Maintaining Spatial Data Accuracy in an Increasingly Space-based National Park Service

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National Park Service
Assateague Island National Seashore/
Resource Information Services Division

EXPERIENCE YOUR AMERICA

Our Mission

"....to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

1916 NPS Organic Act

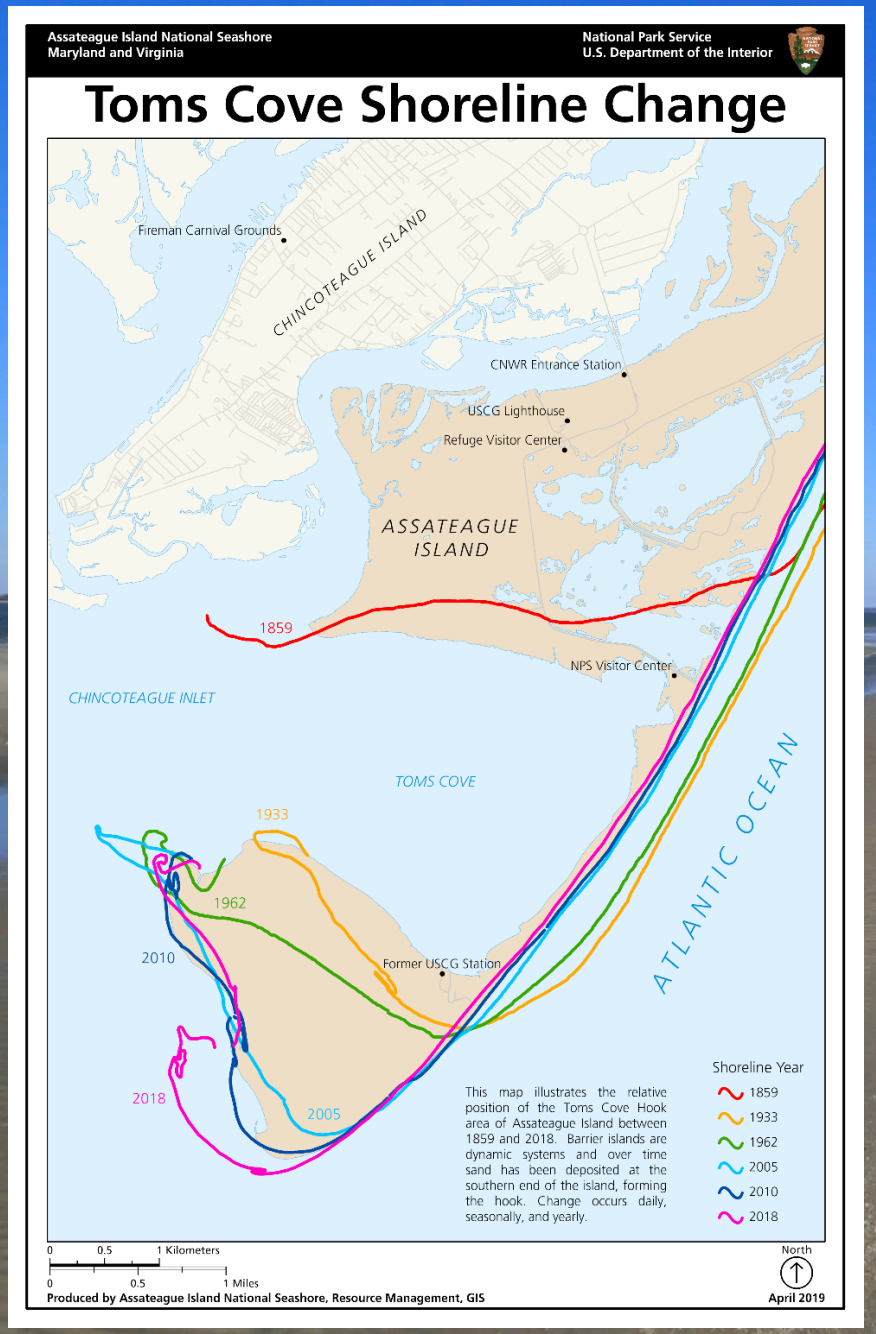
Golden Gate National Recreation Area - California

Presentation Overview

- Importance of Data Accuracy
  - 3 examples
    - Assateague Island NS, Saguaro NP, Cape Hatteras NS
- Reliance on GPS, Productivity with GNSS
- A Complex Future

Dry Tortugas National Park - Florida

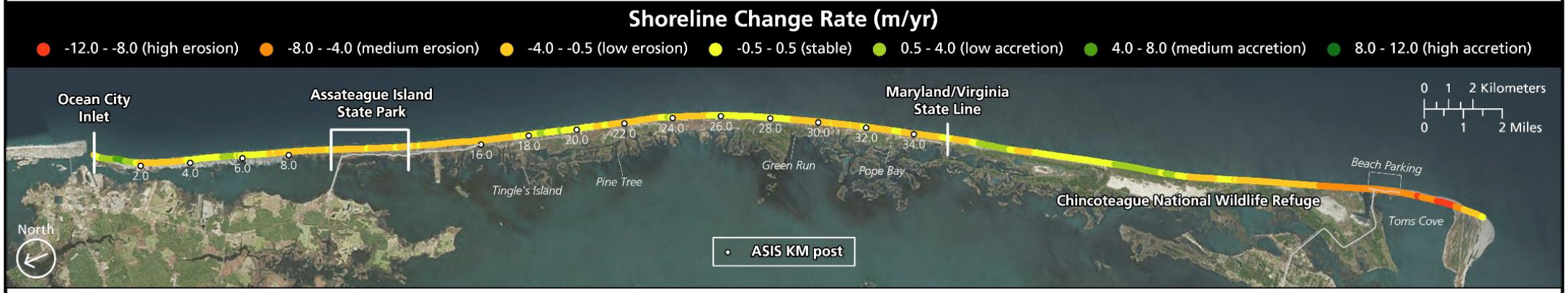
Assateague Island NS Shoreline Monitoring

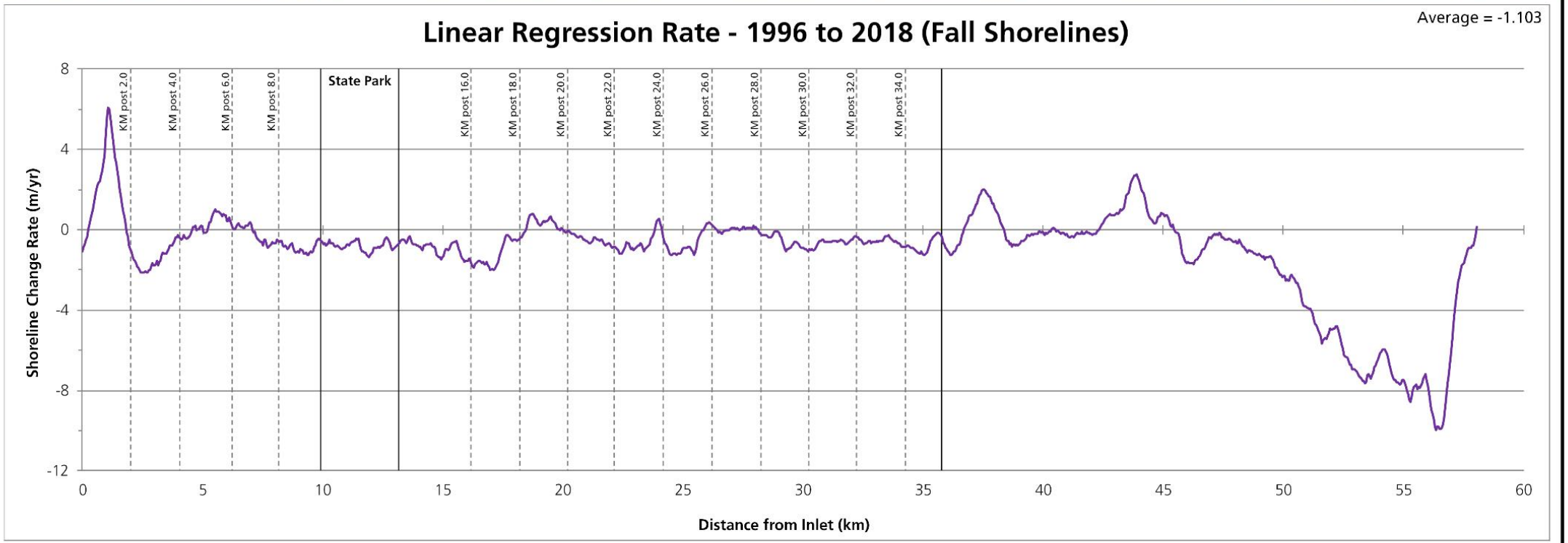


Assateague Island National Seashore
Maryland and Virginia

National Park Service
U.S. Department of the Interior

Assateague Island Oceanic Shoreline Change Rates





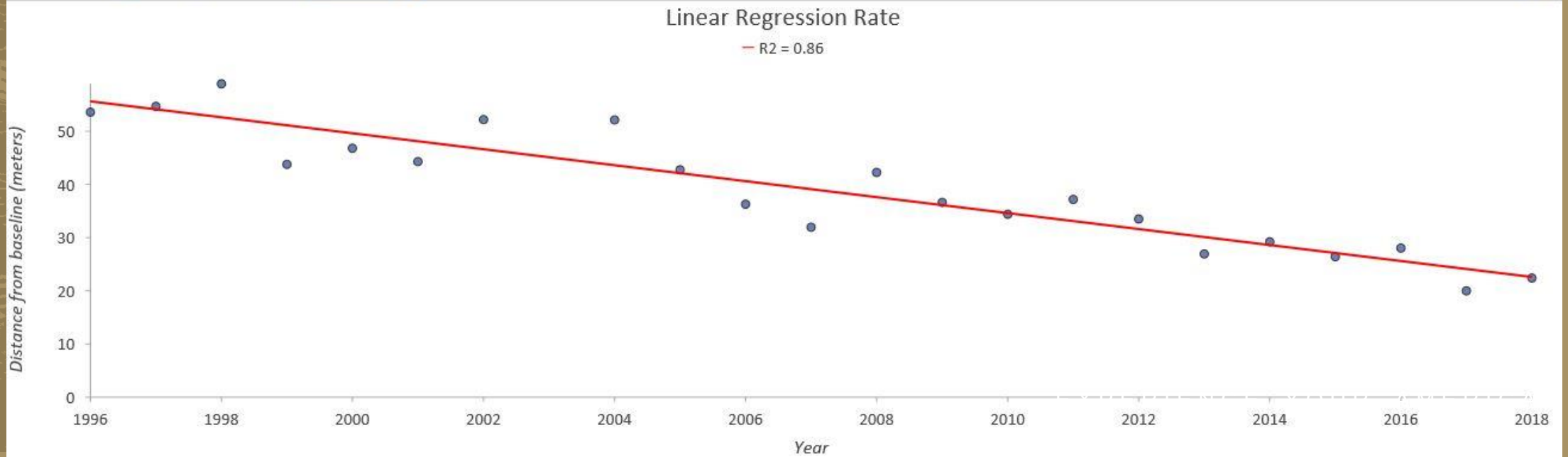
Produced by Assateague Island National Seashore, Resource Management, GIS

March 2019

1:4,480 | 486,009.36E 4,228,029.24N m | Selected Features: 23

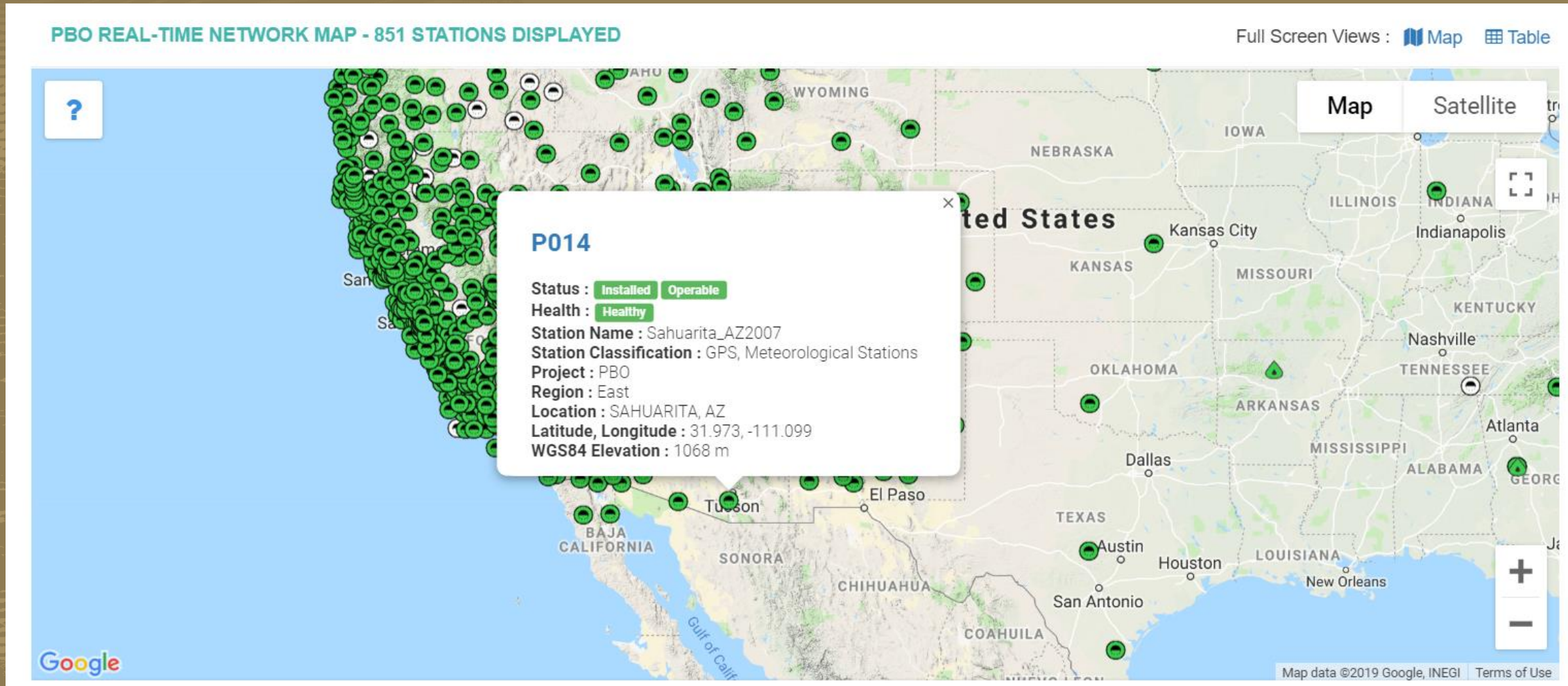
Transects_50m_2018_i...Regression Rate

Properties | Export | Sort | Filter: Selection | Extent | Attribute Table | Rotate Chart



Saguaro National Park: Vegetation Monitoring

Saguaro National Park: Vegetation Monitoring



Saguaro National Park: Vegetation Monitoring

NGS OPUS SOLUTION REPORT
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All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: https://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: lauren_kramer@nps.gov DATE: February 12, 2019
RINEX FILE: log0043o.19o TIME: 21:33:33 UTC

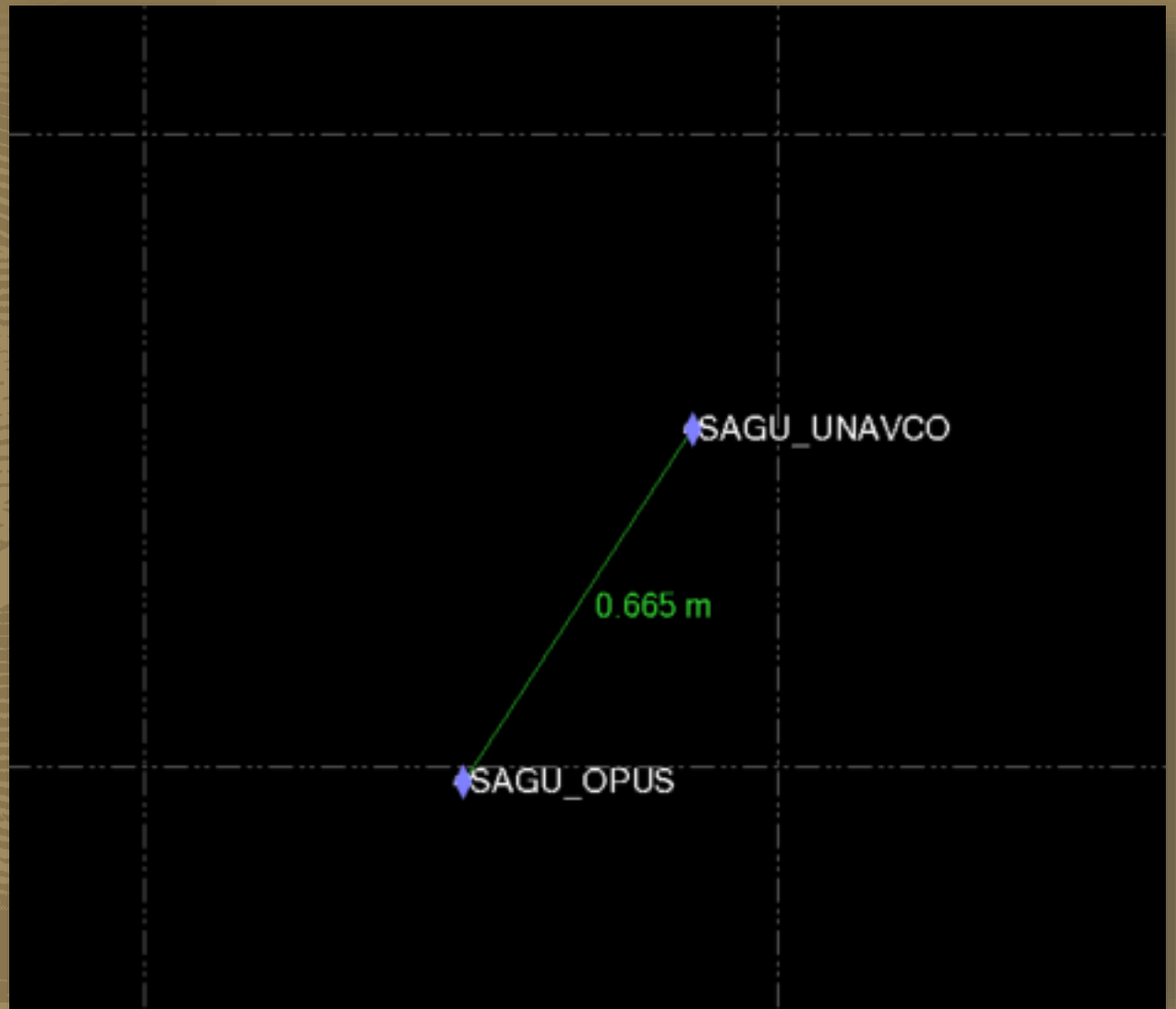
SOFTWARE: page5 1603.24 master91.pl 160321 START: 2019/02/12 14:56:00
EPHEMERIS: igu20402.eph [ultra-rapid] STOP: 2019/02/12 17:28:00
NAV FILE: brdc0430.19n OBS USED: 8484 / 8733 : 97%
ANT NAME: JAVTRIUMPH_2A NONE # FIXED AMB: 49 / 50 : 98%
ARP HEIGHT: 2.025 OVERALL RMS: 0.014(m)

REF FRAME: NAD_83(2011)(EPOCH:2010.0000) IGS08 (EPOCH:2019.1169)

X:	-1913485.944(m)	0.018(m)	-1913486.804(m)	0.018(m)
Y:	-5054189.902(m)	0.037(m)	-5054188.521(m)	0.037(m)
Z:	3377740.383(m)	0.018(m)	3377740.210(m)	0.018(m)

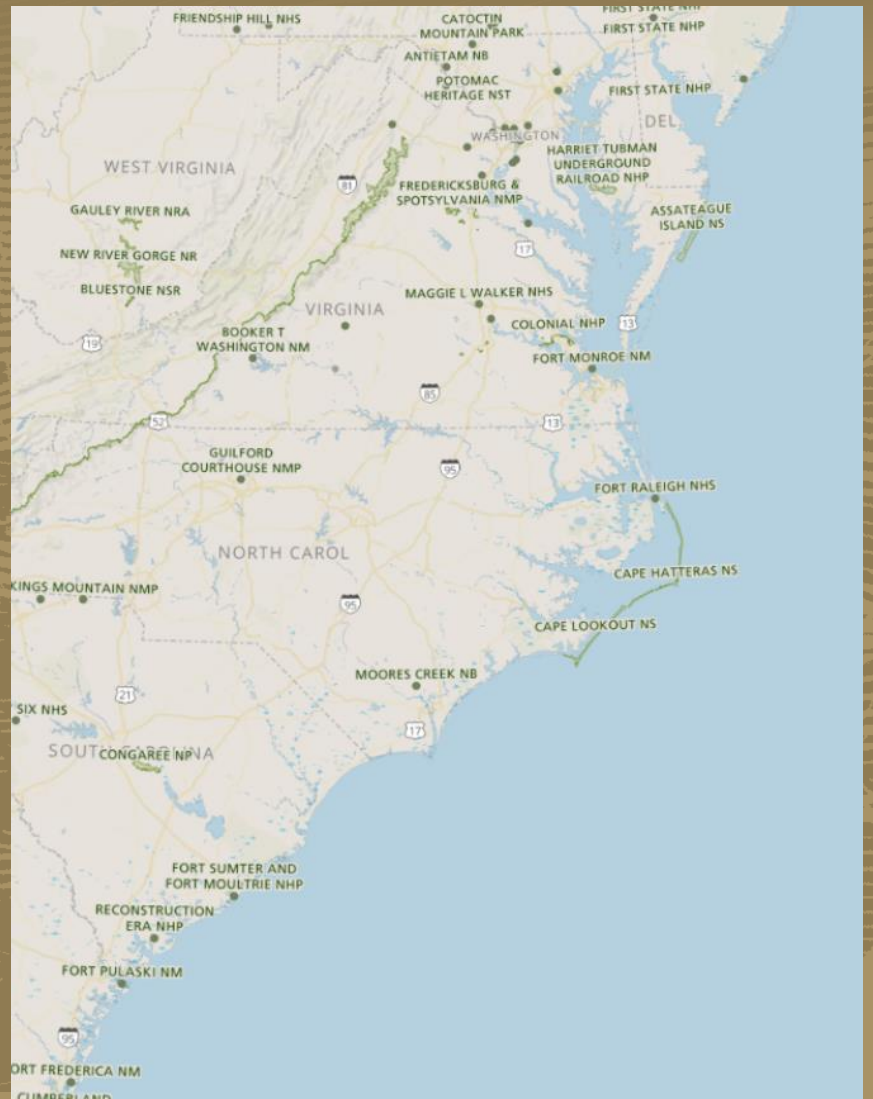
LAT:	32 10 44.64624	0.006(m)	32 10 44.65852	0.006(m)
E LON:	249 15 49.08676	0.004(m)	249 15 49.03740	0.004(m)
W LON:	110 44 10.91324	0.004(m)	110 44 10.96260	0.004(m)
EL HGT:	912.682(m)	0.045(m)	911.754(m)	0.045(m)
ORTHO HGT:	941.220(m)	0.052(m)	[NAVD88 (Computed using GEOID12B)]	

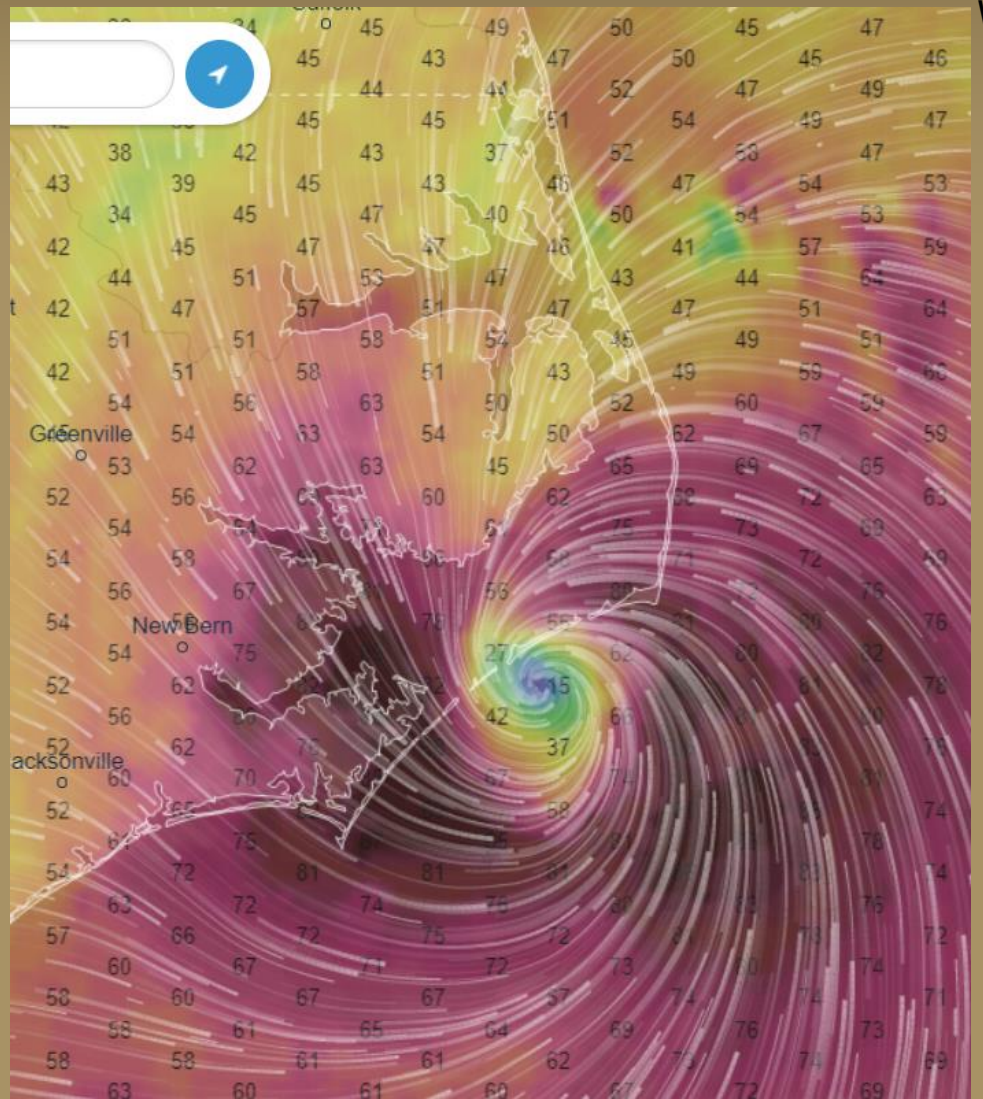
Saguaro National Park: Vegetation Monitoring



Cape Hatteras NS: Building Elevations

Hurricane Dorian
September 6, 2019 8:00am ET
Ventusky.com





Cape Hatteras NS: Building Elevations

Shared Solution

PID: BBDL50
Designation: 2587 A 2006
Stamping: 2587 A 2006
Stability: Monument will probably hold position well
Setting: Stainless steel rod in sleeve (10FT+ or 3.048M+)
Description: THE BENCHMARK IS LOCATED ON THE MARINA PROPERTY SSE OF THE OREGON INLET FISHING CENTER. THE BENCH MARK DATUM POINT IS THE TOP OF A STAINLESS STEEL ROD DRIVEN 84 FT (25.6 M) TO REFUSAL AND ENCASED IN A 3 FT (0.9 M) SLEEVE WITH A CONCRETE KICK BLOCK, 3.5 M (11.5 FT) WEST OF THE FACE OF THE YAUCHT BASIN BULK HEAD, 1.0 M (3.3 FT) SSW OF A 3 FT (0.9 M) X 2.5 FT (0.8 M) CONCRETE WINDBIRD PAD, 0.22 M (0.72 FT) EAST OF THE WITNESS POST.
Observed: 2014-03-11T17:25:00Z
Source: OPUS - page5 1209.04

Close-up View

REF_FRAME: NAD_83(2011) | EPOCH: 2010.0000 | SOURCE: NAVD88 (Computed using GEOID12B) | UNITS: m | SET PROFILE | DETAILS

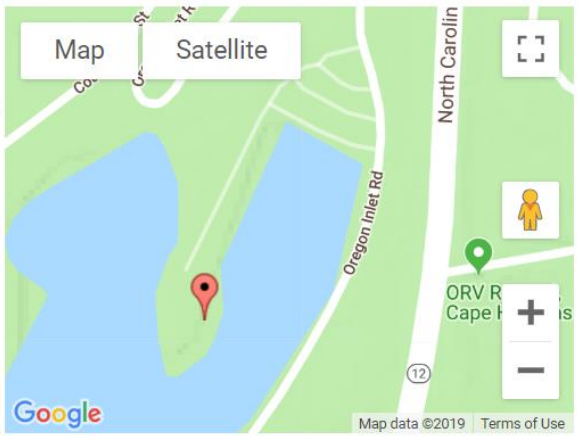
LAT:	35° 47' 44.45557"	± 0.006 m
LON:	-75° 32' 53.58589"	± 0.004 m
ELL HT:	-38.221	± 0.002 m
X:	1292562.927	± 0.004 m
Y:	-5015378.335	± 0.003 m
Z:	3709804.762	± 0.005 m
ORTHO HT:	0.712	± 0.015 m

	UTM 18	**SPC** 3200(NC)
NORTHING:	3961425.616m	232355.459m
EASTING:	450463.011m	921538.809m
CONVERGENCE:	-0.32065752°	1.99226572°
POINT SCALE:	0.99963024	0.99991755
COMBINED FACTOR:	0.99963624	0.99992355

CONTRIBUTED BY

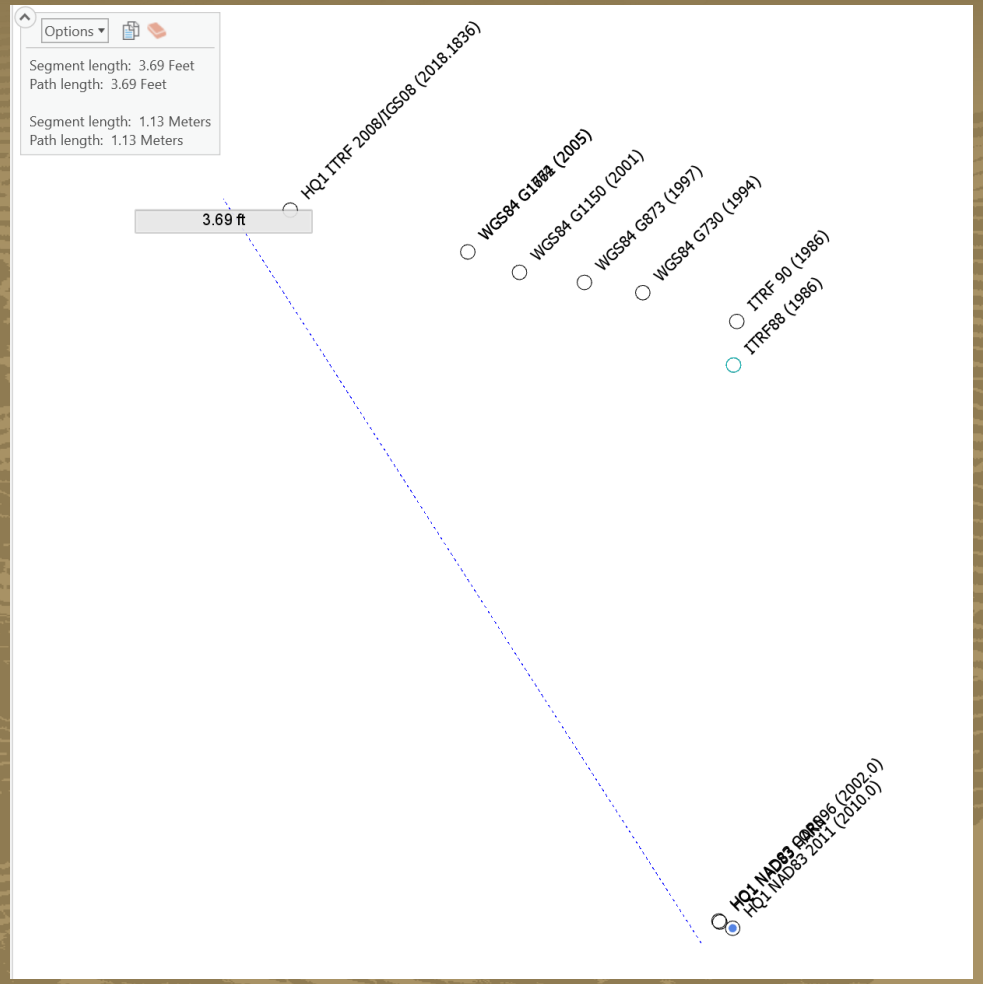
matthew.r.forrest
Center for Operational Oceanographic Products and Services

Horizon View

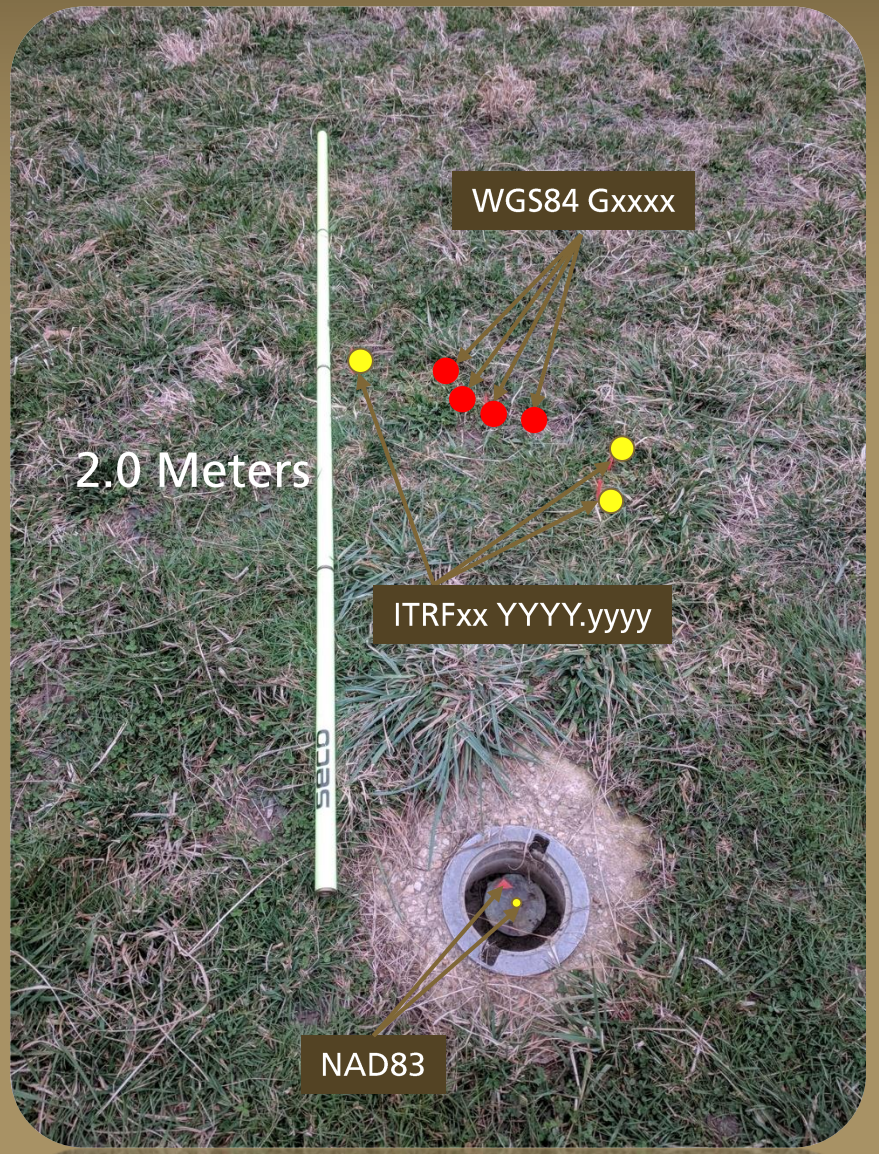


Managing Position Accuracy

Assateague Island National Seashore - Maryland



Datum Conversion Source: HTDP



Reliance on GPS: OPUS Survey Control

NGS OPUS SOLUTION REPORT
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All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: https://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

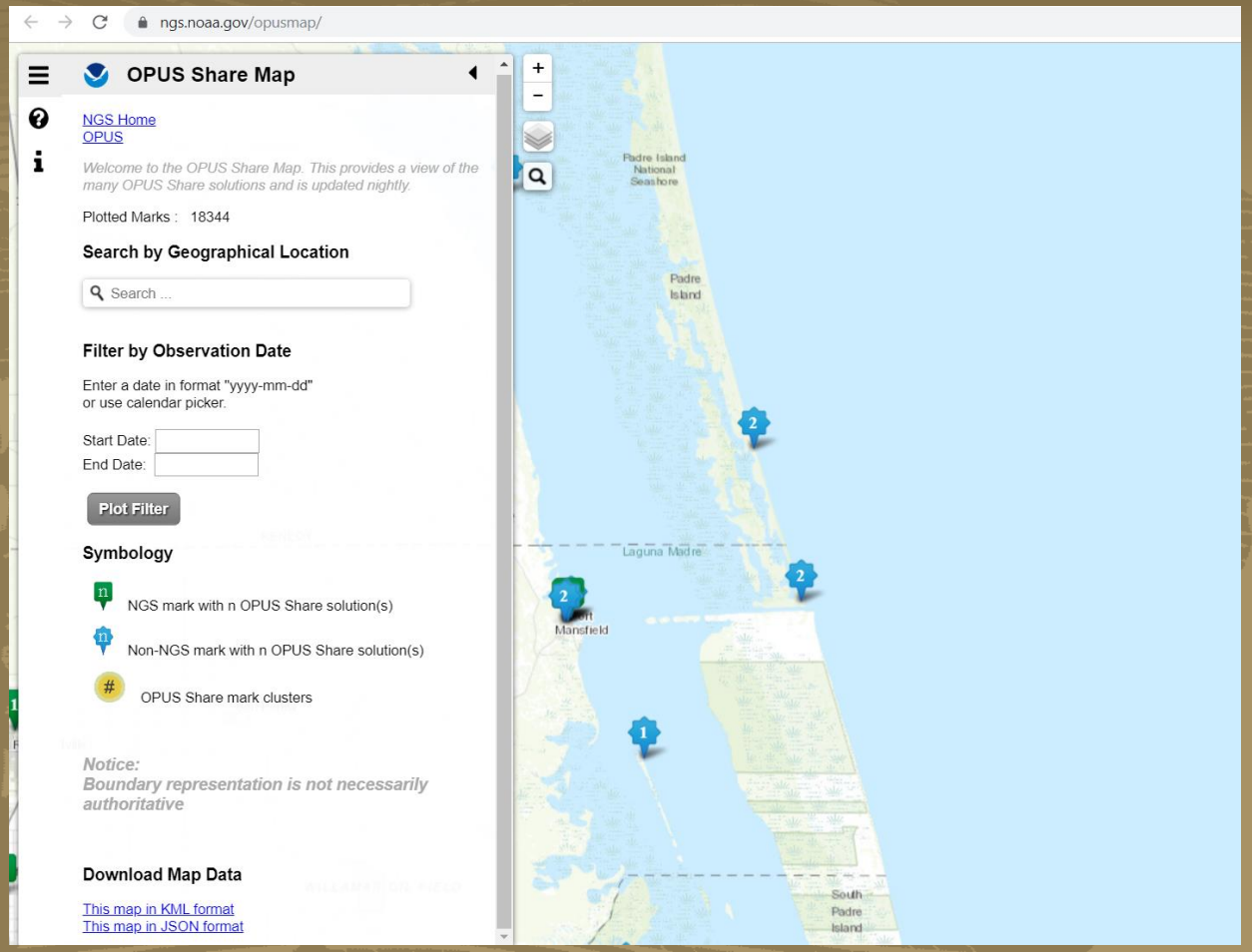
USER: neil_winn@nps.gov DATE: June 15, 2017
RINEX FILE: 0241153s.17o TIME: 16:09:42 UTC

SOFTWARE: page5 1603.24 master90.pl 160321 START: 2017/06/02 18:38:00
EPHEMERIS: igr19515.eph [rapid] STOP: 2017/06/03 17:55:00
NAV FILE: brdc1530.17n OBS USED: 59086 / 61782 : 96%
ANT NAME: TRMR10 NONE # FIXED AMB: 197 / 217 : 91%
ARP HEIGHT: 1.7 OVERALL RMS: 0.017(m)

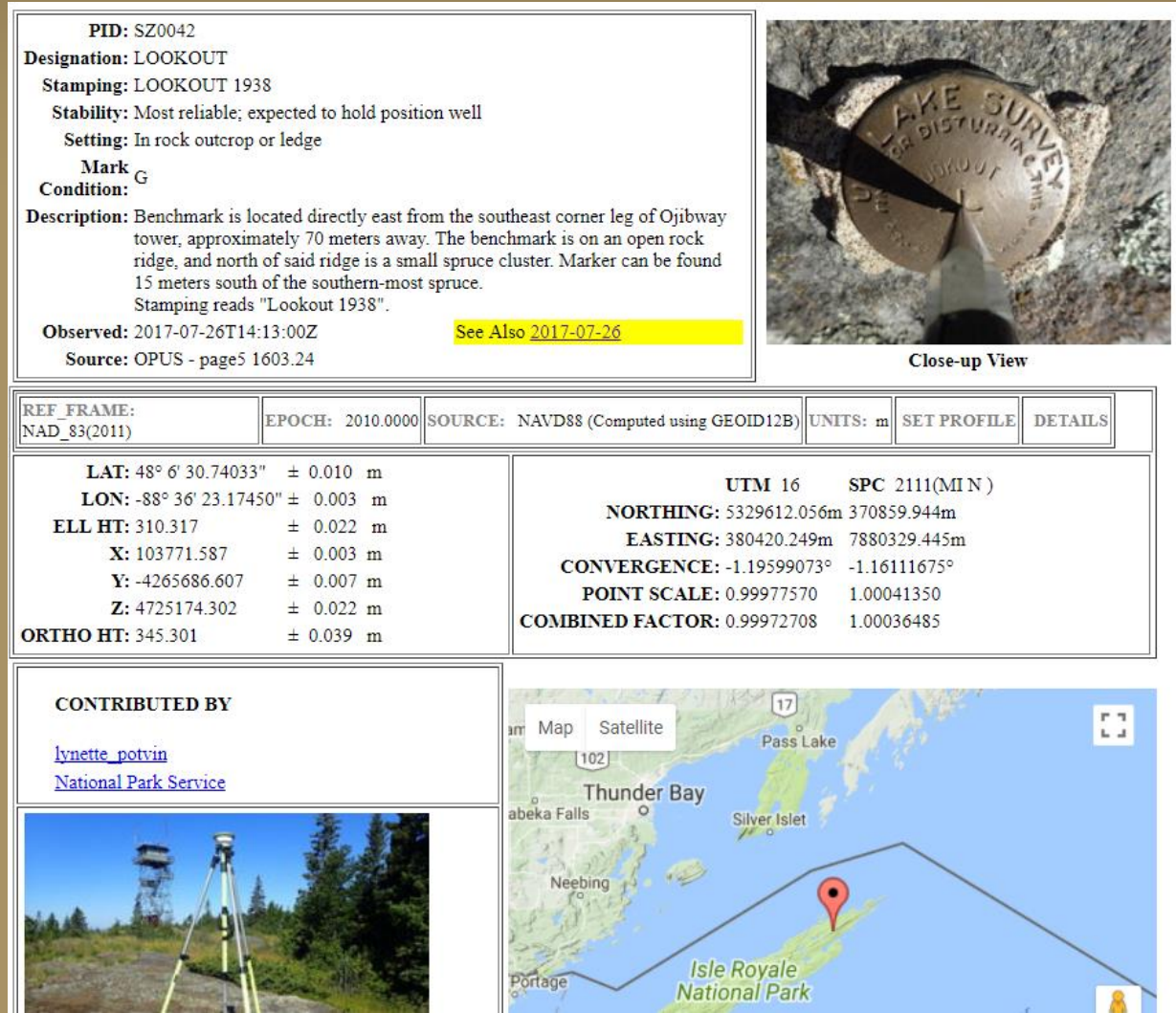
REF FRAME:	NAD_83(2011)(EPOCH:2010.0000)		IGS08 (EPOCH:2017.4199)	
X:	-719099.726(m)	0.006(m)	-719100.534(m)	0.006(m)
Y:	-5618584.924(m)	0.013(m)	-5618583.427(m)	0.013(m)
Z:	2921850.552(m)	0.011(m)	2921850.342(m)	0.011(m)
LAT:	27 26 34.59894	0.015(m)	27 26 34.61359	0.015(m)
E LON:	262 42 23.75194	0.008(m)	262 42 23.71583	0.008(m)
W LON:	97 17 36.24806	0.008(m)	97 17 36.28417	0.008(m)
EL HGT:	-22.207(m)	0.006(m)	-23.530(m)	0.006(m)
ORTHO HGT:	3.346(m)	0.016(m)	[NAVD88 (Computed using GEOID12B)]	

Padre Island National Seashore - Texas

Reliance on GPS: Survey Control



https://ngs.noaa.gov/opusmap



PID: SZ0042
Designation: LOOKOUT
Stamping: LOOKOUT 1938
Stability: Most reliable; expected to hold position well
Setting: In rock outcrop or ledge
Mark Condition: G
Description: Benchmark is located directly east from the southeast corner leg of Ojibway tower, approximately 70 meters away. The benchmark is on an open rock ridge, and north of said ridge is a small spruce cluster. Marker can be found 15 meters south of the southern-most spruce.
Stamping reads "Lookout 1938".
Observed: 2017-07-26T14:13:00Z See Also 2017-07-26
Source: OPUS - page5 1603.24

Close-up View

REF_FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12B)	UNITS: m	SET PROFILE	DETAILS

LAT:	48° 6' 30.74033"	± 0.010 m
LON:	-88° 36' 23.17450"	± 0.003 m
ELL HT:	310.317	± 0.022 m
X:	103771.587	± 0.003 m
Y:	-4265686.607	± 0.007 m
Z:	4725174.302	± 0.022 m
ORTHO HT:	345.301	± 0.039 m

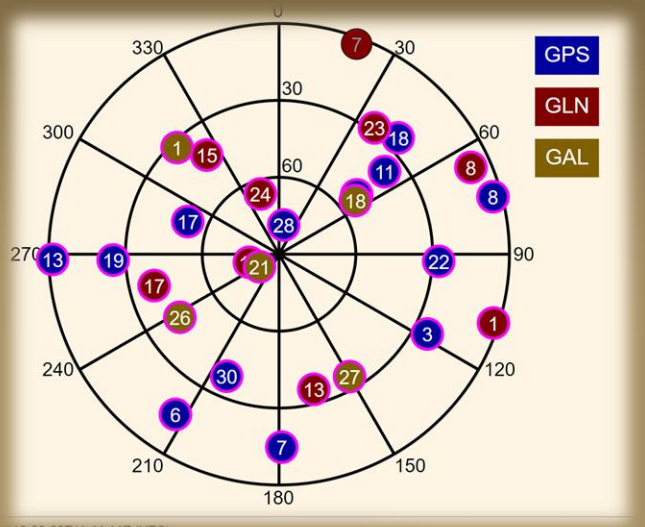
	UTM 16	SPC 2111(MI N)
NORTHING:	5329612.056m	370859.944m
EASTING:	380420.249m	7880329.445m
CONVERGENCE:	-1.19599073°	-1.16111675°
POINT SCALE:	0.99977570	1.00041350
COMBINED FACTOR:	0.99972708	1.00036485

CONTRIBUTED BY

lynette_potvin
National Park Service

Productivity Improved with GNSS

Death Valley National Park (Devil's Hole) - Nevada



Jean Lafitte National Historical Park and Preserve - Louisiana

A Complex Future:
Denali NP UAV Survey

A Complex Future:
Denali NP UAV Survey

Field Spatial Data Collection: A Complex Roadmap

- Increasingly Diverse Field Equipment
- Accuracy as a Service
- Dual-frequency GNSS in a smartphone
  - Four available as of May 2019

Golden Gate National Recreation Area - California

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