Sea-Level Rise Projections for Maryland 2018

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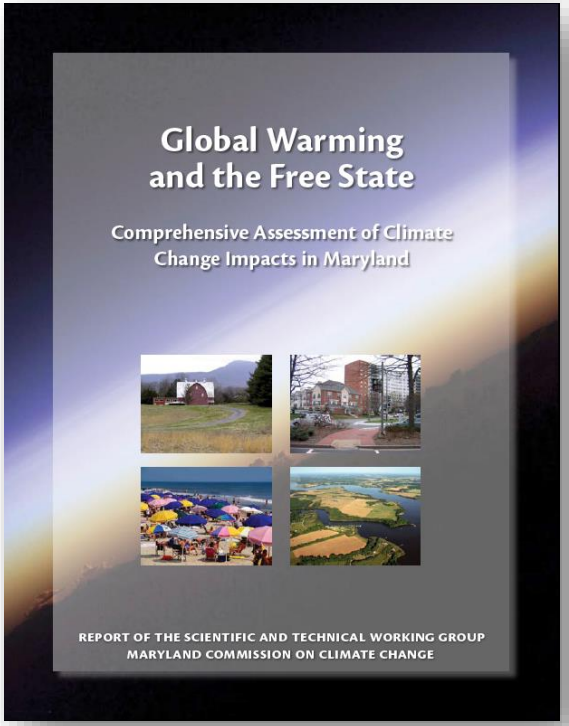
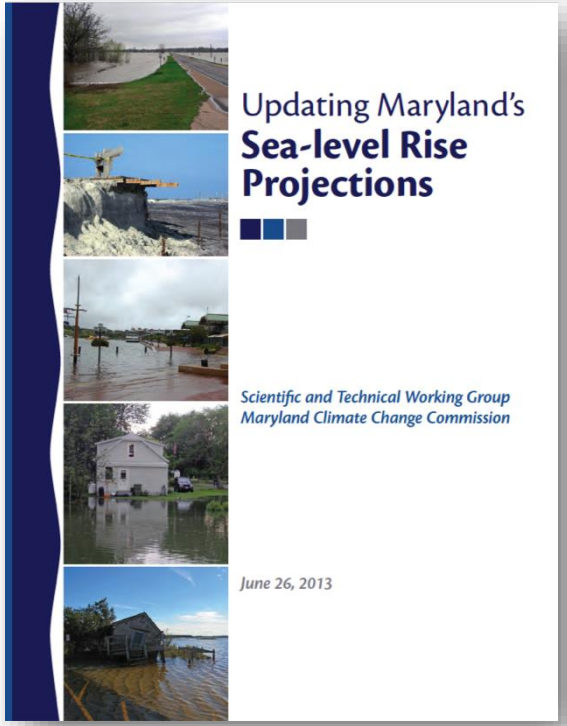
Sea-Level Rise Projections for Maryland



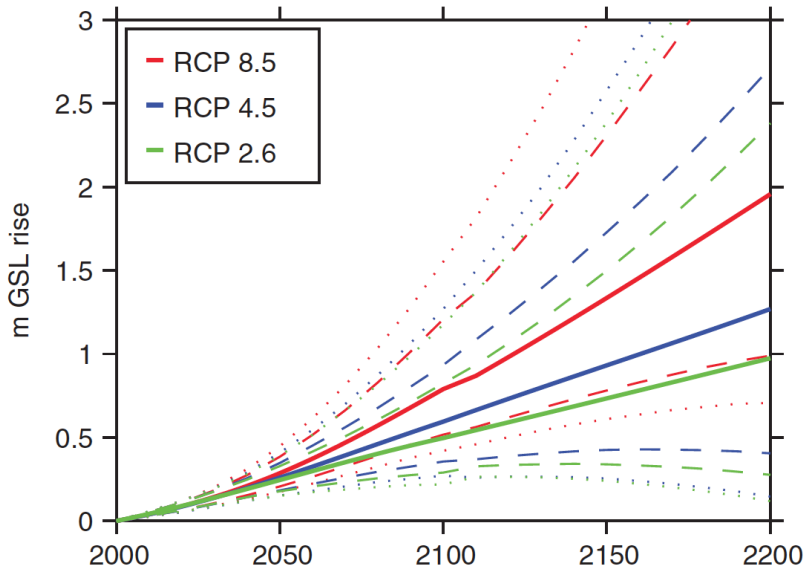
2008



2013

2018

Probabilistic Projections for RCPs

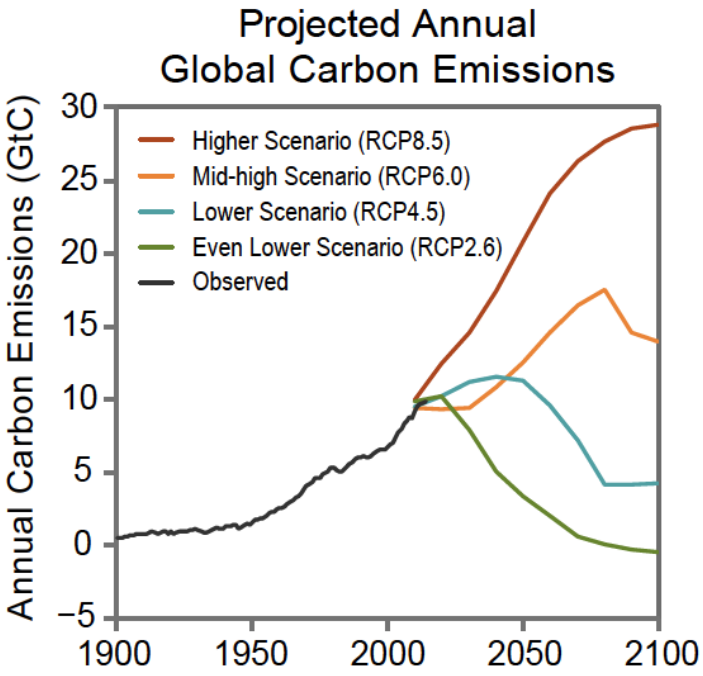


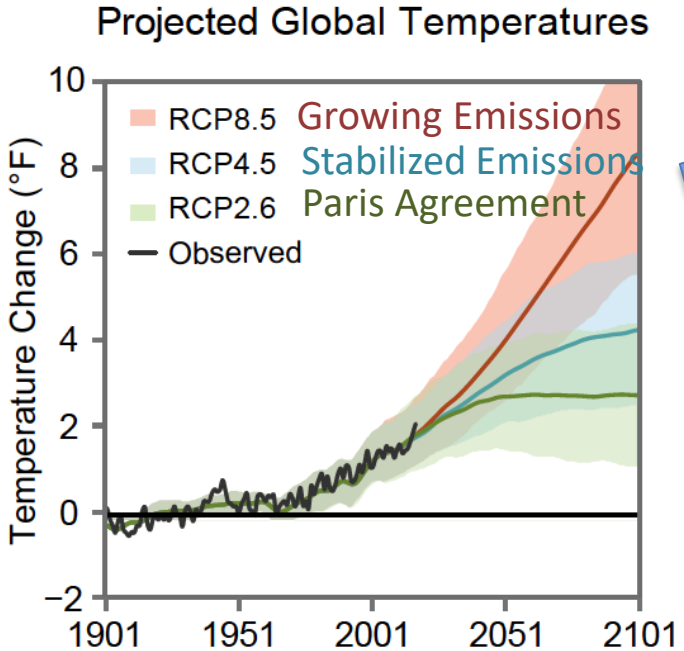
Used probabilistic projections based on method of Kopp et al. (2014, 2017, *Earth's Future*, vols. 2 and 5)

- Probabilities allow assessment of risks
- Projections for greenhouse emissions pathways (RCPs)
- Kopp et al. framework used in number of state and regional projections in US
- Projections available already incorporating regional factors for tide gauges around the world, including those in Maryland

Representative Concentration Pathways

Greater Emissions Lead to Significantly More Warming

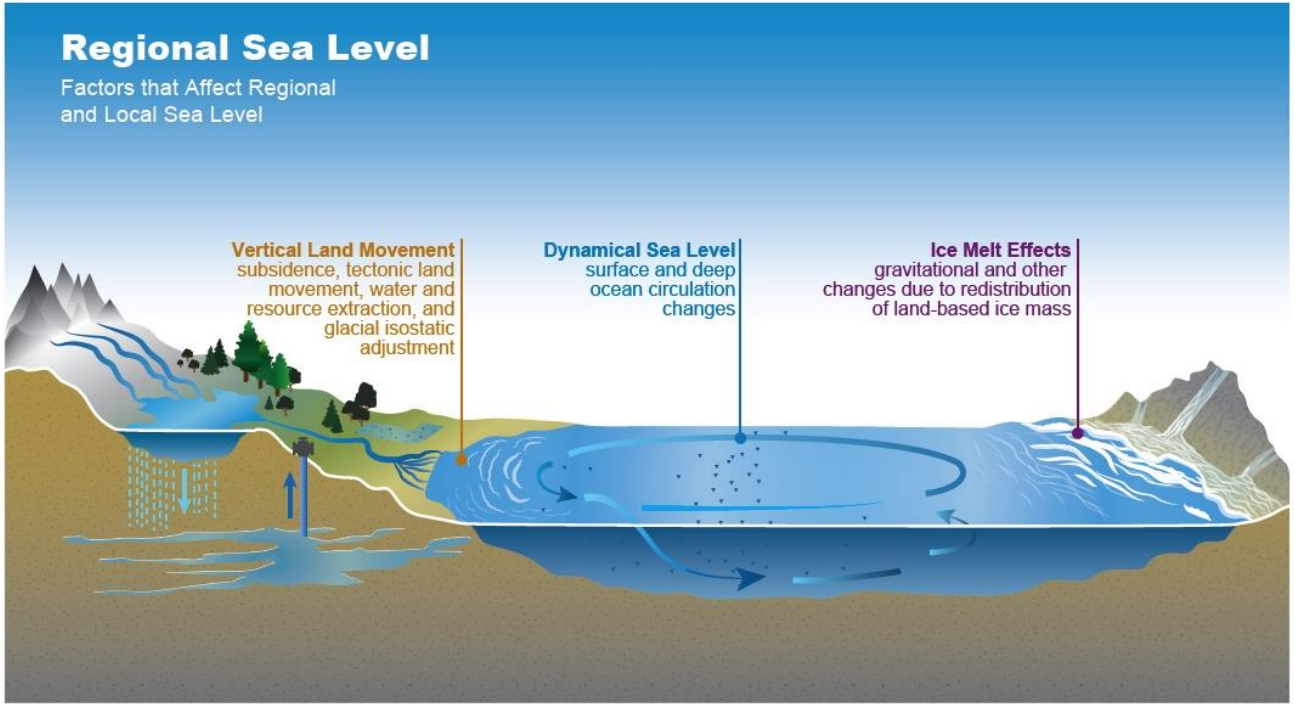




Descriptors used in report for three emissions pathways

Fourth National Climate Assessment

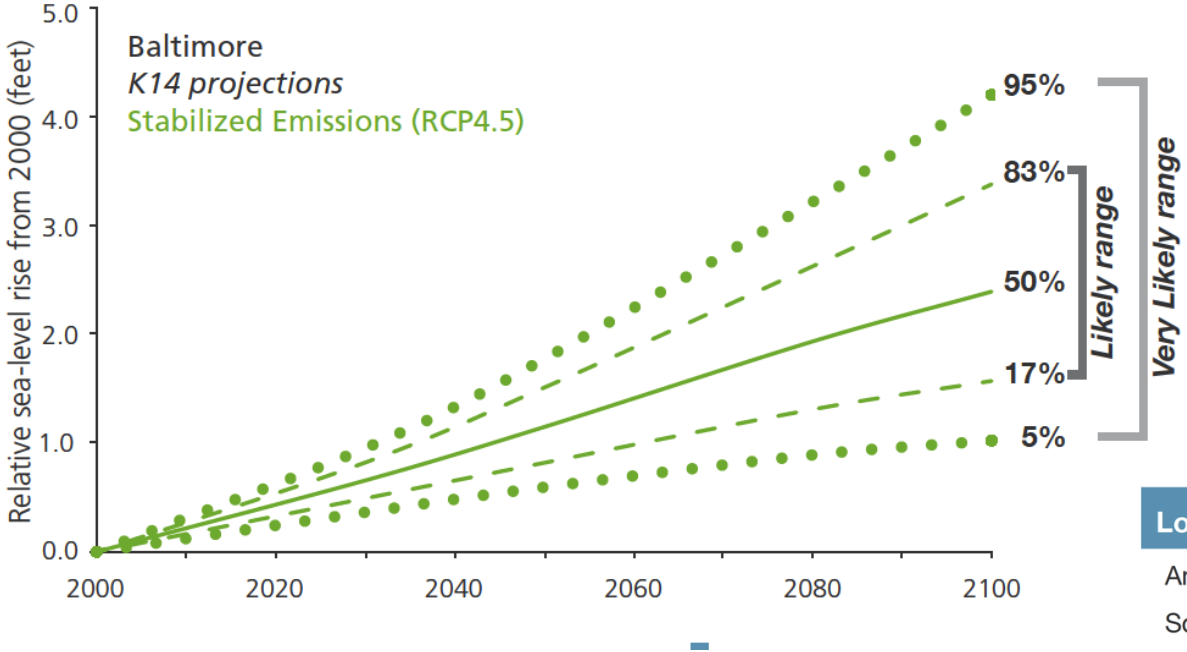
Relative Sea Level Rise



Projections available for multiple tide gauge locations in Maryland.

- Start with global SLR projections consistent with IPCC and expert elicitation.
- Apply regional "fingerprint" of loss of land-based ice & dynamical ocean changes from GCMs.
- Adjust for vertical land motion empirically derived from tide gauge records.

Probabilistic Projections for Maryland



K14: Kopp et al. 2014. *Earth's Future* (consistent with IPPC AR5)

Estimates are provided for the probability distribution over time and for three emissions pathways at Baltimore.

These can be adjusted for the relatively small differences among Maryland locations, mainly due to subsidence.

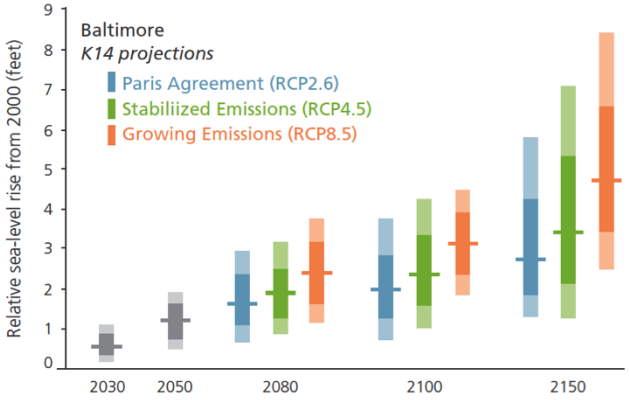
Adjustments from Baltimore

Location	2050	2080	2100
Annapolis	-	-	0.1 ft
Solomons	-	0.1 ft	0.2 ft
Cambridge	0.1 ft	0.1 ft	0.2 ft
Ocean City	0.1 ft	0.1 ft	0.3 ft

Summary of Projections

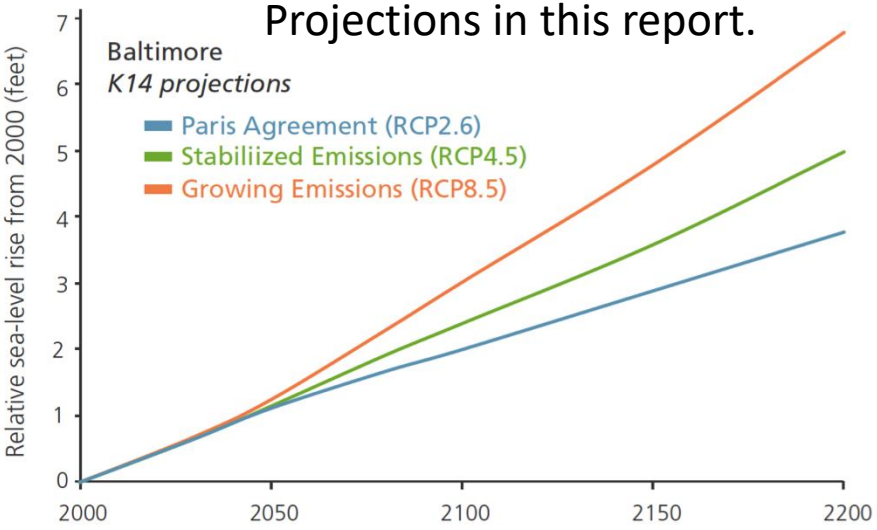
Year	Emissions Pathway	Central Estimate 50% probability SLR meets or exceeds:	Likely Range 67% probability SLR is between:	1 in 20 Chance 5% probability SLR meets or exceeds:	1 in 100 Chance 1% probability SLR meets or exceeds:
2030		0.6 ft	0.4 – 0.9 ft	1.1 ft	1.3 ft
2050		1.2 ft	0.8 – 1.6 ft	2.0 ft	2.3 ft
2080	Growing	2.3 ft	1.6 – 3.1 ft	3.7 ft	4.7 ft
	Stabilized	1.9 ft	1.3 – 2.6 ft	3.2 ft	4.1 ft
	Paris Agreement	1.7 ft	1.1 – 2.4 ft	3.0 ft	3.2 ft
2100	Growing	3.0 ft	2.0 – 4.2 ft	5.2 ft	6.9 ft
	Stabilized	2.4 ft	1.6 – 3.4 ft	4.2 ft	5.6 ft
	Paris Agreement	2.0 ft	1.2 – 3.0 ft	3.7 ft	5.4 ft
2150	Growing	4.8 ft	3.4 – 6.6 ft	8.5 ft	12.4 ft
	Stabilized	3.5 ft	2.1 – 5.3 ft	7.1 ft	10.6 ft
	Paris Agreement	2.9 ft	1.8 – 4.2 ft	5.9 ft	9.4 ft

Up to 2050 projections for different emissions pathways are similar, thus single set of projections provided. After 2050, projections are provided for different pathways.

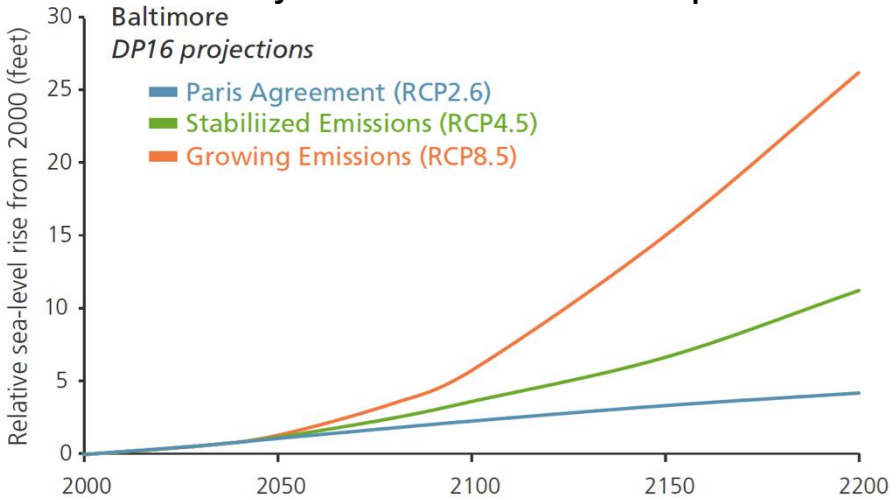


What If Antarctica Rapidly Loses Ice Mass?

Projections in this report.



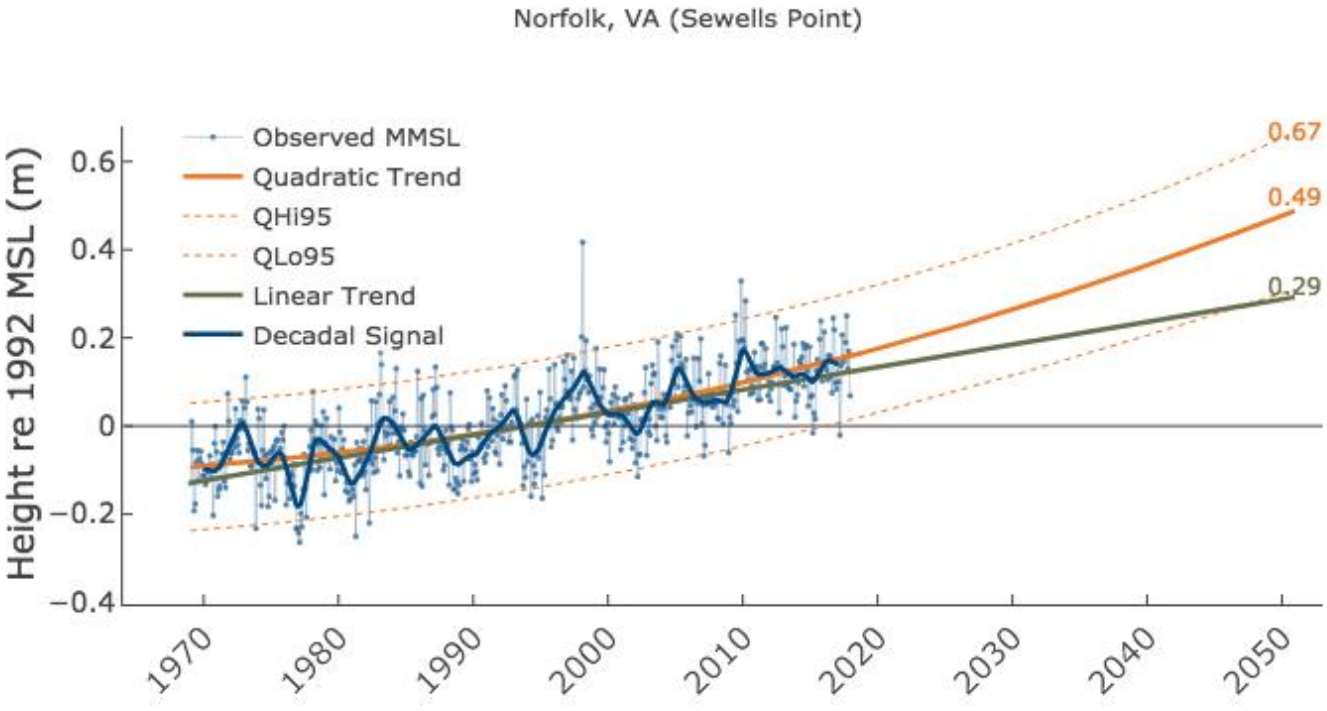
Projections with more rapid ice loss.



A note of caution in that recent scientific research indicates that the rate of loss of ice from Antarctica may be significantly greater toward the end of this century and beyond if emissions continue to grow. Sea-level rise could be greater than the 5% chance estimate by 2100 and exceed 10 feet during the 22nd century.

DP16: Kopp et al. 2017 Earth's Future (based on DeConto & Pollard. 2016 *Nature*)

Sea-Level Rise by Extrapolation



www.vims.edu/research/products/slrc/localities/norfolkva/index.php

CBP modeling first used 0.30 m, then used 0.17 m RSLR by 2025.

	2025	2050
Linear	0.16	0.29
Quadratic	0.23	0.49

Boon and Mitchell. 2015
J. Coastal Res. 36, 1295

Using Probabilistic Projections of RSLR for Chesapeake Bay Water Quality Modeling

2030				2050			
Sewells Point	17%	**Median**	83%	**Sewells Point**	17%	**Median**	83%
RCP8.5	18	**24**	30	RCP8.5	32	**43**	55
RCP4.5	18	**23**	28	RCP4.5	31	**40**	51
RCP2.6	18	**23**	29	RCP2.6	29	**39**	50
Baltimore				**Baltimore**			
RCP8.5	14	**21**	27	RCP8.5	27	**38**	50
RCP4.5	15	**20**	25	RCP4.5	15	**35**	46
RCP2.6	14	**20**	26	RCP2.6	23	**34**	45

- Relative SLR at gauge stations in cm from 2000 base (2030 approximates 2025 in WQ model timeframe).
- K14 projections from Supporting Information table in Kopp et al. 2017. *Earth's Future*.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