Florida Flood Hub

THE STATE OF FLORIDA'S CENTER FOR FLOOD DATA

- Improves flood forecasting
- Informs science-based policy, planning, and management decisions
- Brings together experts from across the country to address flood-related issues
- Creates a one-stop-shop for high-quality flood data
- Helps communities prepare for the realities of rising sea levels, stronger storms, and more extreme rainfall events

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Scientific and Technical Workgroups

WORKGROUPS ARE CENTRAL TO THE SUCCESS OF THE FLOOD HUB

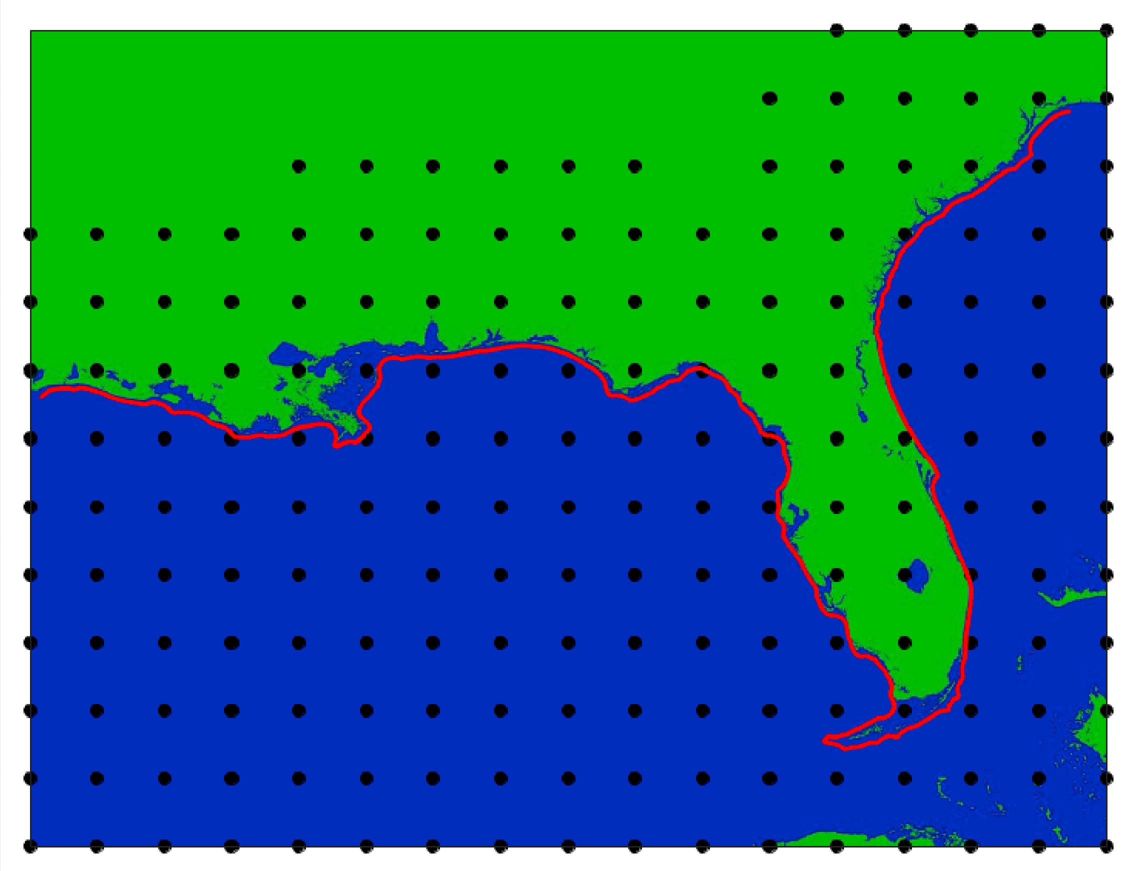
Sea level changes

Rainfall

Comprehensive modeling

Methodology

- Uses the 1 degree by 1 degree data directly from the national report.
- Create a smoothed coastline extending from LA-TX border to SC-NC border and interpolate the gridded data to this coastline.



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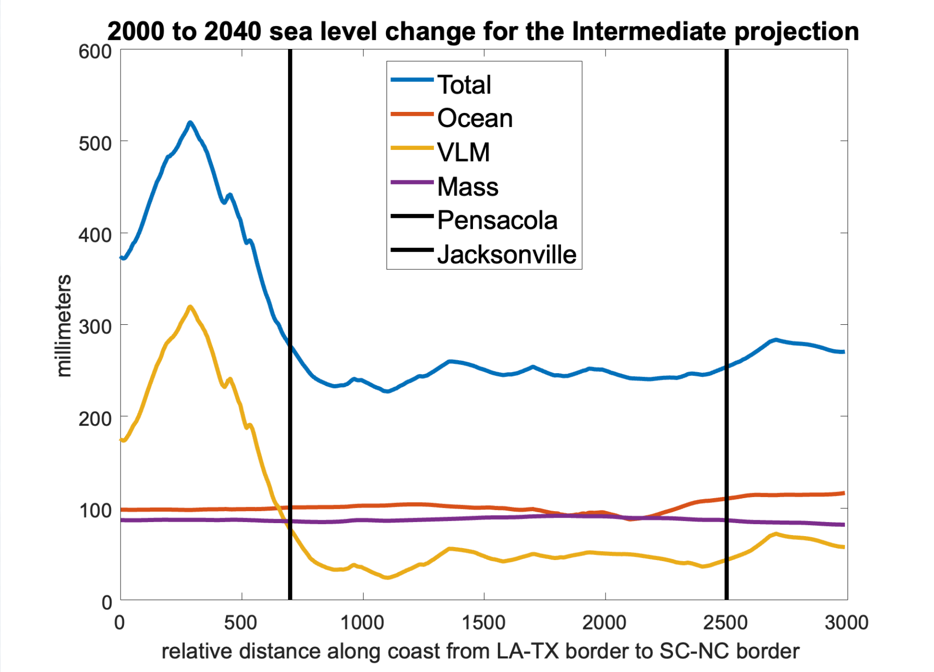
Finding: Remarkable uniformity

- SLR is nearly constant along Florida's coastline from Pensacola to Jacksonville.
- This conclusion holds for all five projections (low, intermediate-low, intermediate, intermediate-high, high) and all three time horizons (2040, 2050, 2070).
- This also holds for all of the contributions to the total sea level change.



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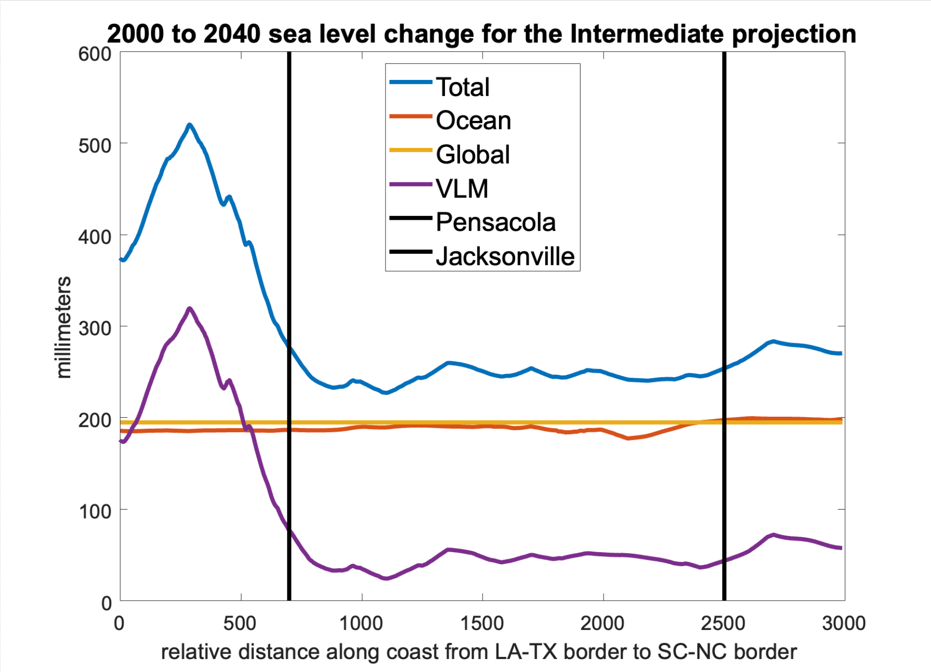
Florida projections are very similar to global projections

- Florida results can be accounted for as a combination of the global average projection plus vertical land motion.
- But what about the regional ocean thermal and dynamical processes?



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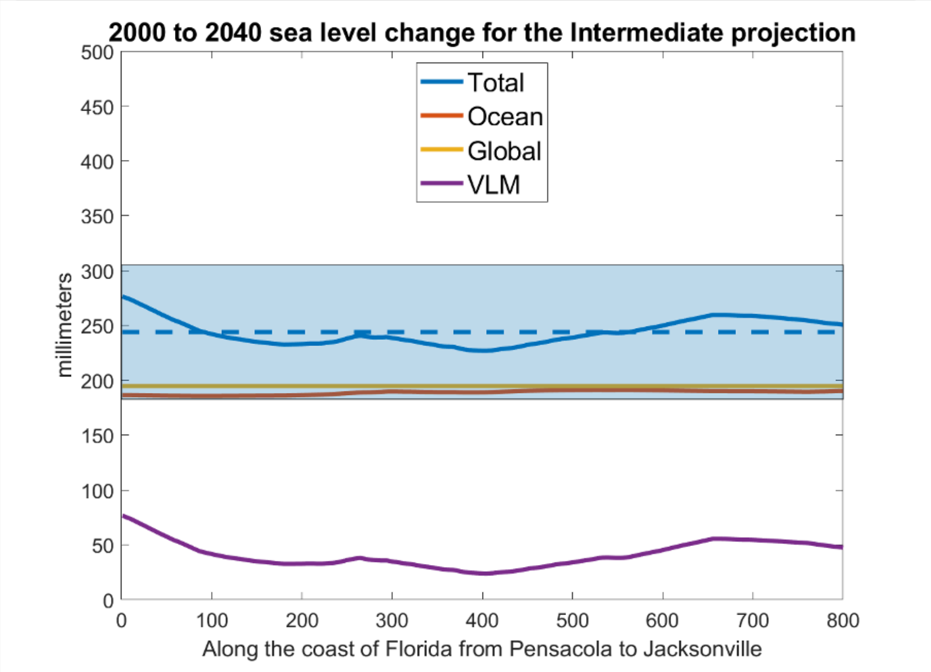
Finding: An average along the Florida coastline is appropriate

- An average works well for SLR projections along the Florida coastline in the sense that deviations from the average are small compared to the spread in the projections.
- This holds true for all 15 combinations of projections and time horizons.



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mm / inches	Low	Int-Low	Intermediate	Int-High	High
2040	198 / 8	227 / 9	244 / 10	271 / 11	296 / 12
2050	250 / 10	292 / 11	330 / 13	394 / 16	454 / 18
2070	334 / 13	423 / 17	548 / 22	759 / 30	966 / 38

- Exceedance probabilities are the key for planning.
- The federal report produced this table.
- We will expand on this to also include all emission pathways and also to include all time horizons.

Table 2: Exceedance probabilities for Florida projected to 2100 with emissions scenarios used in the Federal Task Force Report. Closest emissions scenario-based projections are defined by a combination of Shared Socioeconomic Pathways (SSP) and increases in radiative forcing (2.6–8.5 watts per square meter) that generated rises in global mean sea level closest to the five chosen scenarios.

Global mean sea level rise scenario (rise 2000–2100)	Closest emissions scenario-based global mean sea level projection						
	Low (SSP1-2.6)	Low (SSP1-2.6) to Intermediate (SSP2-4.5)	Intermediate (SSP2-4.5) to High (SSP3-7.0)	High (SSP3-7.0)	Very high (SSP5-8.5)	Low (SSP1-2.6), *Low Confidence processes*	Very high (SSP5-8.5), *Low Confidence processes*
	Predicted increase in global mean surface air temperature (2081–2100)					Unknown likelihood, high impact—low emissions	Unknown likelihood, high impact—very high emissions
	1.5°C	2.0°C	3.0°C	4.0°C	5.0°C		
Low (0.3 m)	92%	98%	>99%	>99%	>99%	89%	>99%
Intermediate-Low (0.5 m)	37%	50%	82%	97%	>99%	49%	96%
Intermediate (1.0 m)	<1%	2%	5%	10%	23%	7%	49%
Intermediate-High (1.5 m)	<1%	<1%	<1%	1%	2%	1%	20%
High (2.0 m)	<1%	<1%	<1%	<1%	<1%	<1%	8%

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Ongoing work

1. Exceedance probabilities
2. High tide flooding
3. Analyses of the historical Florida tide gauge time series
4. Assessment of possible recent SLR acceleration

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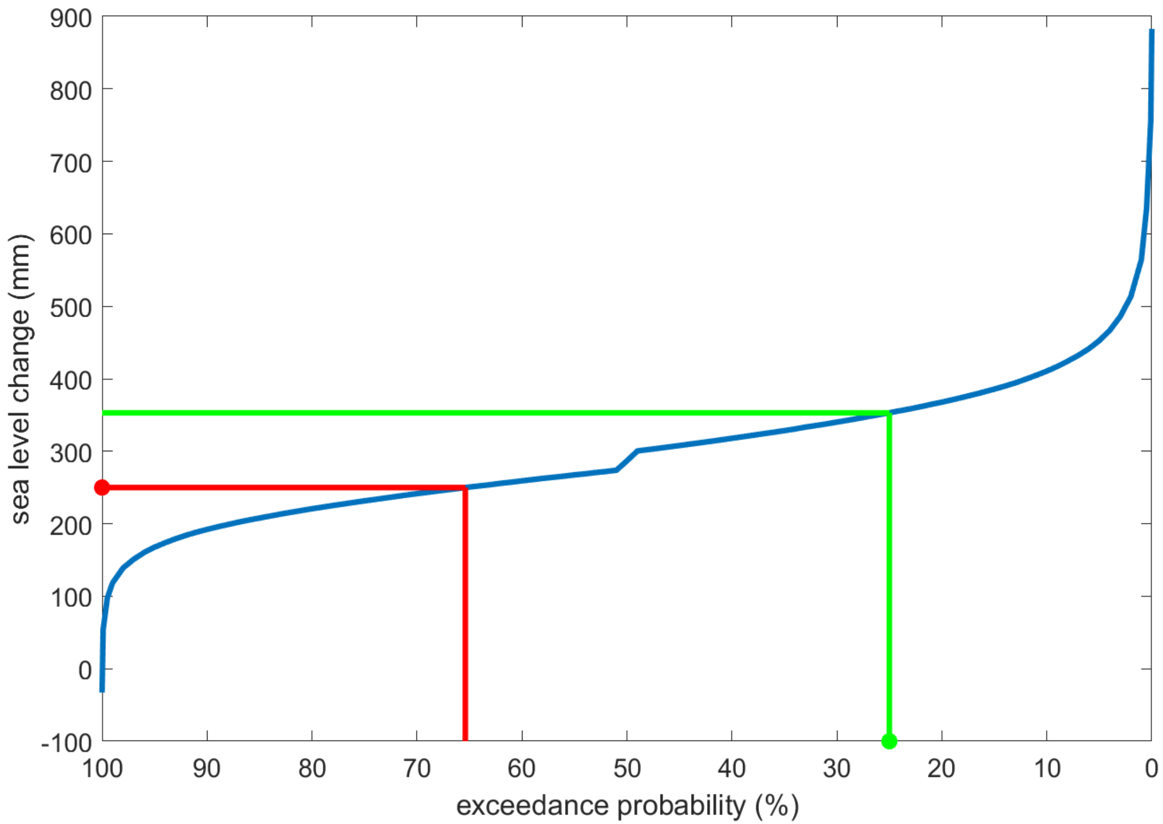
- For each emission pathway or temperature change we know the distribution of the sea level changes. Analogous to what the federal report did we can compute exceedance probabilities for a given sea level change value.
- We can also, though, choose an exceedance probability for a given emission pathway or temperature change and compute the sea level change value that we need to plan for.



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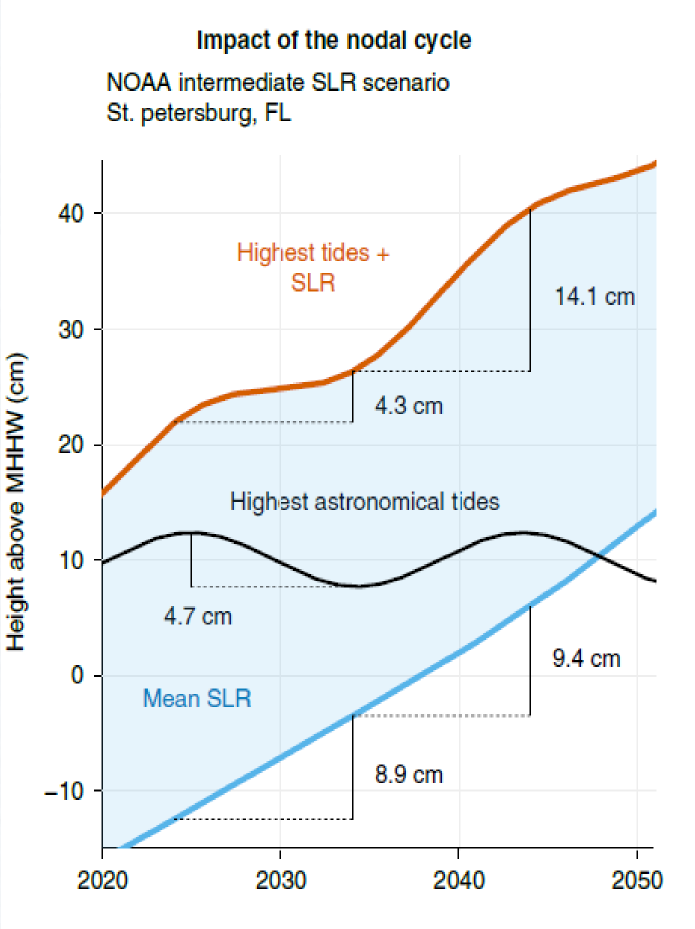
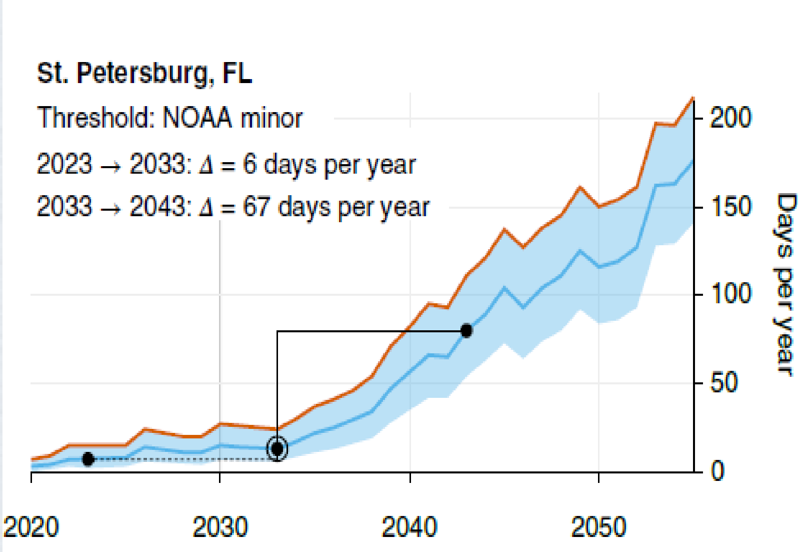
High tide flooding projections for the Tampa Bay region





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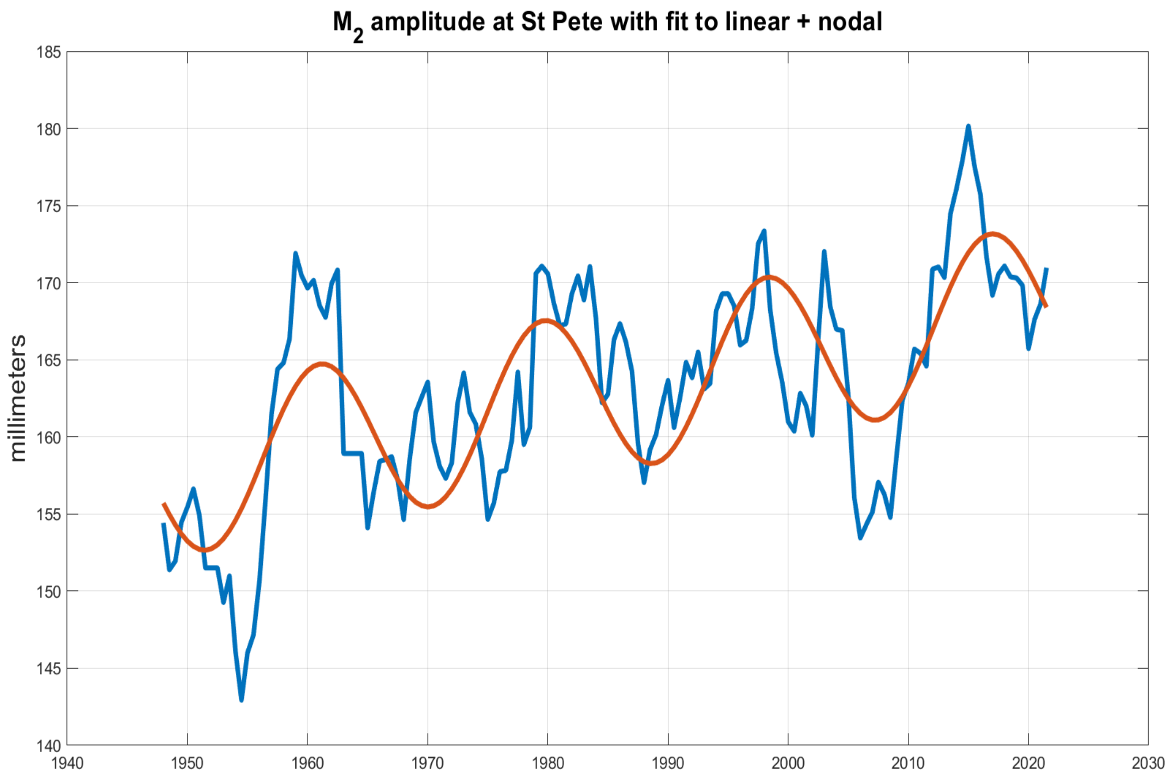
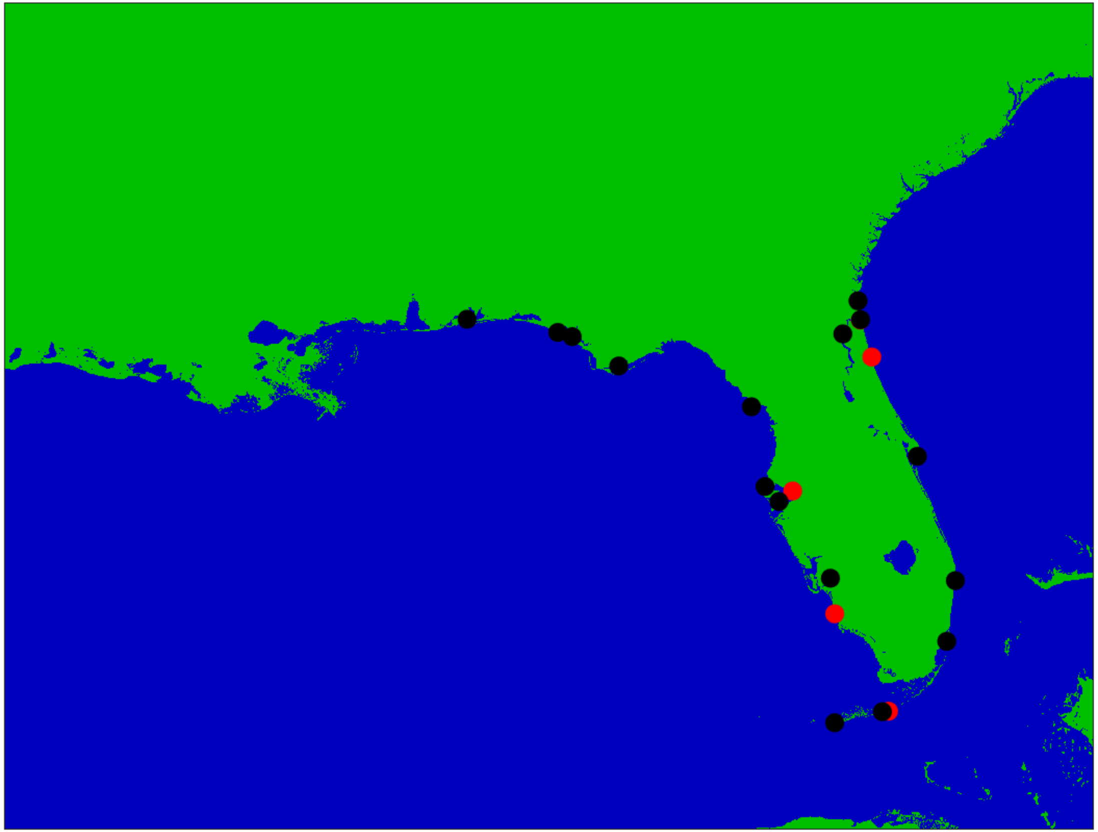
- This figure illustrates how the Thompson et al. calculation works, but note carefully that it requires very long hourly time series at the tide gauges.
- We are exploring methods to extract comparable information from much shorter series in order to be able to make such estimates at much higher density along the Florida coast.



- The black dots are where we have relatively long records from tide gauges that are still operating.
- The red dots are relatively long time series that are no longer operating. These are an opportunity if we can install a new station and link to the original benchmarks.



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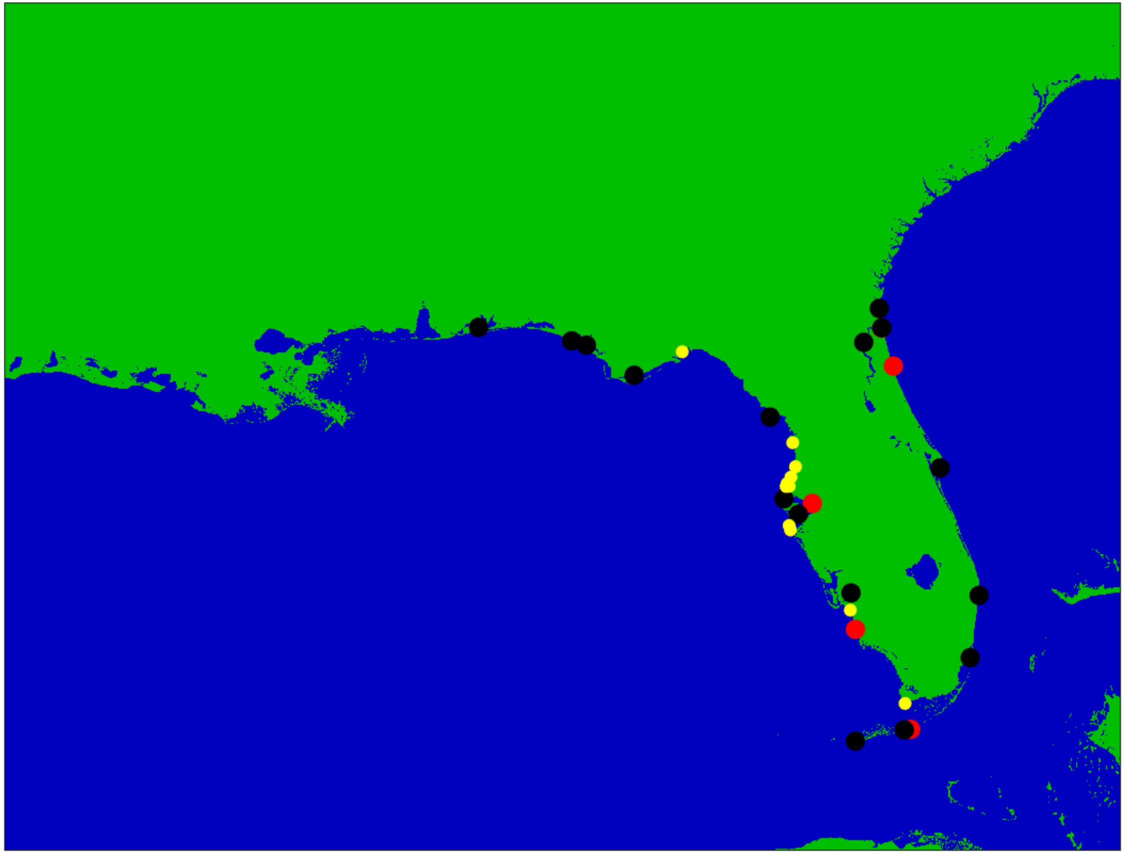
- The yellow dots that have been added are a set of stations operated for a long time by a USF College of Marine Science group.
- There are some clear opportunities here.



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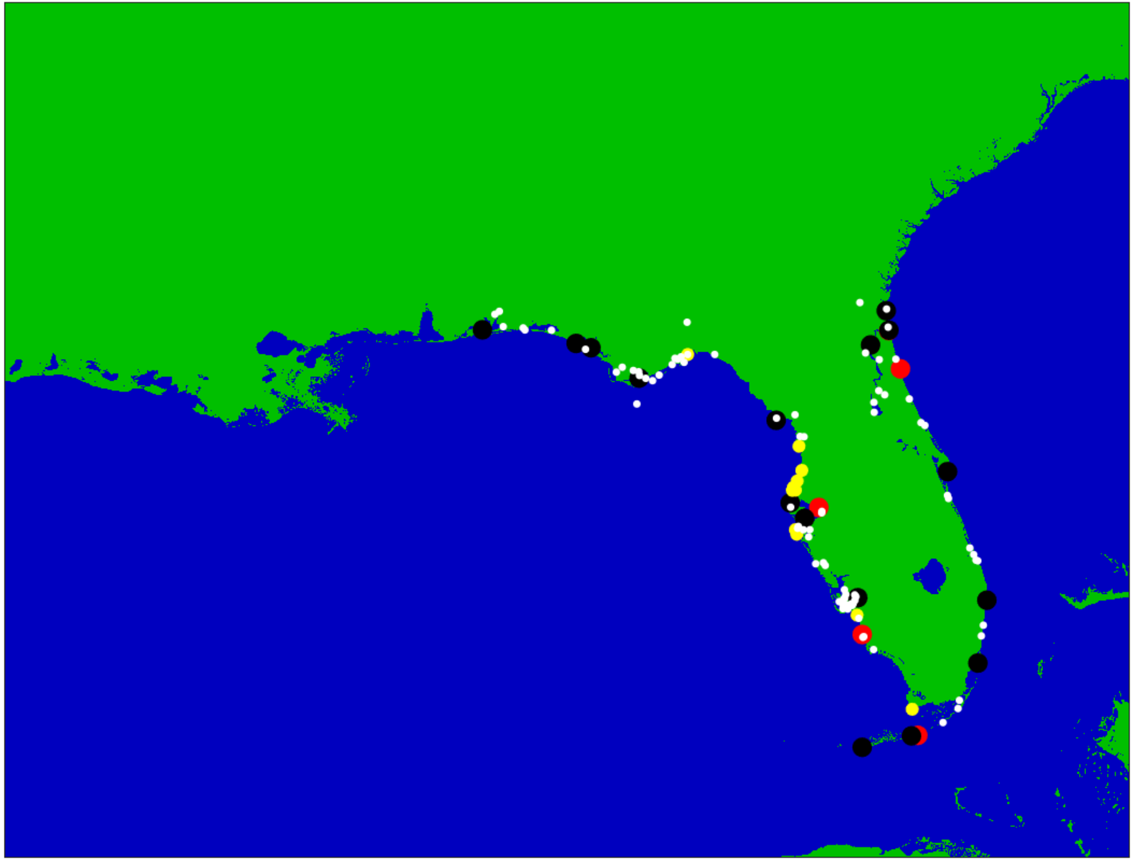
- I have now added with the white dots a large number of short time series collected by the Florida FDEP.
- As with the USF stations, there are some possible opportunities here for densification of the network.



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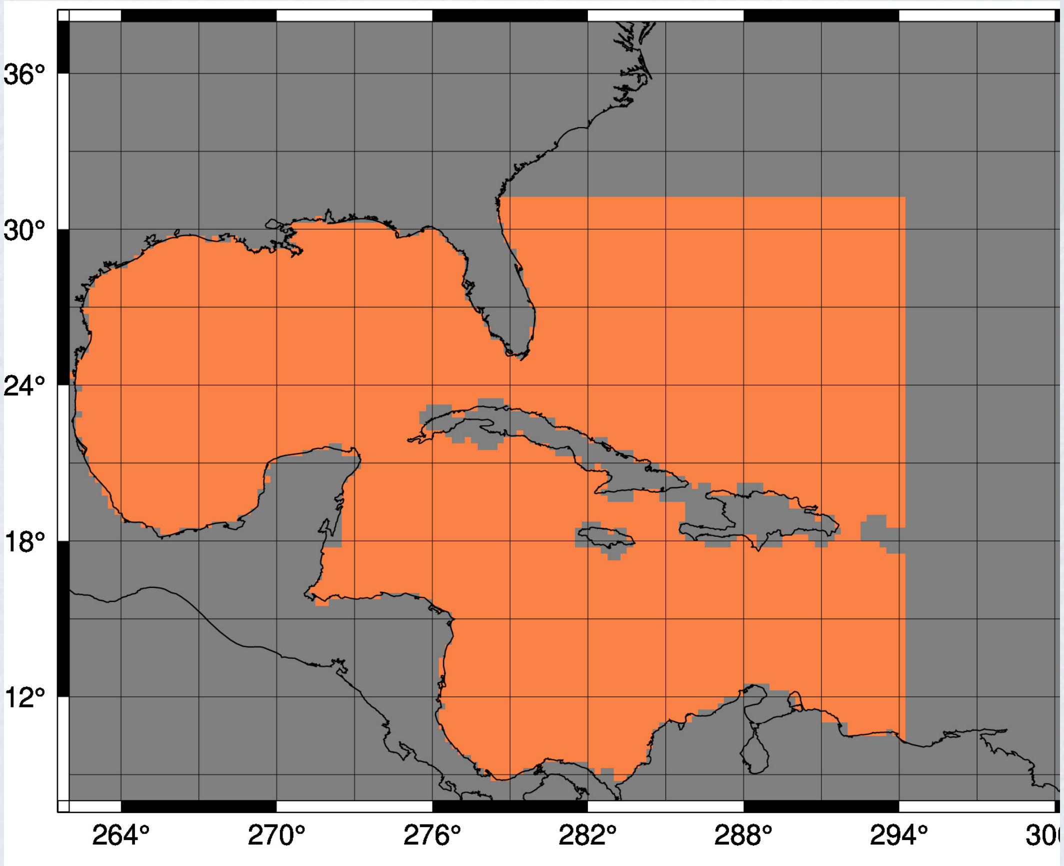
- We extracted altimetry data in the orange shaded region and computed the regional average of sea level over the past 30 years.
- The question is whether this will also show the regional sea level rise acceleration that many people in Florida and around the Gulf are concerned about.



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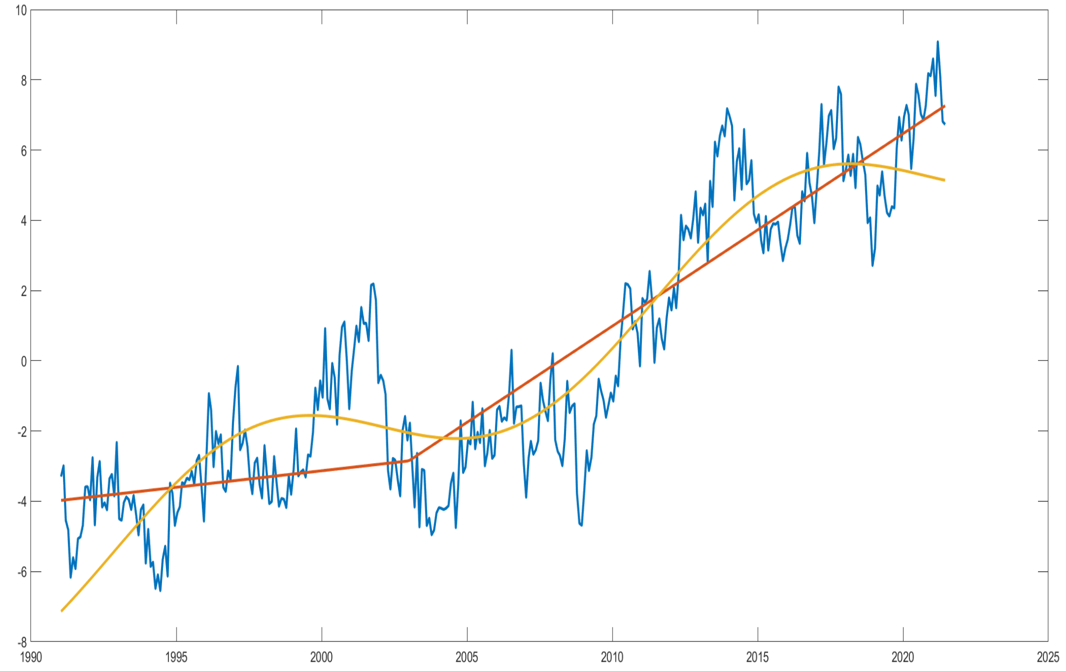
- We can see the signal that people are concerned about and with a better signal to noise ratio.
- But a constant (not accelerating) trend and an 18.6 year signal is a better fit to the data.
- On the other hand, the18.6 year signal is not clearly consistent with what would be expected from the nodal period tide.
- This is definitely a work in progress.



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