Methodology and Technical Overview of 2019 Projection: Part I

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Acknowledgement

Sea Level Rise Ad Hoc Work Group

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- David Enfield, Ph.D., National Oceanic and Atmospheric Administration (retired)
- Nancy J. Gassman, Ph.D., City of Ft. Lauderdale
- Laura Geselbracht, The Nature Conservancy
- Katherine Hagemann, C.F.M., Miami-Dade County
- Jake Leech, Ph.D., Palm Beach County
- Jayantha Obeysekera, Ph.D., P.E., Florida International University (Chair)
- Akintunde Owosina, P.E., South Florida Water Management District
- Joseph Park, Ph.D., P.E., U.S. Department of Interior*
- Michael Sukop, Ph.D., PG, CHg, Florida International University
- Tiffany Troxler, Ph.D., Florida International University
- John Van Leer, Sc.D., University of Miami
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Experts Consulted

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- John Hall, Ph.D., Bureau of Land Management
- Robert E. Kopp, Ph.D., Rutgers University
- Glenn Landers, P.E., U.S. Army Corps of Engineers*
- Mark Merrifield, Ph.D., Scripps Institution of Oceanography at the University of California San Diego
- Gary Mitchum, Ph.D., University of South Florida
- William Sweet, Ph.D., National Oceanic and Atmospheric Administration
- Philip R. Thompson, Ph.D., University of Hawaii
- Chris Weaver, Ph.D., Environmental Protection Agency



Southeast Florida (rate of rise)



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Recent Trends in Regional Tide Gages ("shift in ~2012")





Mean Sea Level Data at Key West





Factors Affecting Global Mean Sea Level Rise





Mass Changes in Ice Sheets

NASA

Greenland





Grace Satellite

Antarctica





Cazenave et al. 2018



Sea Level Budget





Additional Factors Affecting Regional Sea Level





Δ Relative Sea Level (RSL) of Sweet et al. (2017):

following probabilistic framework of Kopp et al. (2014)





Projections Considered



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Sea Level Projections: Deep Uncertainty



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NOAA 2017 Regional Projections Methodology



Process Sources IPCC AR5 • **Expert Elicitation** Fingerprints **Glacier Models** • Oceanographic IPCC (CMIP5 • Models) Land-water Storage Empirical ٠ Relationships GIA/Tectonics/Sedi Long-term • background rate ment Compaction modeled using tide gages

Methods: Historical Trends, Climate Models, and Mixed



Global Scenarios Selected for 2019 Projections



GMSL rise Scenario	RCP2.6	RCP4.5	RCP8.5
Low (0.3 m)	94%	98%	100%
Intermediate-Low (0.5 m)	49%	73%	96%
Intermediate (1.0 m)	2%	3%	17%
Intermediate-High (1.5 m)	0.4%	0.5%	1.3%
High (2.0 m)	0.1%	0.1%	0.3%
Extreme (2.5 m)	0.05%	0.05%	0.1%



Why bias towards RCP8.5?

- "In the absence of an ambitious increase in adaptation efforts compared to those currently underway, high to very high risks are expected in many coastal geographies at the upper end of the RCP8.5 *likely* range" (SROCC, 2019)
- "..advises that local governments and regional agencies assess the likelihood of the three SLR scenarios using RCP 8.5, which models climate change without additional efforts to constrain emissions" (Tampa Bay CSAP)



Interpretations of the GMSL rise scenarios (NCA, Climate Science Reprot, Chapter 12)

Scenario	Interpretation		
Intermediate- High	Slightly above high end of <u>very likely range under RCP8.5</u> Middle of <u>likely range under RCP8.5</u> when accounting for possible ice cliff instabilities		
High	High end of <u>very likely range under RCP8.5</u> when accounting for possible ice cliff instabilities		
Extreme	Consistent with estimates of physically possible "worst case"		



Regional Projections – South Florida







Years



Most Recent SE Climate Compact Projections









Moving Mean Sea Level with USACE SLC Scenarios for Key West, FL

In order to capture tooltips, press the print screen ('prt sc') button.



Source: Landers (2018) USACE/ Broward Flood Risk Management Study for Tidally Influenced Coastal Areas; USACE Sea Level Tracker

NOAA et al. 2017 Relative Sea Level Change Scenarios for : KEY WEST



Year



Datums

- Mean sea level
- North American Vertical Datum 1988

2.5 feet NAVD88	2070 sea level		
		NOAA Intermedia High	ite
o.5 feet NAVD88	Mean High Water	40 inches =~3 feet	
-0.5 feet NAVD88	2017 sea level		
-o.8 feet NAVD88	2000 mean sea level		
-2 feet NAVD88	Mean Low Water		

******Numbers rounded for simplicity





NOAA, 2020

Nuisance Flooding



Future Nuissance Flooding



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