

# Wind data from June to October 2012; recorded near the MBL Dock, Woods Hole, MA, USA (Mnemiopsis feeding in turbulence project)

**Website:** <https://www.bco-dmo.org/dataset/554605>

**Version:** 30 March 2015

**Version Date:** 2015-03-30

## Project

» [Turbulence and Suspension Feeding - a New Approach using the Lobate Ctenophore Mnemiopsis Leidy](#)  
(Mnemiopsis feeding in turbulence)

| Contributors                      | Affiliation   | Role                            |
|-----------------------------------|---|---------------------------------|
| <a href="#">Costello, John H.</a> | Providence College                                  | Principal Investigator, Contact |
| <a href="#">Colin, Sean</a>       | Roger Williams University (RWU)                     | Co-Principal Investigator       |
| <a href="#">Dabiri, John O.</a>   | California Institute of Technology (Caltech)        | Co-Principal Investigator       |
| <a href="#">Rauch, Shannon</a>    | Woods Hole Oceanographic Institution (WHOI BCO-DMO) | BCO-DMO Data Manager            |

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## Dataset Description

Wind data from June to October 2012; recorded near the MBL Dock, Woods Hole.

Reference:

Sutherland, K.R., Costello, J.H., Colin, S.P., and Dabiri, J.O. 2014. Ambient fluid motions influence swimming and feeding by the ctenophore *Mnemiopsis leidy*. J. Plankton Res. 36(5): 1310–1322. doi:[10.1093/plankt/fbu051](https://doi.org/10.1093/plankt/fbu051)

## Methods & Sampling

Wind data originated from a local weather station located at the Woods Hole Oceanographic Institution (within 150 m of the sampling location); data source: [wunderground.com](http://wunderground.com)

Methods and precision described in:

Sutherland, K.R., Costello, J.H., Colin, S.P., and Dabiri, J.O. 2014. Ambient fluid motions influence swimming and feeding by the ctenophore *Mnemiopsis leidy*. J. Plankton Res. 36(5): 1310–1322. doi:[10.1093/plankt/fbu051](https://doi.org/10.1093/plankt/fbu051)

## Data Processing Description

BCO-DMO edits:

- Modified parameter names to conform with BCO-DMO naming conventions.
- Modified formatting of date and time.

- Separated date and time into separate columns.
- Replaced blanks with 'nd' to indicate 'no data'.
- Added lat and lon of the dock using values provided on the metadata form), and location name.

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## Data Files

| File  |
|---|
| <b>comparative_wind.csv</b> (Comma Separated Values (.csv), 4.68 MB)<br>MD5:601226d46508ea183fa444583363bd9f<br><br>Primary data file for dataset ID 554605 |

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## Parameters

| Parameter  | Description   | Units                  |
|------------|---|------------------------|
| location   | Description of sampling location.                               | text                   |
| lat_dock   | Latitude of sampling location.                                  | decimal degrees        |
| lon_dock   | Longitude of sampling location.                                 | decimal degrees        |
| date_local | Month, day, and year of sampling. (Local time zone, EST)        | mm/dd/yyyy             |
| month      | 2-digit month of year.  | mm (01 to 31)          |
| day        | 2-digit day of month.   | dd (01 to 12)          |
| year       | 4-digit year.   | YYYY                   |
| time_local | Time (hours and minutes); 24-hour clock. (Local time zone, EST) | HHMM                   |
| temp_air   | Air temperature.  | degrees Fahrenheit (F) |
| dewpoint   | Dewpoint temperature.   | degrees Fahrenheit (F) |
| press_air  | Air pressure.   | inches (in)            |
| wind_dir   | Wind direction.   | nominal/text           |

|                     |   |                          |
|---------------------|---|--------------------------|
| wind_dir_degrees    | Wind direction.   | degrees                  |
| wind_speed_mph      | Wind speed in mph.  | miles per hour (mph)     |
| wind_speed_m        | Wind speed in m/s.  | meters per second (m/s)  |
| two_hr_avg_wind_spd | Two-hour average wind speed in m/s.   | meters per second (m/s)  |
| wind_speed_gust_mph | Gusting wind speed = maximum wind speed during time interval.   | miles per hour (mph)     |
| humidity            | Humidity.   | percent (%)              |
| ISO_DateTime_Local  | Date and time formatted to ISO 8601 standard. This standard is based on ISO 8601:2004(E) and takes on any of the following forms:<br>YYYY-mm-ddTHH:MM:SS[.xx] (local time)<br><br>e.g.:<br>2009-08-30T09:05:00[.xx] (local time)<br>2009-08-30T14:05:00[.xx]Z (UTC time)<br>2009-08-30T14:05:00[.xx]-05:00 (local time with time zone). | YYYY-MM-DDTHH:MM:SS[.xx] |

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## Instruments

|   |   |
|---|---|
| <b>Dataset-specific Instrument Name</b> | Weather Station   |
| <b>Generic Instrument Name</b>          | Automated Weather Station   |
| <b>Generic Instrument Description</b>   | Land-based AWS systems are designed to record meteorological information. |

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## Deployments

### MBL\_Dock\_0812

|                    |   |
|--------------------|---|
| <b>Website</b>     | <a href="https://www.bco-dmo.org/deployment/554399">https://www.bco-dmo.org/deployment/554399</a> |
| <b>Platform</b>    | MBL   |
| <b>Start Date</b>  | 2012-08-14  |
| <b>End Date</b>    | 2012-08-14  |
| <b>Description</b> | Field surface turbulence measurements made at the MBL dock, Woods Hole, MA, USA, August 14, 2012. |

## Project Information

### Turbulence and Suspension Feeding - a New Approach using the Lobate Ctenophore *Mnemiopsis leidyi* (*Mnemiopsis* feeding in turbulence)

**Coverage:** Marine Biological Laboratory dock, Woods Hole, MA

#### *Description from NSF award abstract:*

Prey selection, intake and, ultimately, the trophic impact of predators are determined by a succession of events that occur at the organismal level -- individual interactions among predators prey, and their environments. Furthermore, because the majority of predator-prey interactions occur in moving fluids, it is critical to observe and quantify predator-prey interactions within a hydrodynamic context. Successful predictions of trophic patterns in natural settings are limited by the ability to: 1) observe directly the effects of turbulence on feeding in pelagic organisms; 2) understand the mechanistic bases of animal-fluid interactions in turbulent environments; and 3) relate quantitative observations from still-water laboratory studies to nature. These limitations are pervasive in studies of trophic exchange within the larger scope of marine ecology.

Recent technological advances, and the combined expertise of the Co-PIs, enables meaningful studies of the influence of turbulence on feeding by the notoriously invasive lobate ctenophore, *Mnemiopsis leidyi*. *Mnemiopsis* is a delicate gelatinous predator which uses a laminar feeding current to entrain and capture prey. Using a remarkably effective feeding strategy, zooplankton standing stocks and overall zooplankton biodiversity are reduced, and standing stocks of phytoplankton are increased via a trophic cascade. Like many suspension feeders, however, the feeding current produced by *Mnemiopsis* may be vulnerable to hydrodynamic disruption by ambient flows. In fact, turbulent events may change the behavior, distribution and prey selection of lobate ctenophores such as *Mnemiopsis*. This species is an ideal model organism to determine the mechanisms by which turbulence affects trophic exchange patterns of ecologically influential planktonic suspension feeders.

Involving a combination of laboratory and in situ methods to quantify, at the organismal level, this study will determine effects of turbulent flows on the feeding mechanics and predator-prey interactions of *Mnemiopsis*. Understanding how these turbulent effects translate to the community level will be accomplished via in situ sampling techniques that relate natural turbulence levels to ingestion rates, prey selection and predatory impact of *Mnemiopsis* in the field. This approach extends beyond current laboratory and modeling studies, with the potential of establishing clear cause-and-effect relationships.

This research will: 1) directly quantify turbulent effects on in situ predator-prey interactions; 2) provide mechanistic understanding of key variables influencing the ecological impact of an important invasive marine species; and 3) develop a novel approach for studying small-scale physical-biological interactions both in the laboratory and in the field.

Knowing how turbulence affects feeding in lobate ctenophores is valuable at the scale of the organism, as well as ecologically. The approach developed here also may be applied to a variety of other turbulence-dominated situations (e.g., mixing at fronts, animal-marine snow interactions) or to other organisms (other plankton, benthic-water column exchanges). In all cases, the outcomes depend upon small-scale physical-biological processes.

## Funding

| Funding Source   | Award                       |
|--|-----------------------------|
| <a href="#">NSF Division of Ocean Sciences (NSF OCE)</a> | <a href="#">OCE-1061353</a> |
| <a href="#">NSF Division of Ocean Sciences (NSF OCE)</a> | <a href="#">OCE-1061182</a> |
| <a href="#">NSF Division of Ocean Sciences (NSF OCE)</a> | <a href="#">OCE-1061268</a> |

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