

An aerial photograph of Granite Island in Lake Superior, showing its rugged, rocky terrain and surrounding water. The island is the central focus of the slide, with the text overlaid on it.

Granite Island in Lake Superior

A new BSRN water site proposal

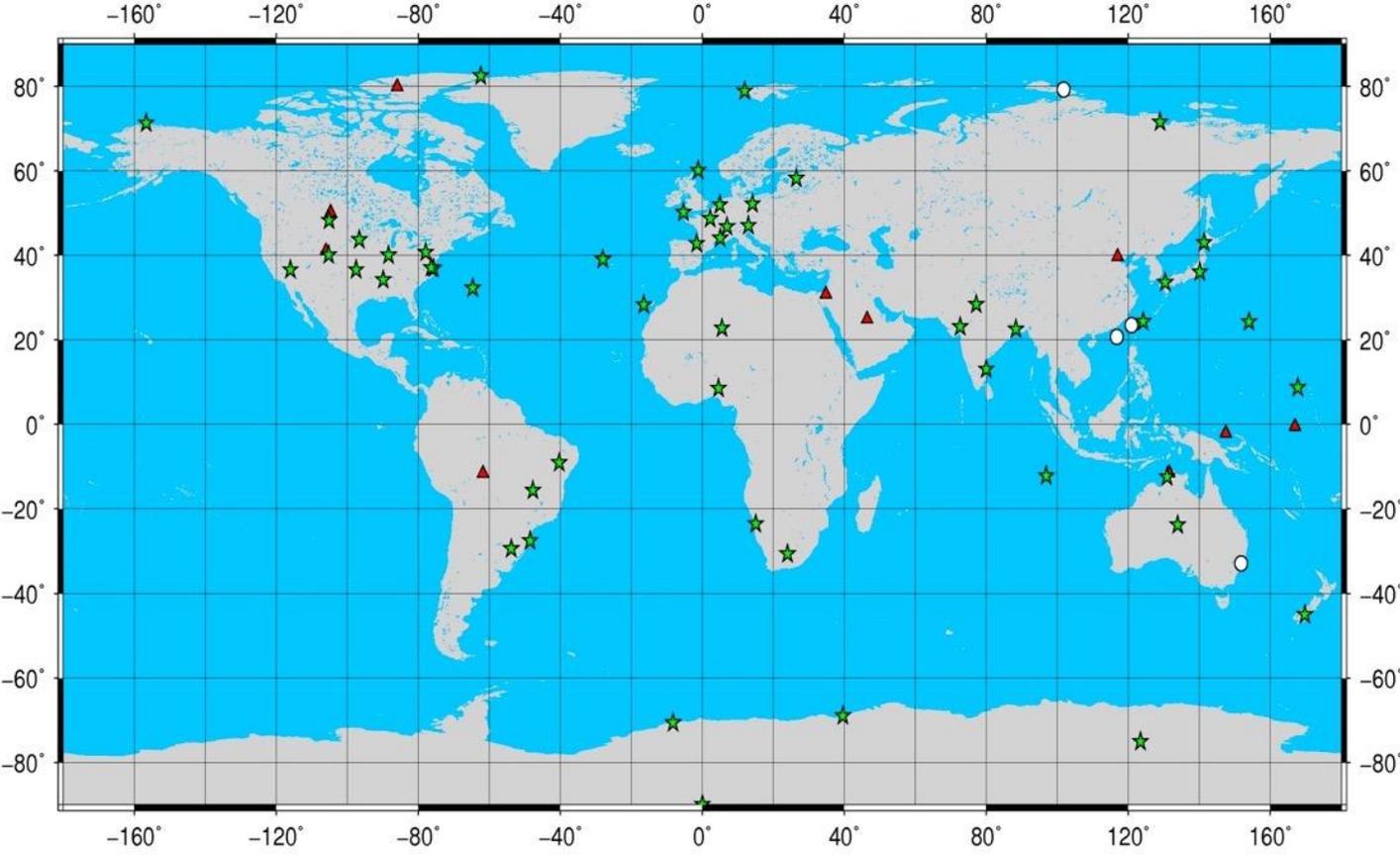
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1- Science Systems and Applications, Inc. (SSAI), 2- Nasa Langley Research Center

15th BSRN Scientific Review and Workshop – Boulder, Colorado, USA

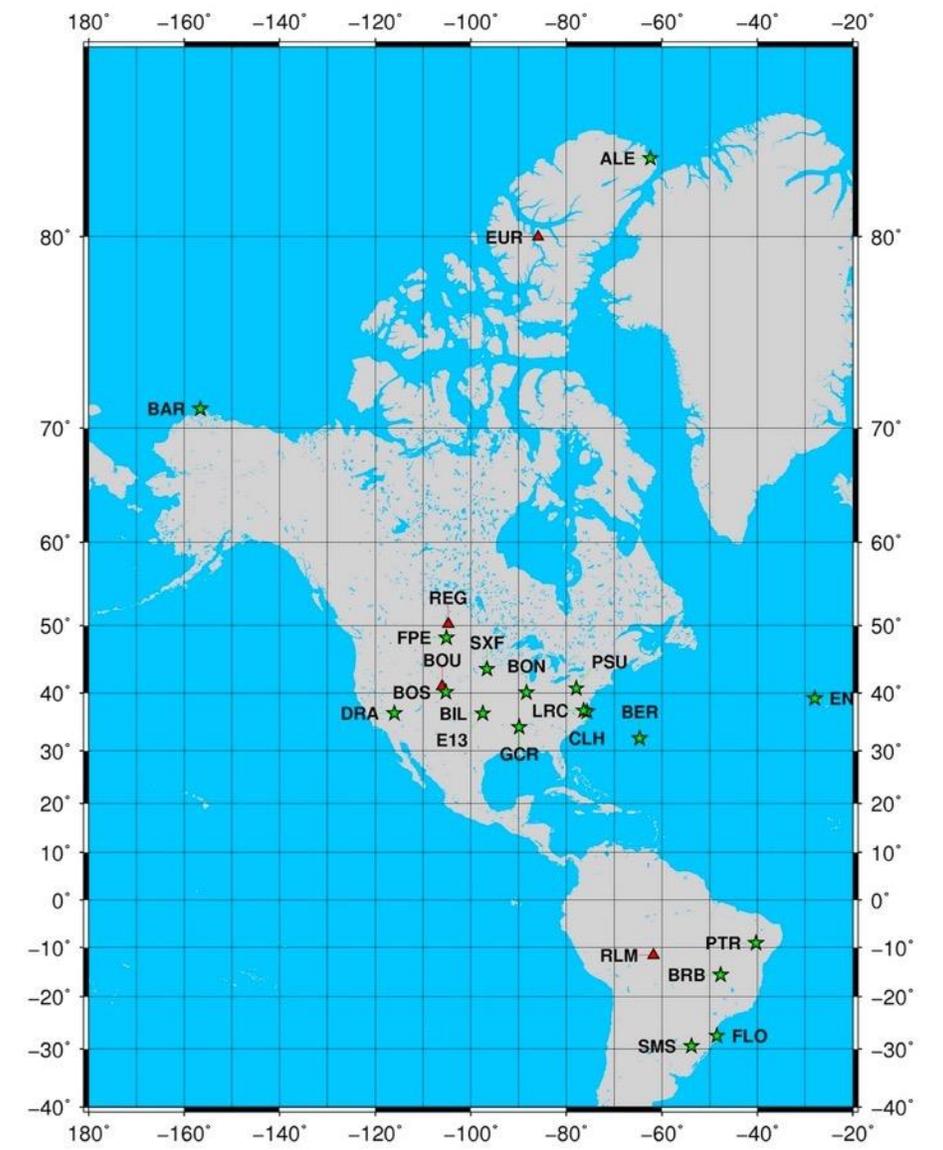
2018 July 16-20

Running, planned, and closed BSRN Stations, April 2018



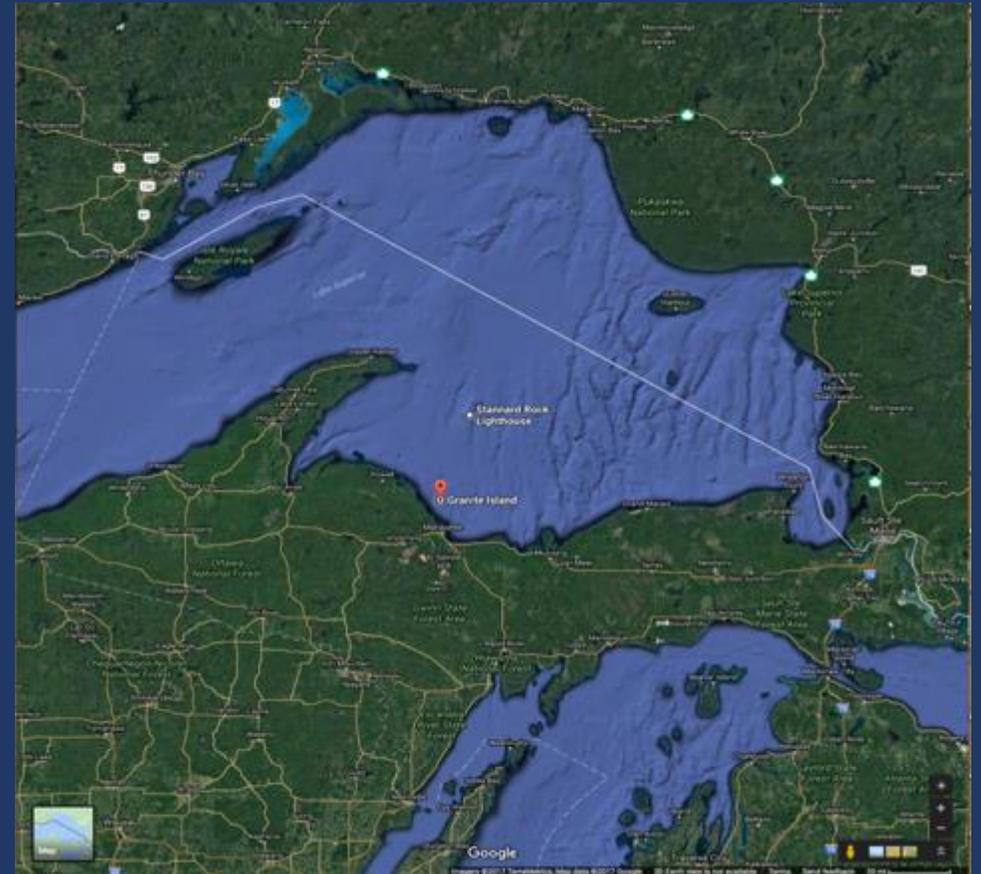
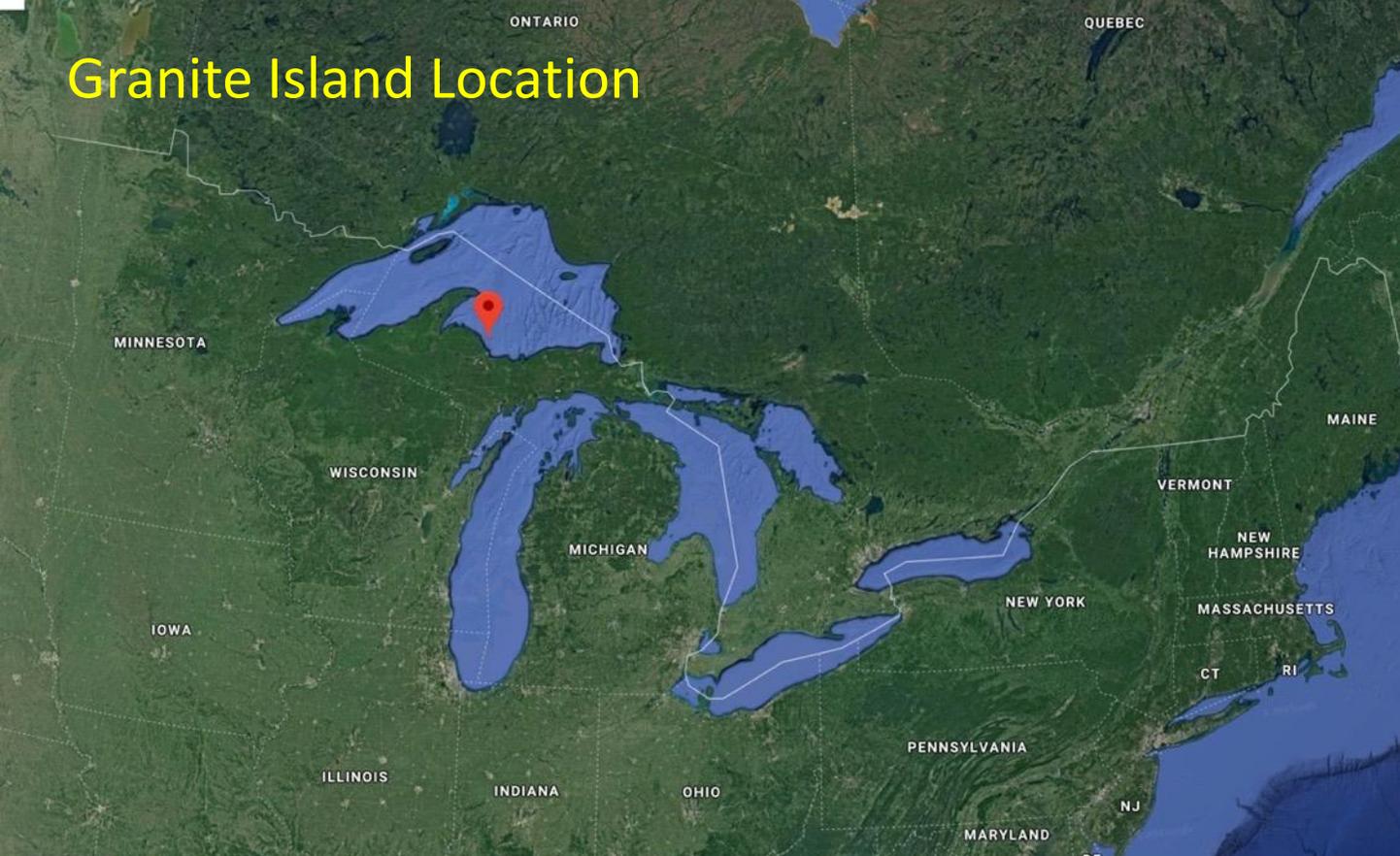
- Stations**
- ★ Running
 - Inactive
 - ▲ Closed
 - Candidate

Running, planned, and closed BSRN Stations, April 2018

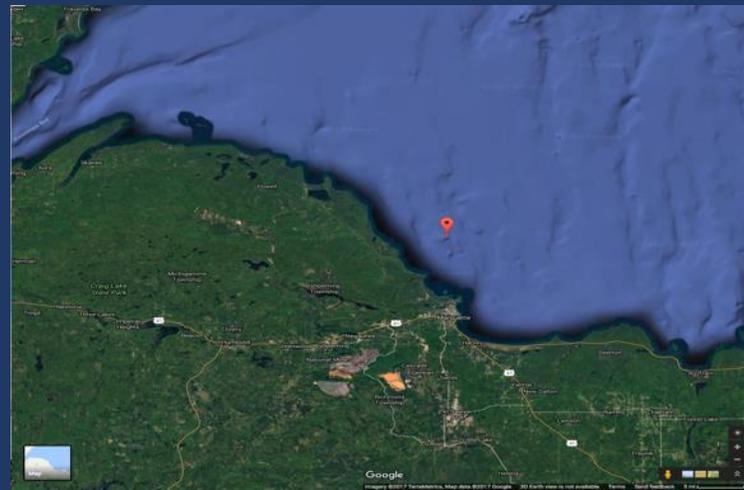


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Granite Island Location



Closest land point is about 10 km (6 miles) away.



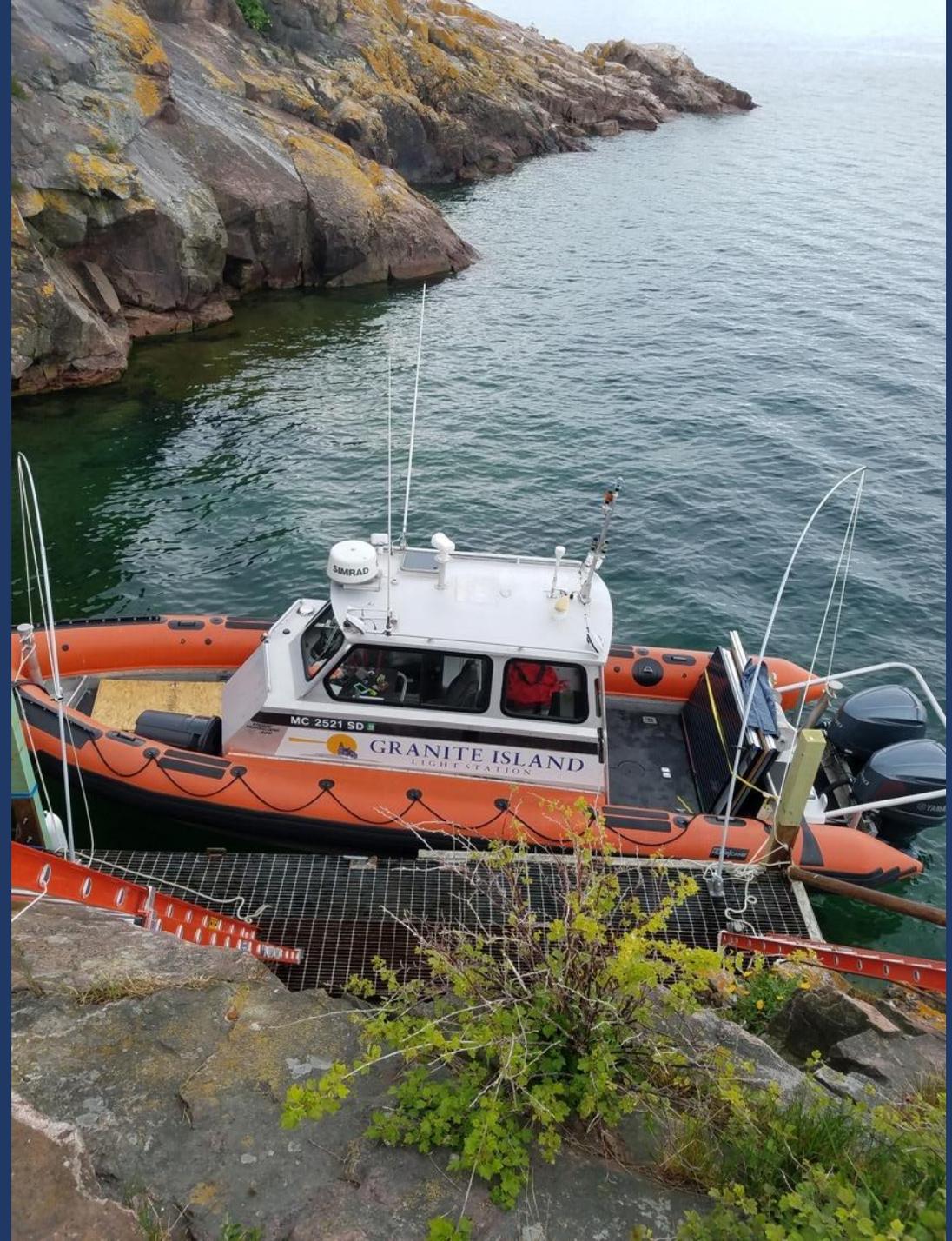
Granite Island Coordinates:
46.721 N
87.411 W

Granite Island information:

- 0.01 square km (2.5 acre) granite rock island
- Granite Island at its base is approximately 193 m above sea level
- Rises nearly perpendicular to 18 m above surface of Lake Superior
- Surrounded by deep water (18-30 m)



Transportation to Granite Island is by boat. Pictured is a 9 m Zodiac 920.





Installation as viewed from the boat.

Installation is approximately 15 m above the water line (as measured from the solar tracker height). The Granite Island installation is approximately 208 m above sea level.



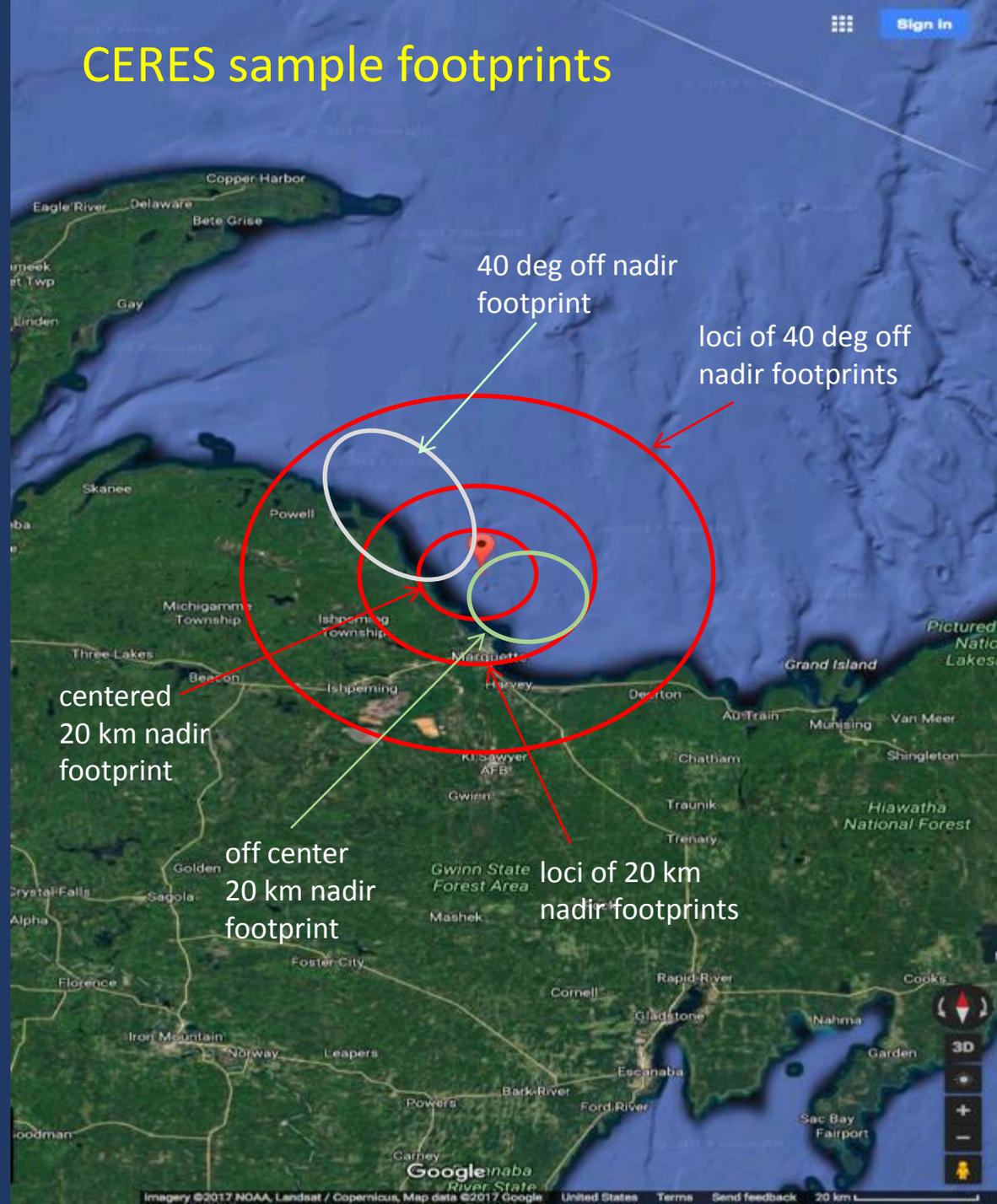
Motivation for establishing a Measurement Site at Granite Island

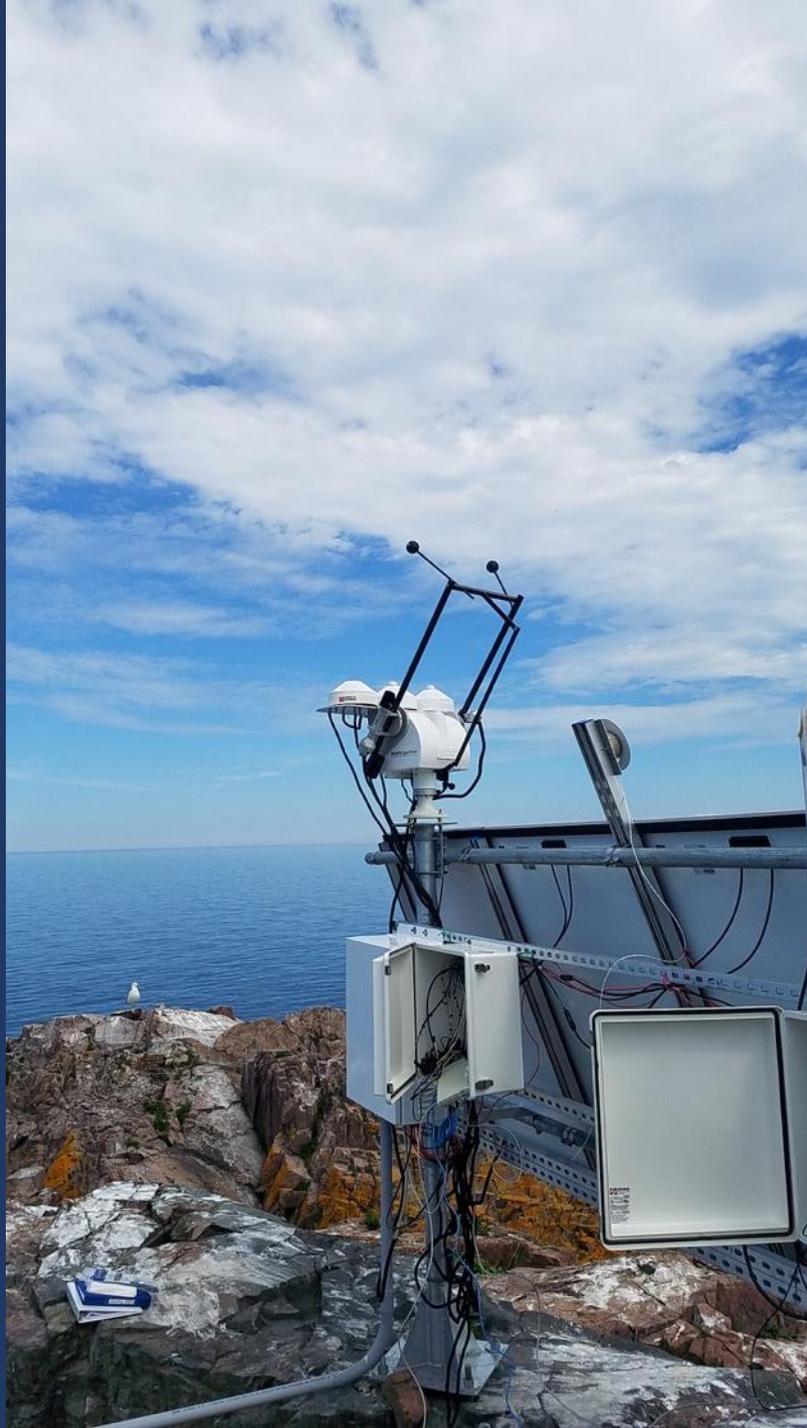


NASA Langley is interested in using BSRN and Clouds and the Earth's Radiant Energy System (CERES) measurements with the Great Lakes Evaporation Network (GLEN) data to improve understanding of the Earth's energy budget.

Other motivations:

- Water sites are uncommon
- Surface validation of satellites such as CERES





Instruments Currently Collecting Data at Granite Island:

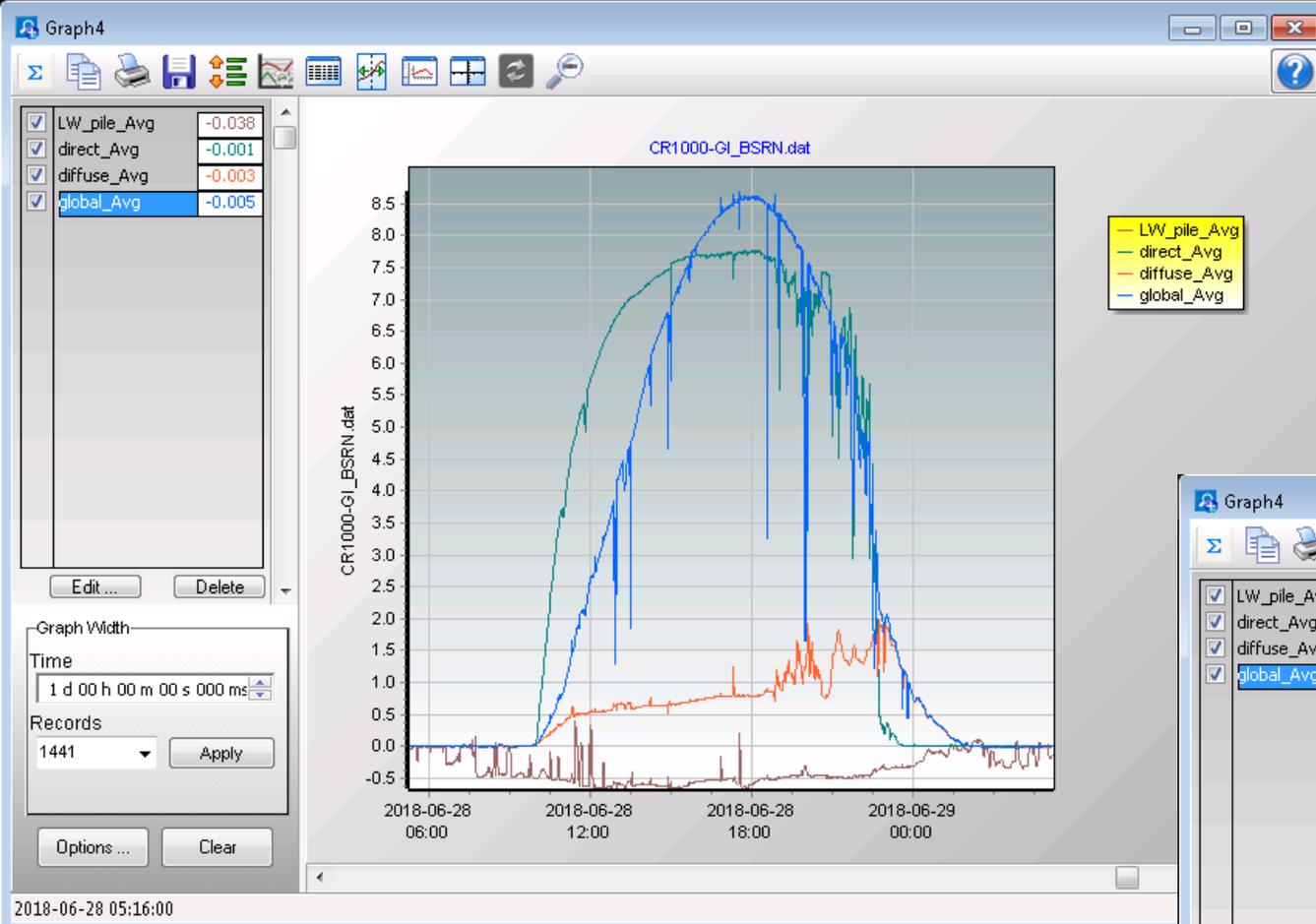
- Downwelling Shortwave Direct (K&Z CHP 1)
- Downwelling Shortwave Diffuse (K&Z CM 22)
- Downwelling Shortwave Global (K&Z CM 22)
- Downwelling Longwave (K&Z CG4)
- Solar Tracker (K&Z Solys2)
- AERONET cimel sunphotometer

Upcoming Instruments Planned:

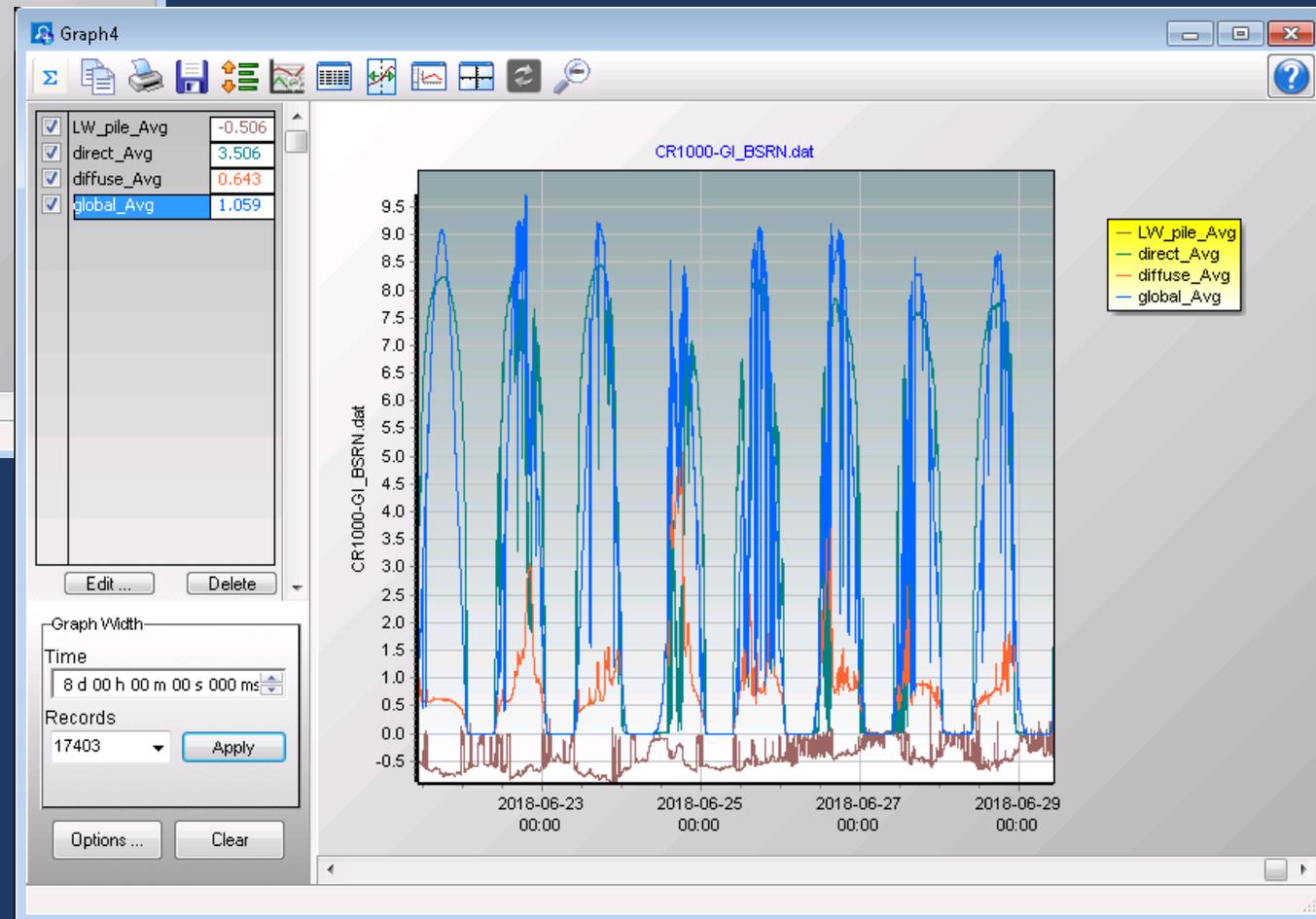
- Meteorological (Temperature, RH, Pressure, Wind Speed and Direction)

Solar Power System at Granite Island





A single day of downwelling shortwave (direct, diffuse and global) and downwelling longwave. ←

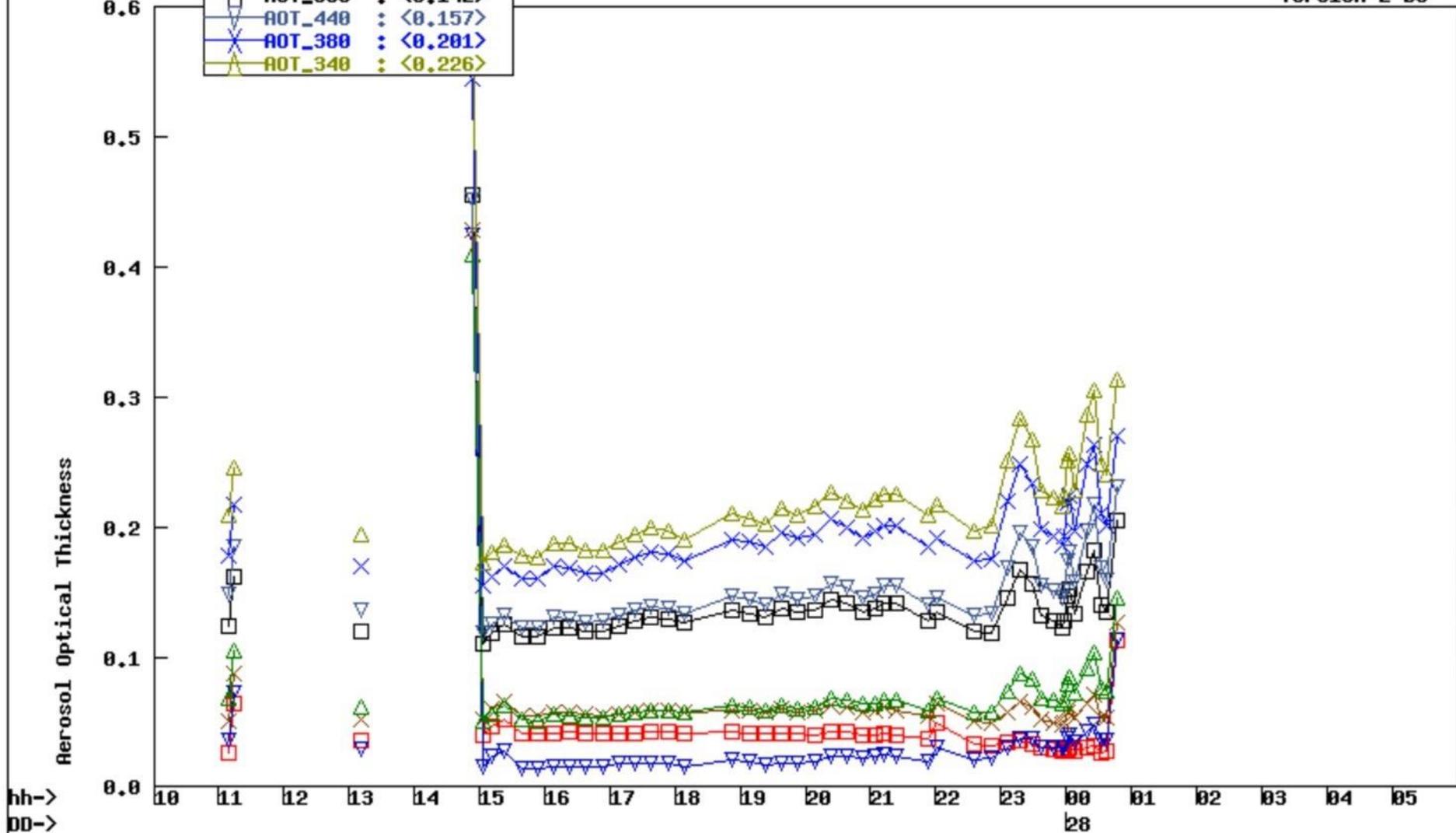


A week of downwelling shortwave and longwave data. →

Granite_Island , N 46°43'15", W 87°24'43", Alt 199 m,
PI : Brent_Holben, Brent.N.Holben@nasa.gov
Level 1.0 AOT; Data from 27 JUN 2018

- AOT_1640 : <0.048>
- AOT_1020 : <0.036>
- AOT_870 : <0.067>
- AOT_675 : <0.075>
- AOT_500 : <0.142>
- AOT_440 : <0.157>
- AOT_380 : <0.201>
- AOT_340 : <0.226>

Version 2 DS



AERONET Project, NASA GSFC

A single day
of AERONET data
at Granite Island.

hh->
DD->
JUN
Time(UTC) 2018



JUN.22,18 03:06:00PM



Seagulls are an issue that will need to be resolved.



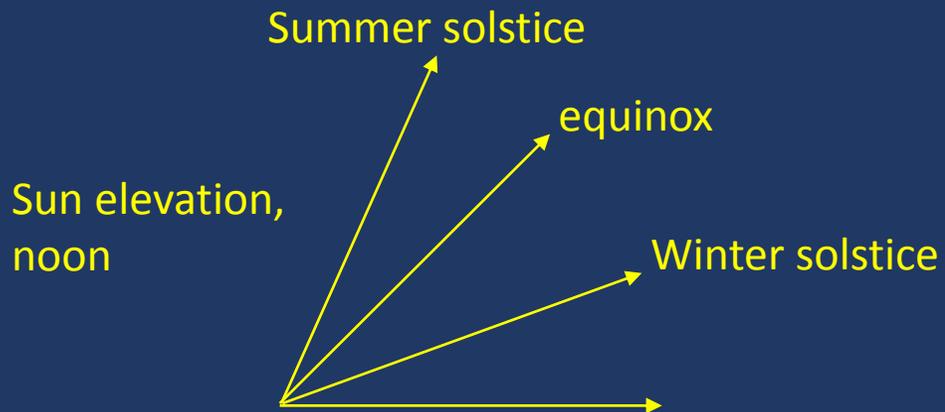
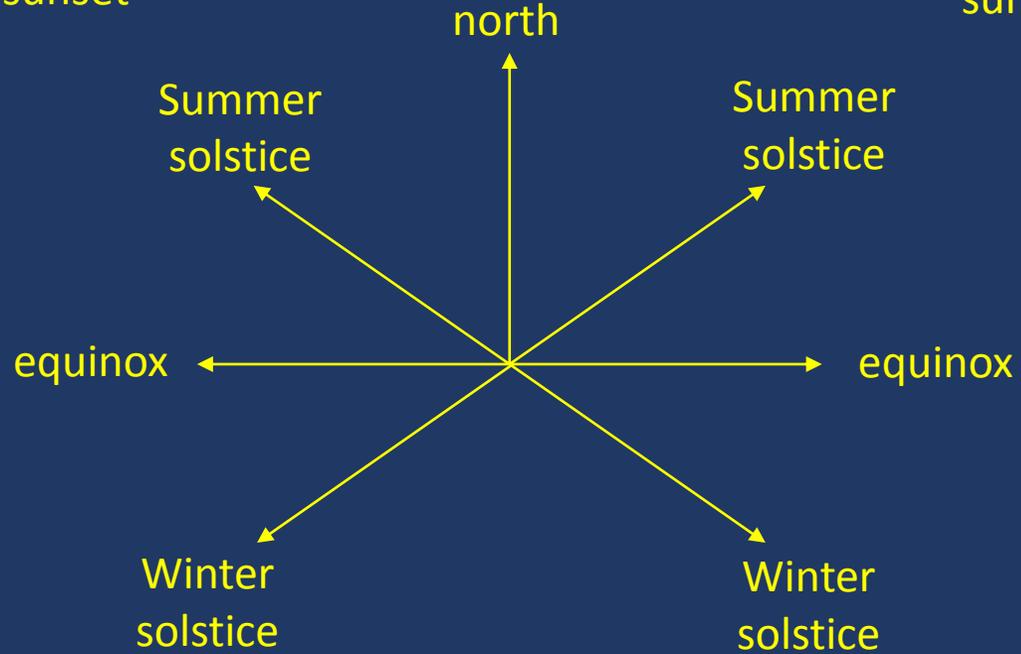
A temporary solution is using tie wraps to deter seagulls from perching on the domes.

Island View.

Sun rise/set azimuths

sunset

sunrise



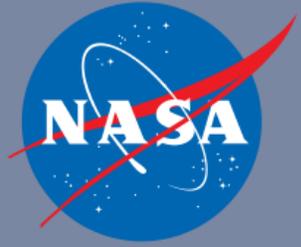
Approximate 9-10 degree blockage, late in day, by towers and house in the summer months.

Calibration Procedures

- Two Automatic Hickey-Frieden (AHF) cavity radiometers are used to calibrate the shortwave instruments every year at the Langley Research Center location (BSRN site ID: LRC).
- Have attended the National Pyrheliometer Comparison at the National Renewable Energy Laboratory (NREL) in Golden, Colorado every year to calibrate the AHF's for the last 20 years.
- Have attended the International Pyrheliometer Comparison in Davos, Switzerland every 5th year (last was in 2015) since 2000.
- The longwave instruments are sent to NREL for calibration every other year.

Acknowledgements:

- We would like to thank Scott Holman, owner of Granite Island for allowing a new measurement site to be introduced.
- We thank NASA Langley and the CERES project for providing the funding for Granite Island.
- We appreciate Brent Holben (AERONET PI) for providing an AERONET cimel at Granite Island.
- We thank John Lenters, Warren Smith, students and faculty of Northern Michigan University and especially Dan “Ducky” Chiconsky for assisting in the installation of instruments at Granite Island.



THANK YOU

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