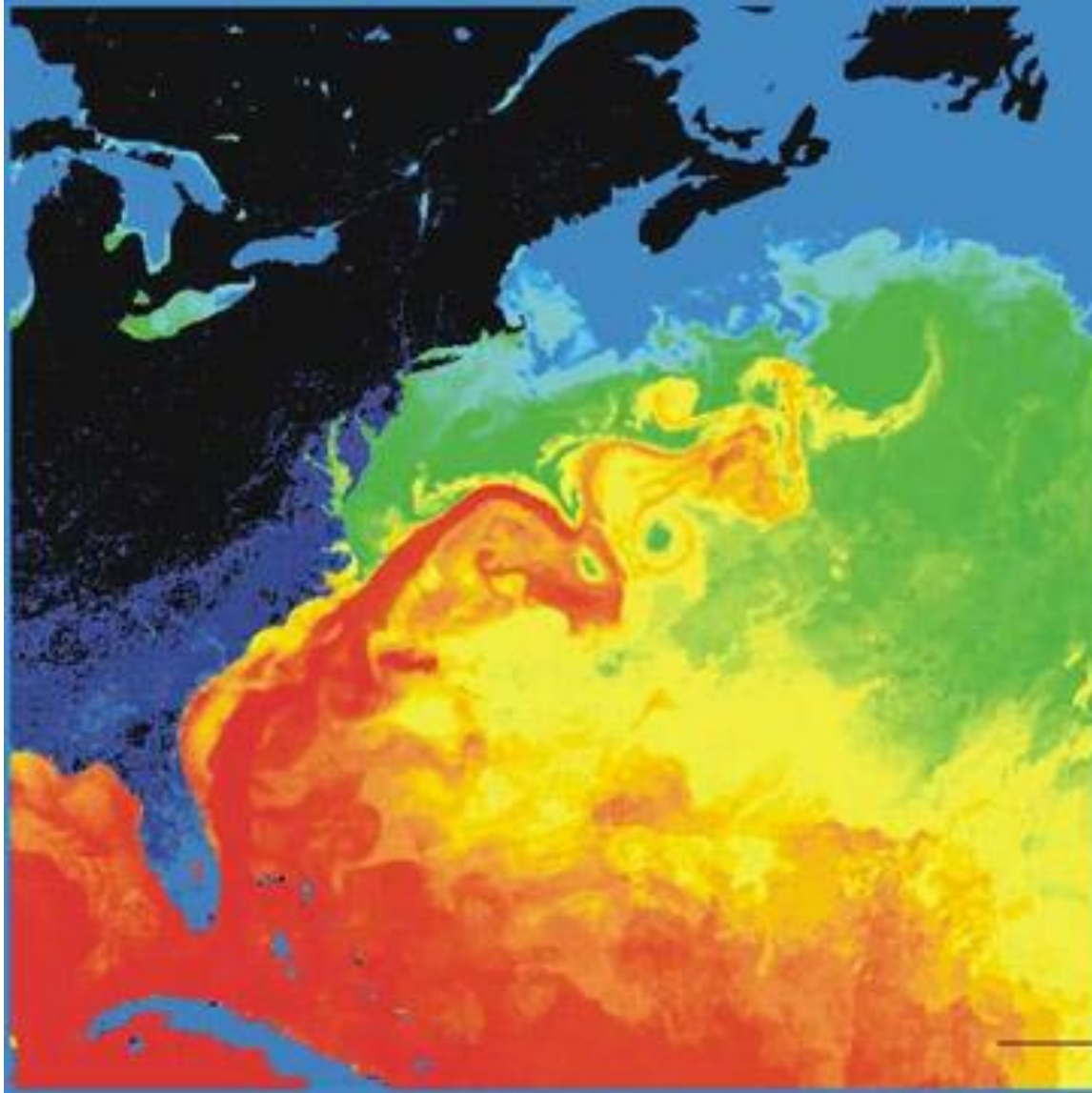
# Estimating Vertical Land Motion



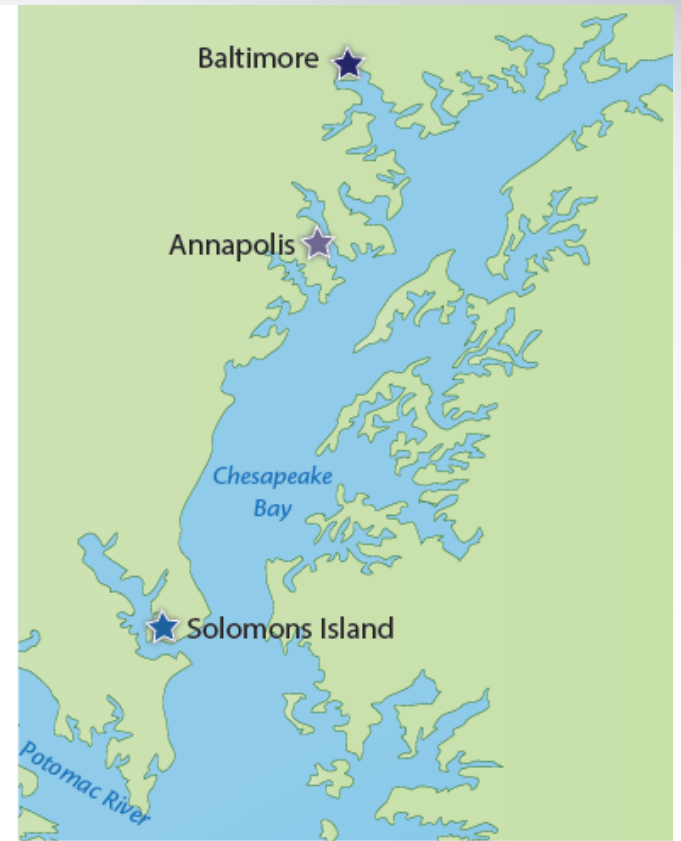
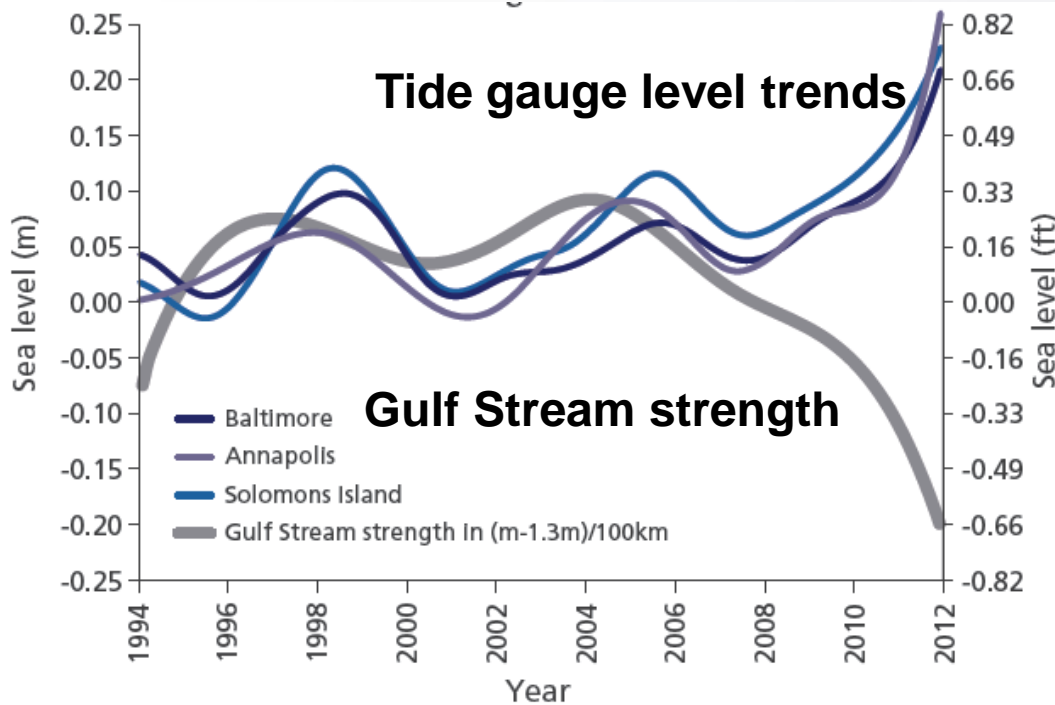
Florida Maryland New York New England

Sinking mainly the result of collapse of the bulge in land surface created during last ice age

# The Gulf Stream



# Slowing of Gulf Stream Raises Sea Level



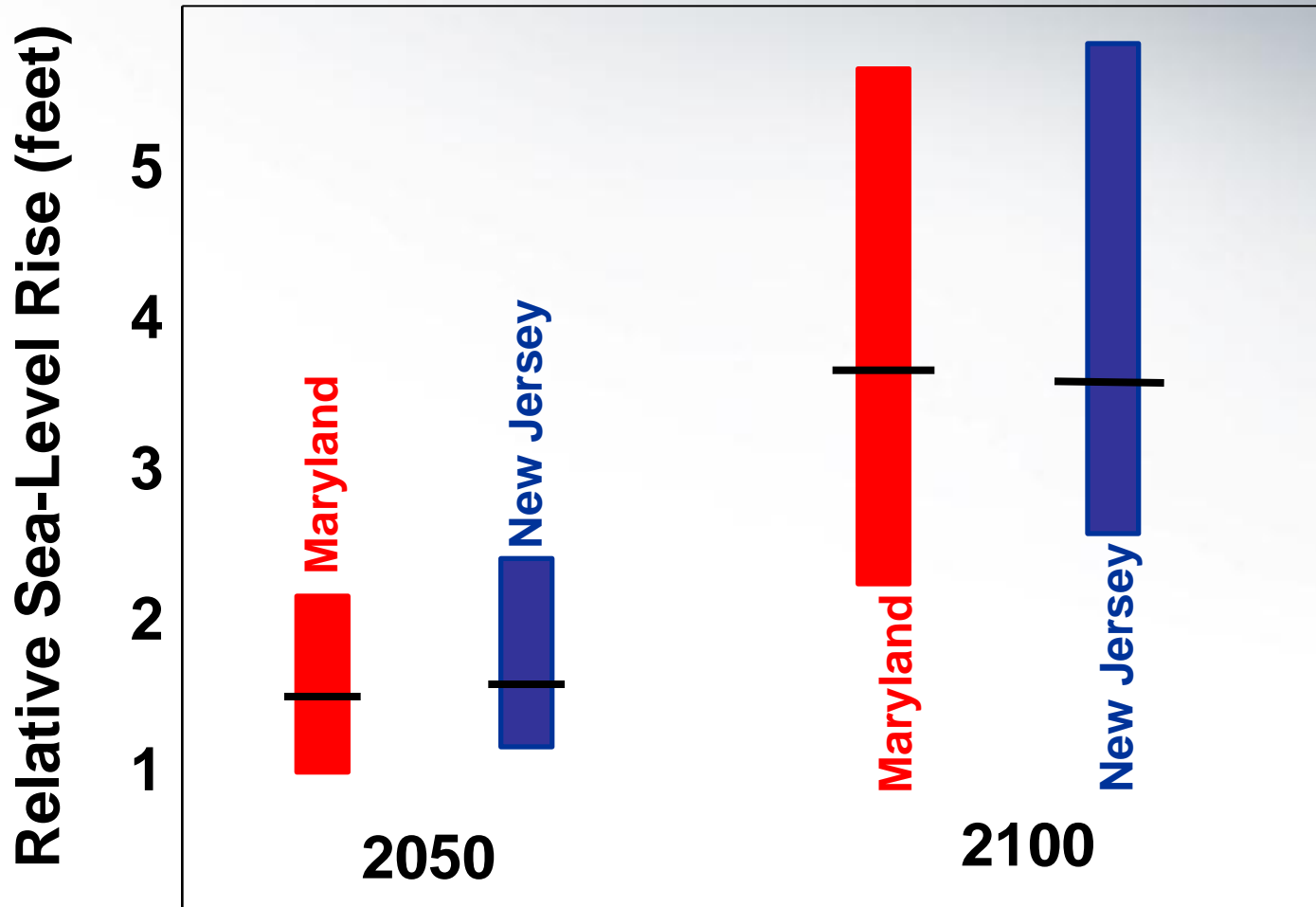
Ezer et al. *J. Geophysical Research* 118:685

# Putting It All Together How Much Will Sea Level Rise in Maryland?



Maryland Relative Sea-level Rise	Thermal (m)	Glaciers (m)	Greenland (m)	Antarctica (m)	Dynamic (m)	VLM (m)	Relative SLR	
							meters	feet
<b>2050 best</b>	<b>0.10</b>	<b>0.05</b>	<b>0.03</b>	<b>0.09</b>	<b>0.09</b>	<b>0.075</b>	<b>0.4</b>	<b>1.4</b>
2050 low	0.04	0.05	0.02	0.04	0.07	0.065	0.3	0.9
2050 high	0.19	0.06	0.05	0.16	0.10	0.085	0.7	2.1
<b>2100 best</b>	<b>0.24</b>	<b>0.13</b>	<b>0.10</b>	<b>0.30</b>	<b>0.17</b>	<b>0.15</b>	<b>1.1</b>	<b>3.7</b>
2100 low	0.10	0.12	0.08	0.10	0.13	0.13	0.7	2.1
2100 high	0.46	0.17	0.17	0.58	0.19	0.17	1.7	5.7
Land ice change fingerprint scale factors		<b>0.9</b>	<b>0.5</b>	<b>1.25</b>				

# Maryland Projections Agree with Recent Projections for New Jersey



# Questions or Comments?

A photograph of a flooded area. In the foreground, there is a body of water reflecting the sky and the surrounding landscape. In the middle ground, there is a white two-story house with a dark roof and a chimney, partially surrounded by water. To the left of the house, there is a utility pole with power lines. The background shows a line of trees and a clear sky with some clouds.

✿ [boesch@umces.edu](mailto:boesch@umces.edu)

✿ [www.umces.edu/people/president](http://www.umces.edu/people/president)

✿ [@DonBoesch](https://www.instagram.com/DonBoesch)