

Modern Sea Levels at Carrie Bow Cay, Mesoamerican Barrier Reef, Belize

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SI Physical Monitoring Network



Smithsonian
Institution

Modern sea levels at Carrie Bow Cay, Belize



Operated by the Smithsonian Marine Station at Fort Pierce FL (NMNH)
Caribbean Coral Reefs Ecosystem (CCRE) Program, est. 1972
15 miles offshore on the Mesoamerican Barrier Reef
<http://www.ccre.si.edu/>



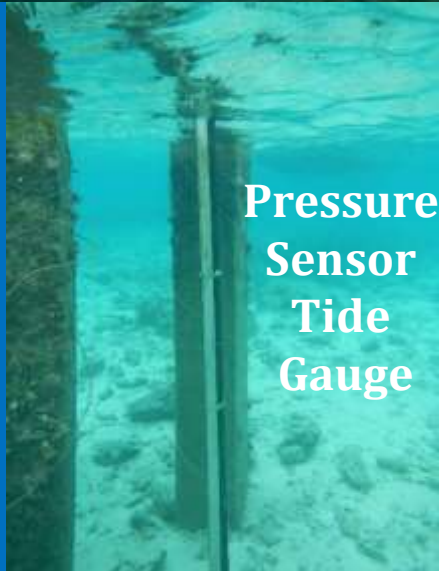
2015-
2016



New Instrument Platform



Radar Tide Gauge



Pressure
Sensor
Tide
Gauge



Small Platform, 90 m from benchmark, =“Xtreme” surveying, leveling

Geodetic network now includes a platform benchmark
No room for GPS tripod – Gorilla Tape + bipods!
Barely any room to level tide gauges to benchmark
Leveling Radar in choppy water = 4mm closure error!



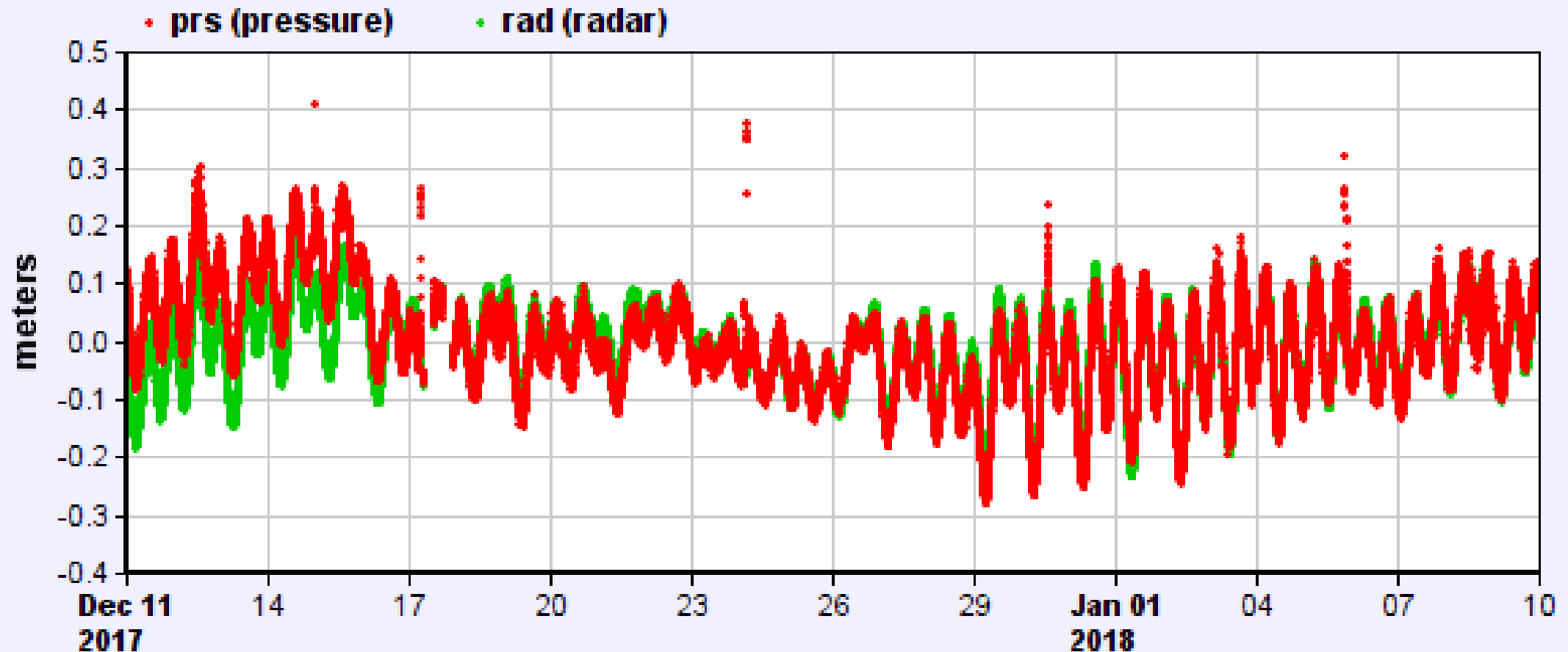
Carrie Bow Cay, Belize
Sea Level History - Monthly Averages
Caribbean Satellite Sea Level shown for reference¹



¹ http://sealevel.colorado.edu/files/current/sl_Caribbean_Sea.txt

Platform Radar/PS data – IOC since 2015

Sealevel at Carrie Bow Cay station (offset: 2.494 m)



From 2017-12-11 00:00+00:00 to 2018-01-10 00:00+00:00

© IOC-VLIZ

Tidal Statistics for CARRIE BOW CAY RADAR

Port details: TASK Analysis: 102 HCs ; Start: 19/04/2016 (000001) ;

End: 27/02/2018 (163094)

Datum of Predictions = Chart Datum

Highest Astronomical Tide (HAT): 2.82 metres

Lowest Astronomical Tide (LAT): 2.33 metres

Maximum Tidal Range possible: 0.33 metres

Mean High Water Spring (MHWS): 2.66 metres

Mean High Water Neap (MHWN): 2.62 metres

Mean Low Water Neap (MLWN): 2.54 metres

Mean Low Water Spring (MLWS): 2.49 metres

Tide Type: 0.54 (mixed - mainly semi-diurnal)

Shallow Water Influence: 0.02

Selected Period: 01/01/2018 to 31/12/2018

Highest Tide in this period: 2.80 metres

Lowest Tide in this period: 2.33 metres

Highest observed water level

Mean Higher High Water

Mean High Water

Diurnal Tide Level

Mean Tide Level

Mean Sea Level

Mean Low Water

Mean Lower Low Water

Lowest observed water level

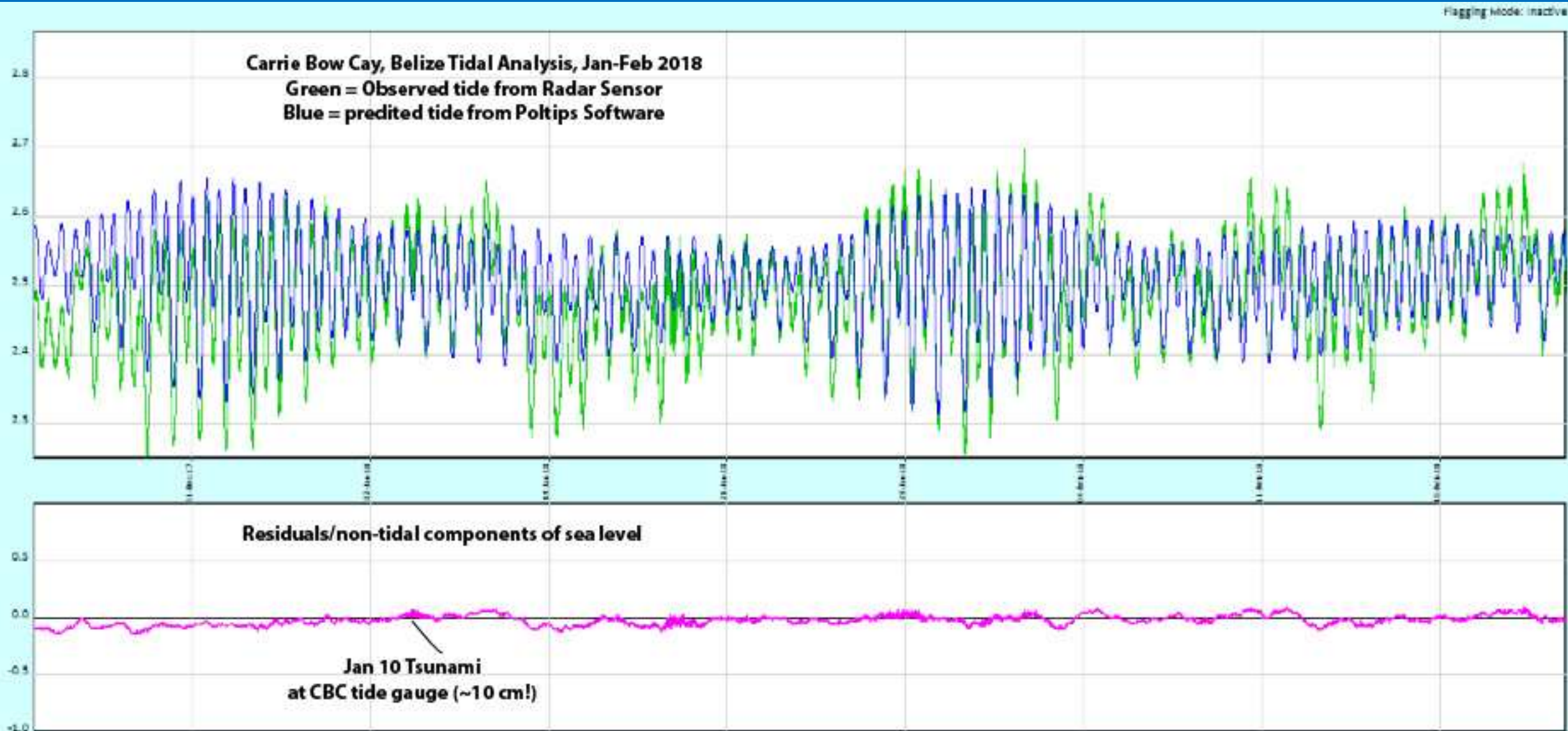
HWL	0.688	(Mar 19, 2003 09:00)
MHHW	0.516	
MHW	0.501	DHQ 0.014 Diurnal High Water Inequality
DTL	0.414	Diurnal Range of Tide GT 0.203
MTL	0.423	
MSL	0.421	MN 0.156 Mean Range of Tide
MLW	0.345	
MLLW	0.313	DLQ 0.032 Diurnal Low Water Inequality
LWL	0.164	(Feb 10, 2003 23:24)
HWI	9.57	
LWI	3.55	

Note: all numerical values in meters, except for HWI and LWI (which are in units of hours)

Computed from 5-months of tabulated observations:
January thru May 2003

Source; CO-OPS 11/19/2012

TASK Plot – Jan 2018 Tsunami detection:



Thankful for:

Tide Tables – an exciting development for field research!

Still Need:

- CSV or text file containing date-time, observed tide, predicted tide, residuals;
- Need to create other graphics for publications and field station websites;
- Need to compute other indices such as rate of SLR

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a Biodiverse Planet*



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Belize



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National Geodetic
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Smithsonian MarineGEO
Panama

Smithsonian Tropical Research Institute



PANAMA