Development of a Metocean Reference Site near the Massachusetts and Rhode Island Wind Energy Areas

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SUMMARY

The Metocean Reference Station (MORS-1) is a six-year record of offshore hub-height winds near the RI/MA lease areas.

Start-up of the facility has been supported by WHOI, NOWRDC, and the MassCEC.

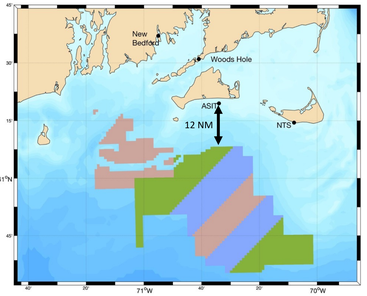
All MORS-1 data is publicly available.

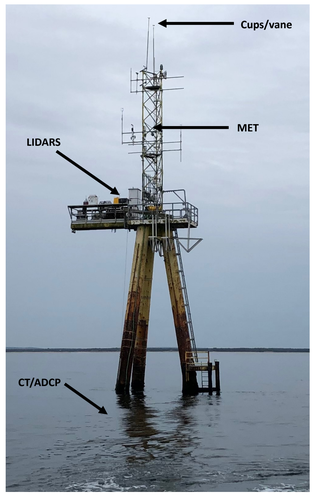
MORS-1 is pre-permitted for Lidar buoy validations.

Long term support for MORS-1 observations will come from at-cost buoy validation fees.

THE OBSERVATORY

MORS-1 is housed at the Martha's Vineyard Coastal Observatory's (MVCO)'s Air-Sea Interaction Tower (ASIT).





Operated by WHOI, ASIT is a cabled, fixed platform located 3 km south of Martha's Vineyard in 17 m of water.

MVCO and the ASIT have been supporting basic and applied science users since 2001.

MORS-1 INSTRUMENTATION

Online since October 2016, MORS-1 is the first Metocean reference site in the US; collecting both industry specific wind observations along with meteorological and oceanic observations for both research and commercial use.

Parameter	Sensor	Location
Primary Vertical profiles of horizontal winds	ZX300m, purchased in April 2021	13-m amsl
Secondary Vertical profiles of horizontal winds	Leosphere WindCube v2, purchased in 2016	13-m amsl
Wind speed	rNRG 40c, P2546c-OPR cup anemometers	26-m amsl
Wind direction	rNRG200P wind vane	24-m amsl
Air temperature, pressure, relative humidity	Viasala HMP45A-P	20-m amsl
Sea surface temperature and salinity	Seabird 37 CT	4-m bmsl
Ocean wave height	downward looking Riegl laser altimeter	13-m amsl
Ocean currents	upward looking Nortek signature 1000 AD2CP	15 m bmsl

All lidar sensors have been validated at UL's tall tower facility in Texas.

MORS-1 Funding History

2016-2019: Startup by the MassCEC
2020-2022: Expansion by NOWRDC
2023-beyond: Supported by buoy validation fees

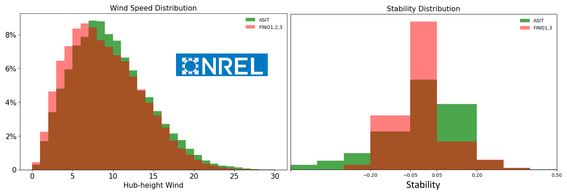
MORS-1 Public Data Repositories

https://hdl.handle.net/1912/27014
citable for research and publication use

https://ftp.awstruepower.com
for industry real-time data viewing

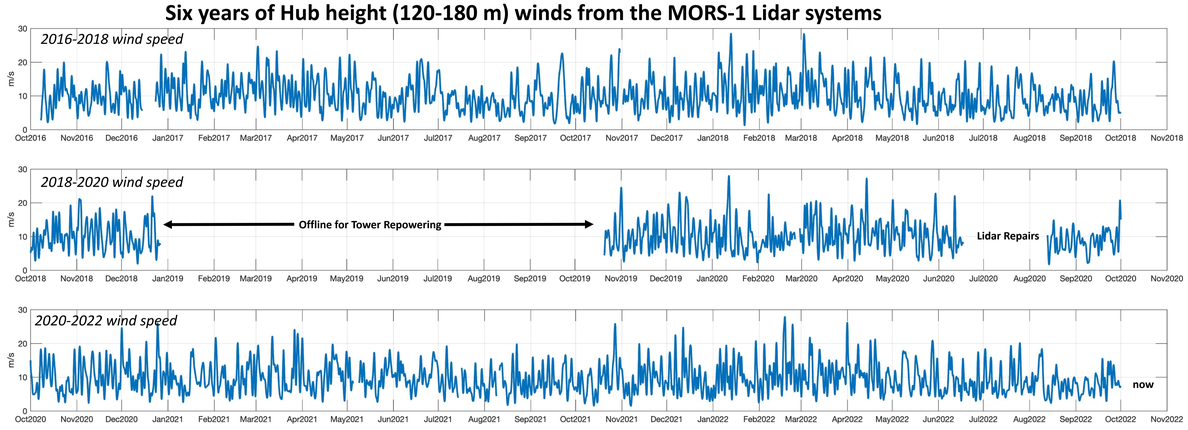
https://mvco.whoi.edu/projects/vertical-wind-profile/
for real-time data viewing

Wind Climatology Comparison to Europe's FINO Tower Data



MORS-1 has a higher percentage of stronger hub-height winds, stronger extreme winds, larger variability in wind speed and more extreme boundary layer stability.

Six years of Hub height (120-180 m) winds from the MORS-1 Lidar systems



LIDAR BUOY VALIDATIONS

MORS-1 is open for use as a Metocean Buoy Validations Facility

WHOI holds all required state and federal permits for buoy validations.

Users contract with WHOI to use pre-permitted locations (see below) for a set time block. BYO-Buoy, mooring, and anchor.

User fees per validation allow use of the permit and access to validation data.

One of the DOE Lidar buoys on validation, April 2020.

Validation fees fund MORS-1 data collection only.

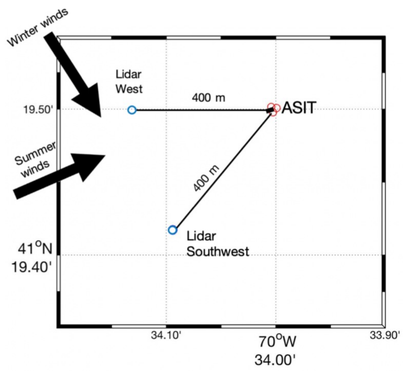
WHOI is a non-profit research institution and supports the ASIT for basic and applied science uses.

Validations booked through Spring 2023

Detailed map of area near the ASIT with the tower orientation, buoy permit locations, and relative wind directions.

The tower legs and platform extension directed towards a bearing of 253° are shown at approximately true scale.

With predominant summer winds from ~250° and winter winds from ~320°, this configuration would minimize wind wakes on the buoys from the tower.



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