Coastal Sea Level Rise in the Philippines

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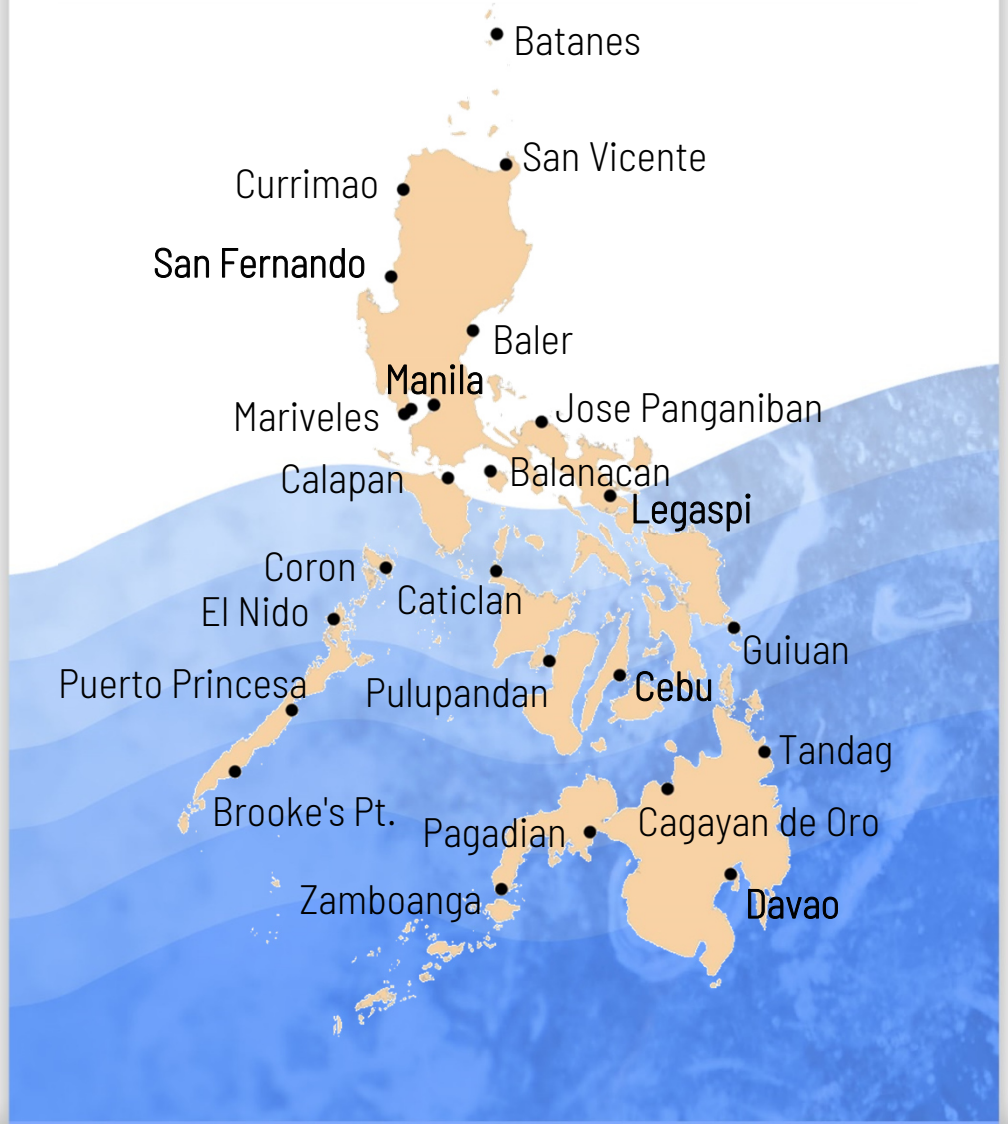
Objectives and Conceptual Framework

https://www.noaa.gov/explainers/tracking-sea-level-rise-and-fall

- To quantify the sea level rise (SLR) and rates at the 25 selected coastal areas in the Philippines using in-situ and space-based measurements.
- To determine influence of local factors contributing to SLR.
- To develop a low-cost GNSS tide gauge float and buoy for sea level monitoring.

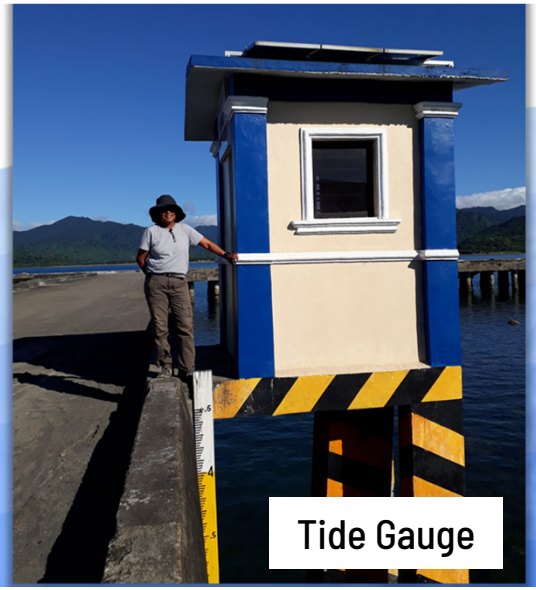
- Local sea level changes may be more or less than the global average of 3.4mm/yr (Nerem et al., 2018) based on local conditions.



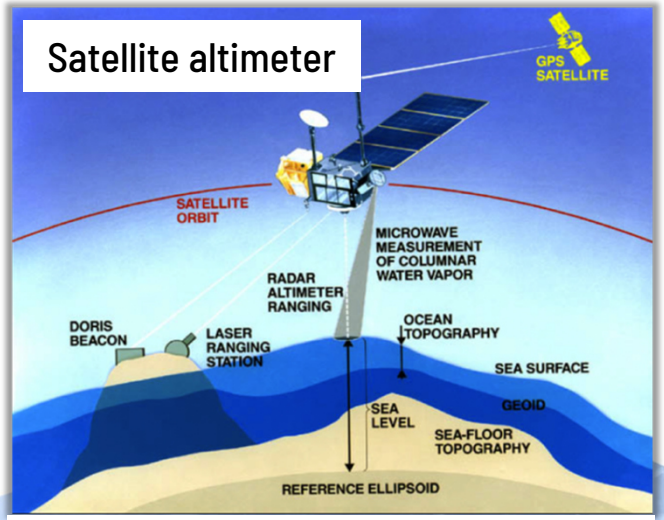
Study Sites

- 25 out of 50 sites with installed tide gauges (TG) were selected as study sites
- 8 of these TGs were collocated with GNSS receivers (Manila, San Fernando, Legaspi, Cebu, Guian, Cagayan de Oro, Davao, and El Nido)

Data Sources

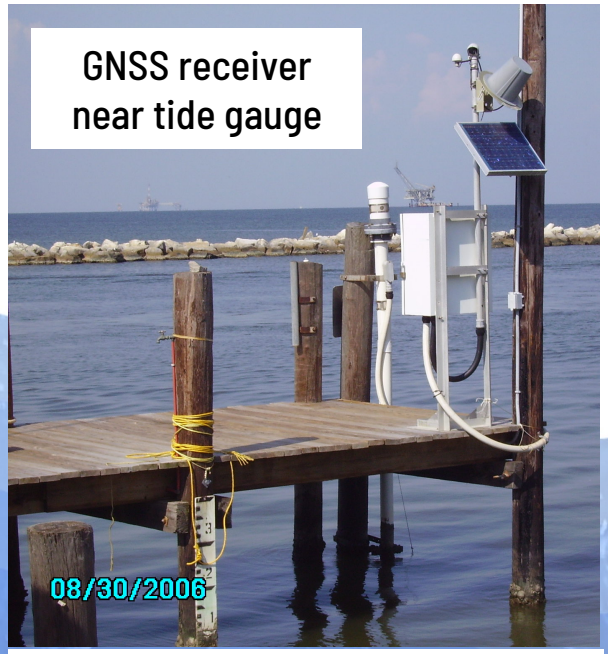


Affected by ground movement



Not affected by ground movement

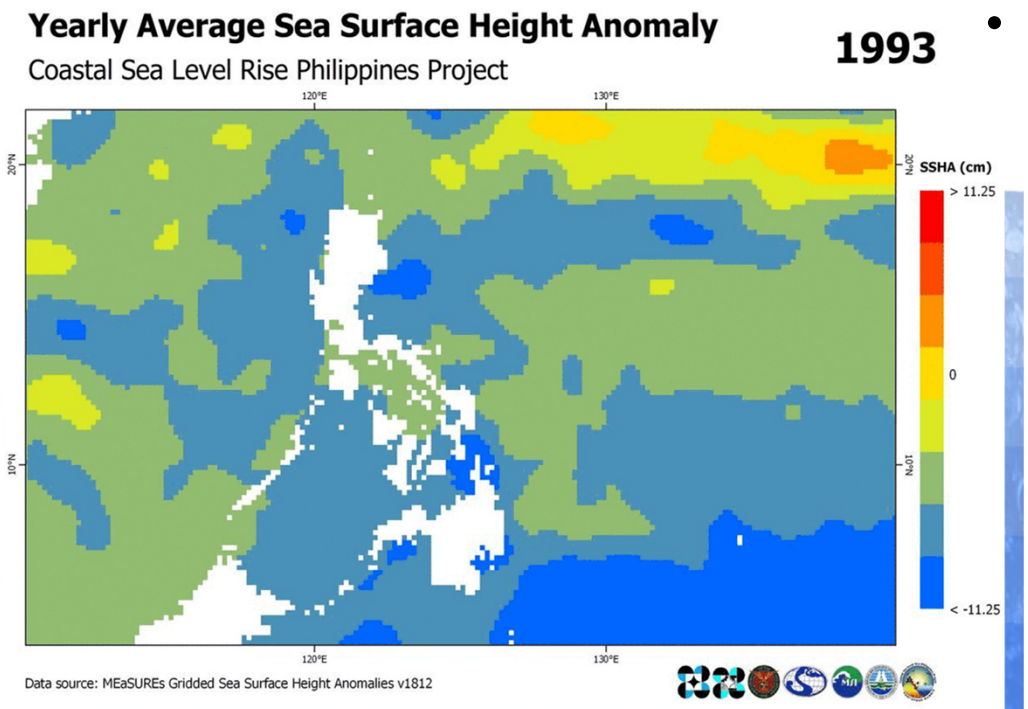
Detects ground movement

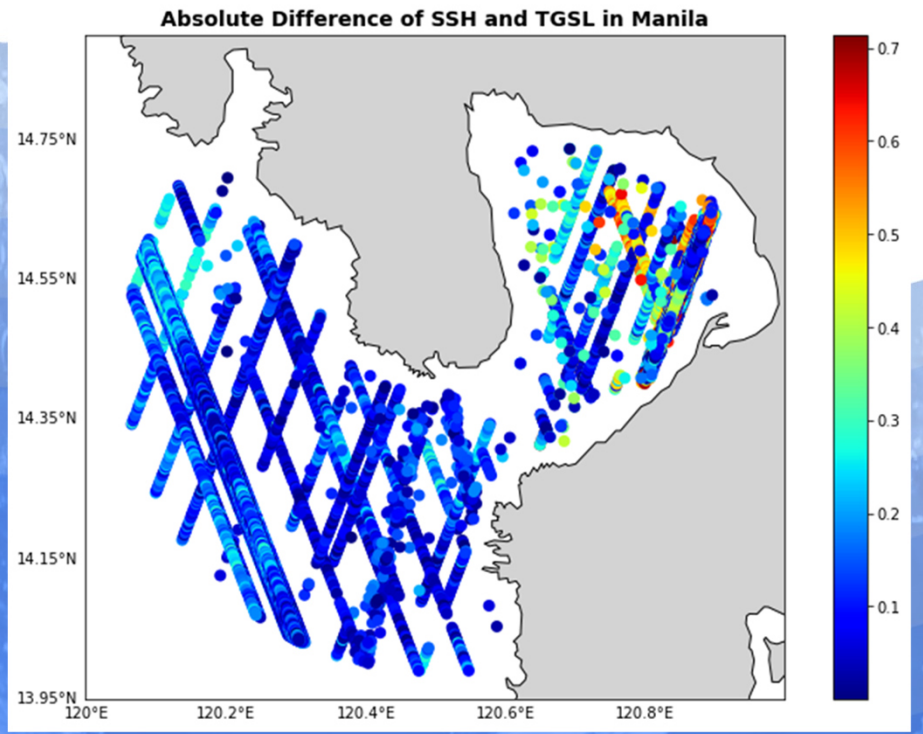


Detects ground movement

SA Pre-Processing

- Data from EnviSat, Topex Poseidon, Jason 1 to 3, Saral, Sentinel satellite missions (Along track and gridded data)
- SA data processed from 3 km from the coast to 50 km offshore



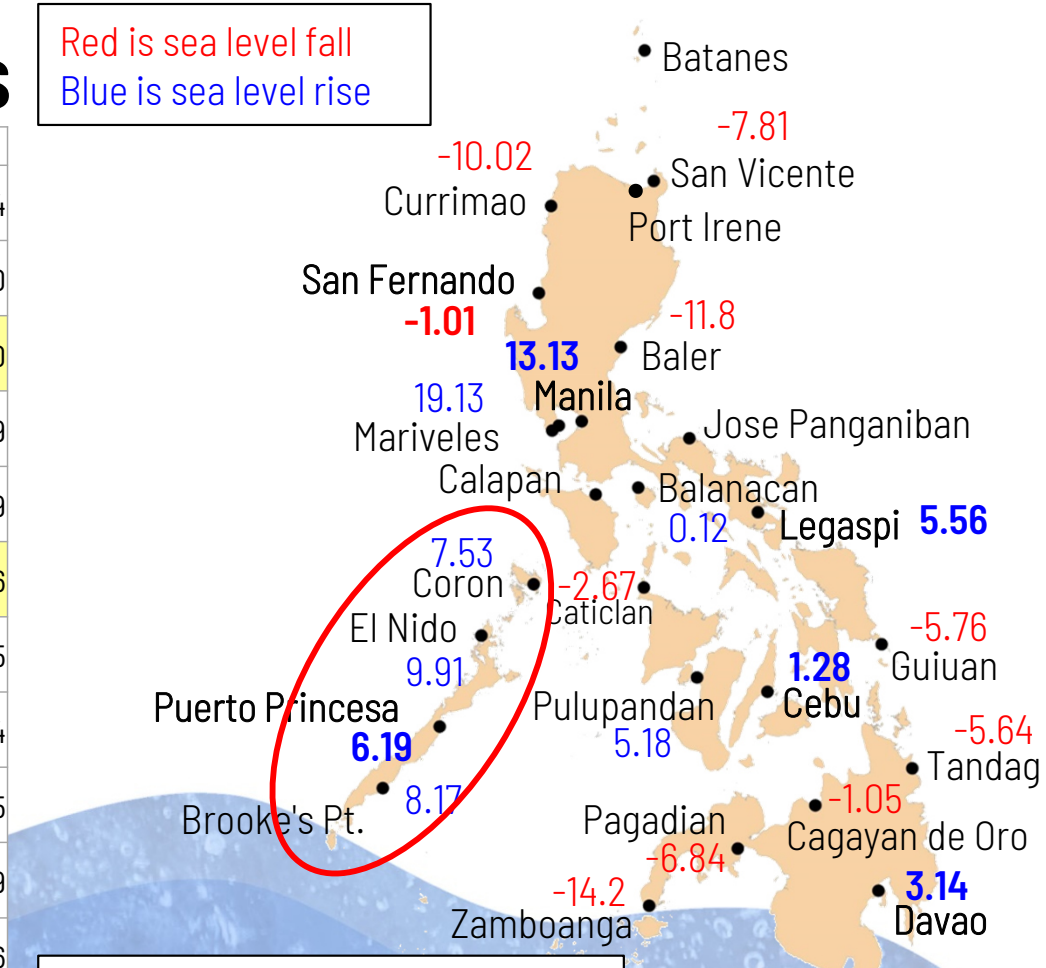


3 SA retracked products:
1) ALES; 2) XTRACK; and 3) MLE4

Results: TG SLR rates

Site	Period			Rate	Std err
Balanacan	2007-12-12	to	2020-12	0.12	0.64
Baler	2010-05-05	to	2020-07	-11.80	0.90
Batanes	2017-01-01	to	2020-12	-230.62	2.00
Brooke's Pt.	2008-01-01	to	2020-09	8.17	5.19
Cagayan de Oro	2007-10-10	to	2020-12	-1.05	0.49
Calapan	2009-08-08	to	2015-12	-63.11	1.46
Caticlan	2008-03-03	to	2020-11	-2.67	0.55
Cebu	1947-05-05	to	2020-12	1.28	0.04
Coron	2008-03-03	to	2020-12	7.53	0.55
Currimao	2007-11-11	to	2020-11	-10.02	0.29
Davao	1948-03-03	to	2020-12	3.14	0.06
El Nido	2014-01-01	to	2020-12	9.91	1.05
Guiuan	2008-01-01	to	2020-12	-5.76	0.31

Red is sea level fall
Blue is sea level rise

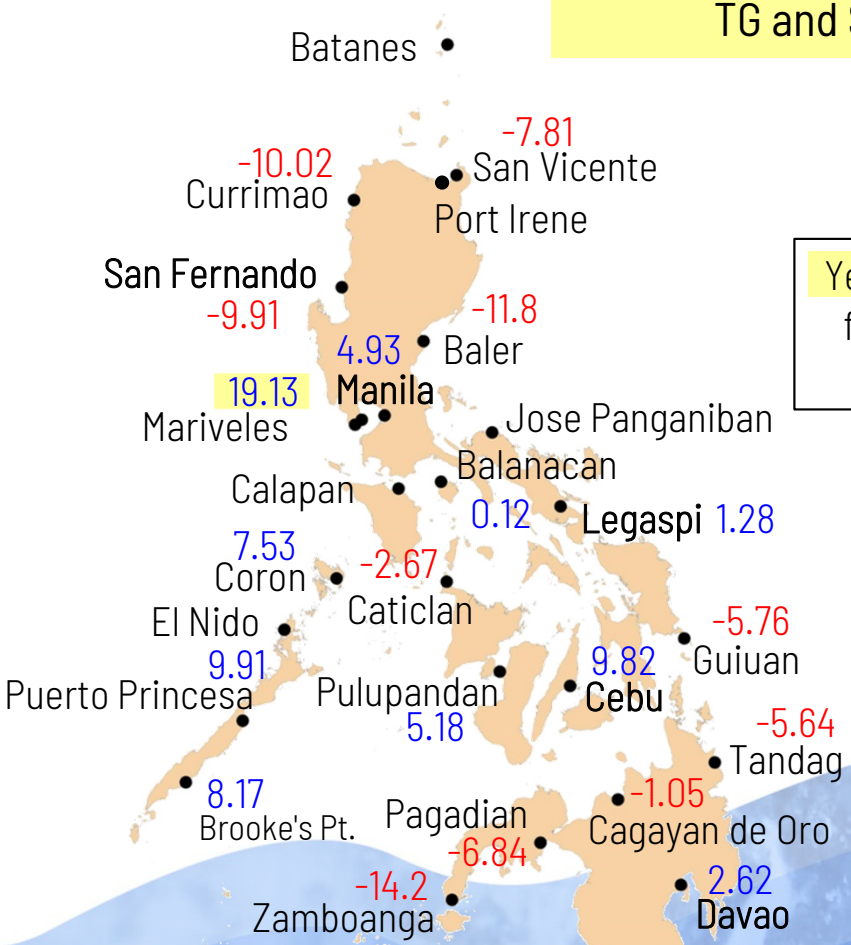


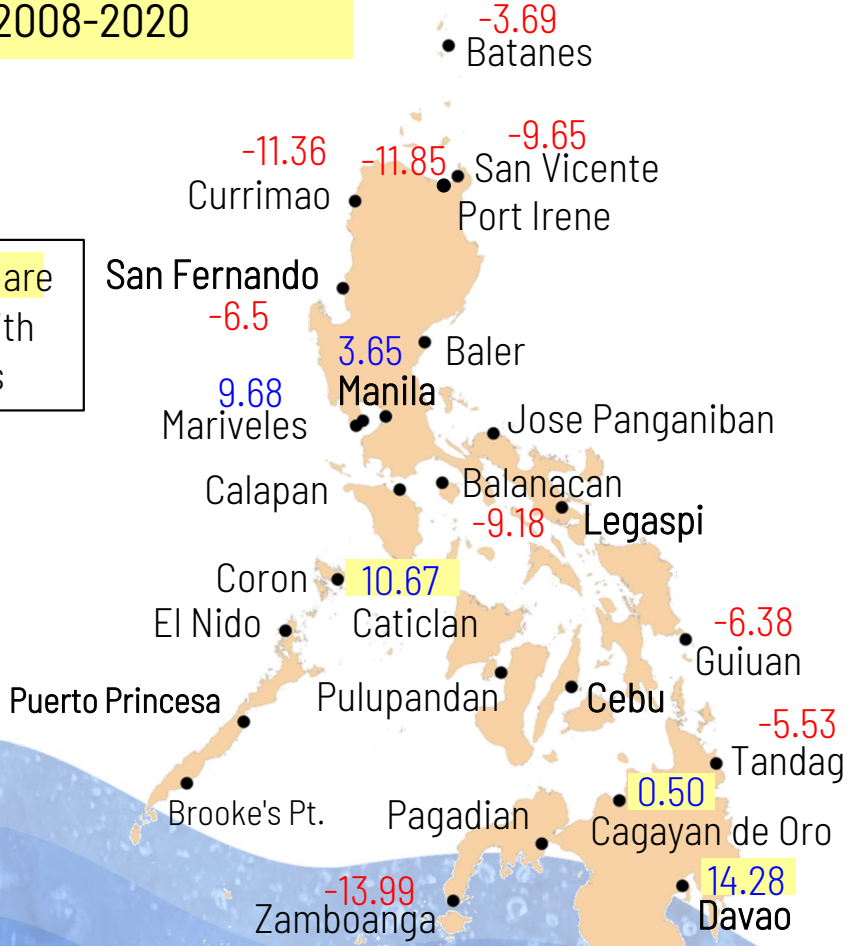
Note the period of observation!

Yellow shaded rows have numerous data gaps.

Same length and period of observation for TG and SA 20 Hz: 2008-2020

Yellow values are from data with many gaps





TG SLR rates

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