

Average pH from replicate spectrophotometric measurements during laboratory experiments using a Durafet pH sensor in February of 2017 (pHVAR project)

Website: <https://www.bco-dmo.org/dataset/723785>

Data Type: experimental

Version:

Version Date: 2018-01-16

Project

» [OCE PRF: Track 2 \(International\) Indirect effects in a changing ocean: a case study of seagrass photosynthesis and mussel physiology](#) (pHVAR)

| Contributors | Affiliation | Role |
|-----------------------------------|-----------------------------------------------------|---------------------------------|
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Dataset Description

Average pH from replicate spectrophotometric measurements during a laboratory experiment using Durafet pH sensors. This experiment was conducted at Villefranche-sur-Mer, France on Feb. 27th, 2017.

The pH time series from Durafet sensors collected during this experiment are available in a separate dataset:

Durafet methods development: pH time series

<https://www.bco-dmo.org/dataset/723336>

These data are presented in the following publication:

Kapsenberg, L., Bockmon, E. E., Bresnahan, P. J., Kroeker, K. J., Gattuso, J. P., & Martz, T. R. (2017). Advancing ocean acidification biology using Durafet® pH electrodes. *Frontiers in Marine Science*, 4, 321. doi:[10.3389/fmars.2017.00321](https://doi.org/10.3389/fmars.2017.00321)

Methods & Sampling

These data originate from methods development of UDA-Durafet pH electrodes. Briefly, pH electrodes are calibrated against spectrophotometric pH measurements prior to the experiment. A post-calibration spectrophotometric pH measurement is used to correct the time series to the same pH value at the time of sampling, at the end of the experiment. Upon conclusion of the experiment, spectrophotometric pH measurements are used to identify any change in electrode performance. The precision of pH measurements is 0.008 (Kapsenberg et al., 2017). Data are not corrected for any offset in post-experiment spectrophotometric pH measurement.

Sampling and analytical procedures (Spectrophotometric pH measurement using purified m-cresol) are Dickson et al. 2007.

References:

Dickson, A. G., Sabine, C. L., & Christian, J. R. (2007). Guide to best practices for ocean CO₂ measurements. PICES Special Publication 3, p. 191.
Available at http://cdiac.ess-dive.lbl.gov/ftp/oceans/Handbook_2007/Guide_all_in_one.pdf

Kapsenberg, L., Bockmon, E. E., Bresnahan, P. J., Kroeker, K. J., Gattuso, J. P., & Martz, T. R. (2017). Advancing ocean acidification biology using Durafet® pH electrodes. *Frontiers in Marine Science*, 4, 321. doi:[10.3389/fmars.2017.00321](https://doi.org/10.3389/fmars.2017.00321)

Data Processing Description

BCO-DMO data manager processing notes:

* Added ISO format timestamp (UTC)

* two different timestamp formats in the originally named "Time" column. Changed the format of the numeric values to match the rest of the dataset (Timestamp_local, dd-mm-yy HH:MM)

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Data Files

| File |
|------------------------------------------------------------------------------------------------------------------------------------------------|
| phAvs.csv (Comma Separated Values (.csv), 496 bytes) MD5:a95cc4b2043b54c08eb32430d47e27ca Primary data file for dataset ID 723785 |

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Parameters

| Parameter | Description | Units |
|------------------|----------------------------------------------------------------------------------------|--------------------------|
| Timestamp_local | Local Date and Time (France CET/CEST) in format yyyy-mm-dd HH:MM | unitless |
| ISO_DateTime.UTC | ISO timestamp based on the ISO 8601:2004(E) standard in format YYYY-mm-ddTHH:MMZ (UTC) | unitless |
| Spec_pH_AVG | Average pH over 3 replicate spectrophotometric pH measurements | total hydrogen ion scale |

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Instruments

| | |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dataset-specific Instrument Name | Honeywell UDA2182 and Honeywell Durafet III pH electrodes |
| Generic Instrument Name | pH Sensor |
| Generic Instrument Description | An instrument that measures the hydrogen ion activity in solutions. The overall concentration of hydrogen ions is inversely related to its pH. The pH scale ranges from 0 to 14 and indicates whether acidic (more H+) or basic (less H+). |

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Project Information

OCE PRF: Track 2 (International) Indirect effects in a changing ocean: a case study of seagrass photosynthesis and mussel physiology (pHVAR)

Coverage: NW Mediterranean Sea

NSF abstract:

One of the major goals of ocean acidification research is to understand how ecosystem functioning and services will change in the future. In this project, the fellow will assess the influence of pH variability on an ecologically and economically important mussel species, under future ocean pH and temperature conditions. The research will be conducted at Laboratoire d'Océanographie de Villefranche-sur-Mer, France in collaboration with international host scientist Dr. Jean-Pierre Gattuso and sponsoring scientist Dr. Todd Martz (Scripps Institution of Oceanography, USA). By hosting a workshop, the fellow will introduce pH sensors to European students and scientists and promote the use of field data in the design of biological experiments. The project supports the training of a postdoctoral fellow and two undergraduate student interns. Results and data from this project will be disseminated at conferences and through open-access publications and data repositories.

Experiments investigating the effects of ocean acidification on marine organisms often ignore the spatio-temporal variability in seawater pH that is present in coastal marine ecosystems. Such heterogeneity in pH may provide temporal refuge from corrosive seawater under future levels of acidification. Utilizing a combination of field and lab experiments, this project will evaluate the influence of pH variability and interactive effects of warming and acidification on mussel physiology through several levels of biological organization. Should variability in pH provide beneficial effects on mussel development and growth, results of the project provide an avenue for local management of ocean acidification in coastal regions and aquaculture practices.

This project produced the following publications:

Kapsenberg, L., Miglioli, A., Bitter, M. C., Tambutté, E., Dumollard, R., and Gattuso, J. P. (2018) Ocean pH fluctuations affect mussel larvae at key developmental transitions, *Proceedings of the Royal Society B: Biological Sciences*, 285, 20182381, doi: 10.1098/rspb.2018.2381.

Kapsenberg, L, EE Bockmon, PJ Bresnahan, KJ Kroeker, J-P Gattuso, and TR Martz (2017) Advancing ocean acidification biology using Durafet® pH electrodes. *Frontiers in Marine Science* 4: 321. doi:10.3389/fmars.2017.00321

Kapsenberg, L, S Alliouane, F Gazeau, L Mousseau, and JP Gattuso (2017) Coastal ocean acidification and increasing total alkalinity in the northwestern Mediterranean Sea. *Ocean Science* 13: 411-426. doi:10.5194/os-13-411-2017

Kapsenberg, L, DK Okamoto, J Dutton, and GE Hofmann (2017) Sensitivity of sea urchin fertilization to pH varies across a natural pH mosaic. *Ecology and Evolution* 7: 1737-1750. doi:10.1002/ece3.2776

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Funding

| Funding Source | Award |
|----------------------------------------------------------|-----------------------------|
| NSF Division of Ocean Sciences (NSF OCE) | OCE-1521597 |

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