

Status and Operations of the Chesapeake Light (CLH) BSRN Station

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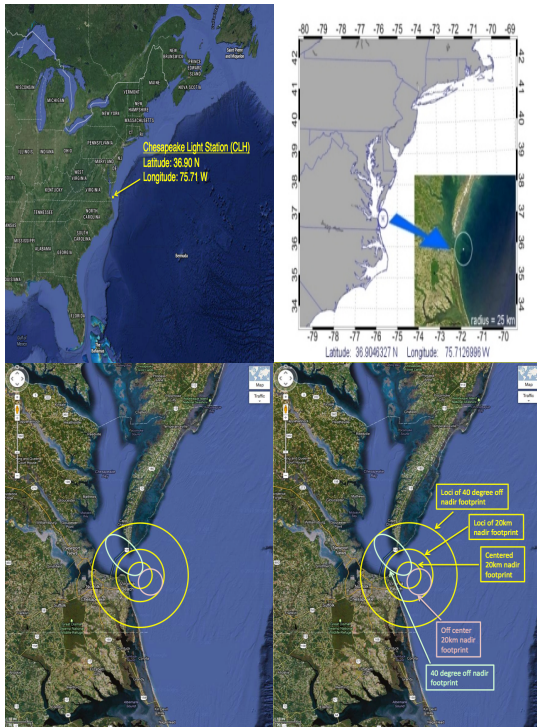
Clouds and the Earth's Radiant Energy System (CERES) Ocean Validation Experiment (COVE) at CLH website: <http://cove.larc.nasa.gov>

Introduction:

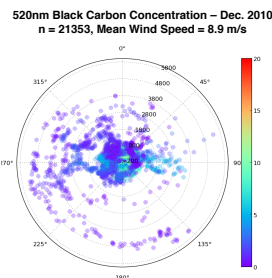
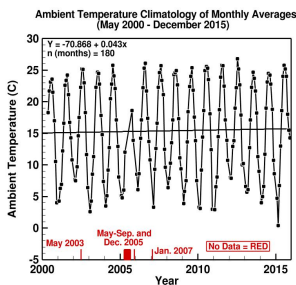
- BSRN data has been collected at CLH continuously for 16 years.
- The Department of Energy (D.O.E.) gained ownership of CLH on October 1, 2012 for wind monitoring purposes but has decided to abandon its project and auction CLH due to higher than expected renovation costs that were needed to meet their safety specifications.
- Due to D.O.E.'s decision, several instruments were removed from CLH in December 2014, including upwelling SW and LW radiometers, a Multi-Filter Rotating Shadowband Radiometer (MFRSR), Sky and Sea Surface Temperature and Photosynthetically Active Radiation (PAR).
- A table of current measurements and instrumentation are shown.
- Methodology of cleaning CLH instruments remotely for many months.



Wide view of CLH looking at the South side



- CLH is approximately 25 km off the coast of Southeast Virginia, USA.
- Latitude: 36.90 N, Longitude: 75.71 W.
- CLH was established in 1999 as a satellite validation site for the Clouds and the Earth's Radiant Energy System (CERES) satellite.
- The circles represent hypothetical scenarios of a satellite's footprint near the CLH site. Some footprints represent a true water scene such as the "centered 20km nadir footprint", while other footprints represent the more complex water and land scenes such as "Loci of 20km nadir footprints" and "40 degree off nadir footprints".



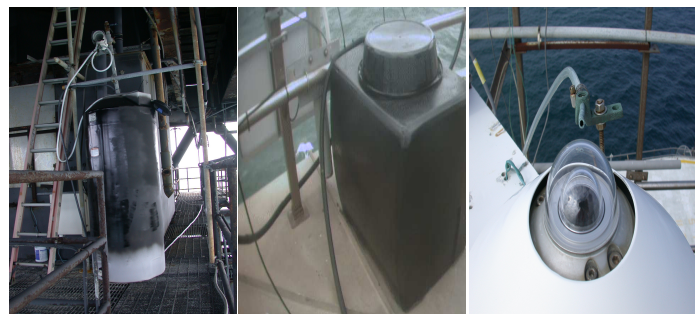
Select Data Results from CLH:

Left: Ambient temperature climatology (monthly means) over a 15+ year period. Missing or no data is listed in RED. The missing months are May 2003, May-September 2005, December 2005 and January 2007. There is a slight positive trend.

Right: December 2010 Black Carbon measurements (collected by an Aethalometer instrument, using the 520nm filter). Black Carbon (ng/m^3) is depicted by the radials, wind direction is the compass and wind speed is the colorbar. This is a different way to look at specific variables with respect to wind speed and direction. This plot was created in Python.

List of Measurements

Measurement	Instrument (Model)	Units	Wavelength in nm	Remarks
Direct Shortwave Irradiance	Kipp and Zonen Pyrheliometer (CH1)	W/m ²	200-4000	Since May 2000
Diffuse Shortwave Irradiance	Kipp and Zonen Pyranometer (CM31)	W/m ²	200-4000	Since May 2000
Global Shortwave Irradiance	Kipp and Zonen Pyranometer (CM22)	W/m ²	200-4000	Since May 2000
Longwave Irradiance	Eppley Pyrgometer (PIR)	W/m ²	5000-50000	Since May 2000
Direct and Diffuse Narrowband Radiance	Cimel Electronique SeaPRISM Sunphotometer (CE 318N SP9 Ver. 5)		412, 443, 490, 532, 551, 667, 870 and 1020	Part of AERONET Network since October 1999
Normalized Water Leaving Radiance	Cimel Electronique SeaPRISM Sunphotometer (CE 318N SP9 Ver.5)	mW/cm ² sr/μm	411, 442, 491, 530, 551, 668, 870 and 1016	Part of AERONET-OC since November 2005
Integrated Precipitable Water Vapor	Trimble Global Navigation Satellite System (NetR9)	cm		Part of NOAA's GPS-MET network since July 2001
Air Temperature	Rotronic (Hygroclip-S3)	°C		Since May 2000
Relative Humidity	Rotronic (Hygroclip-S3)	Percent		Since May 2000
Barometric Pressure	Vaisala (PTB110)	mb		Since May 2000
Wind Speed and Wind Direction	R. M. Young (05103)	m/s and 0-360°		Since May 2000



Automatic rinse installation: The leftmost picture is a 200 gallon tank that "catches" rainwater from the flight deck. The 200 gallon tank has a subsurface pump that pumps water to the 35 gallon tank (middle picture). The 35 gallon tank also has a subsurface pump that provides the water to clean our downwelling shortwave instruments every morning before sunrise. The rightmost picture shows a rinsing in place to clean the diffuse Kipp and Zonen pyranometer. The tanks are painted black to limit the amount of algae formation. This automatic rinse installation is programmed with Campbell Scientific software but can also be run manually.

Future of CLH:

- D.O.E.'s future at CLH appear to be coming to an end. D.O.E. is auctioning Chesapeake Light Station. The latest news is the two plans D.O.E. was pursuing (Option A: Full renovation for CLH and Option B: Using CLH for a 2 year campaign as a staging site for a WINDCUBE LiDAR system) have been abolished. The safety and renovation cost to meet "D.O.E." standards became too exorbitant. In the meantime, we successfully petitioned the D.O.E. to allow our current research to continue in a minimal capacity until the selling process is resolved. This decision dramatically reduced our trips to CLH to only two in 2015 and zero so far in 2016.

Acknowledgements:

- We thank the D.O.E. for allowing continued use of CLH for atmospheric and oceanic research.
- We thank NASA Langley's Chemistry and Physics Atmospheric Boundary Layer Experiment (CAPABLE) for allowing us to establish a land calibration site for our instrumentation. <http://capable.larc.nasa.gov/>