Coral larvae respiration collected from the Natl Museum Mar. Bio. and Aquar., Taiwan in 2010 (Climate_Coral_Larvae project)

Website: https://www.bco-dmo.org/dataset/3802
Version: 2012-11-28

Project
» The ecophysiological basis of the response of coral larvae and early life history stages to global climate change (Climate_Coral_Larvae)

Contributors	Affiliation	Role
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Coverage

Spatial Extent: **Lat**:22.0497 **Lon**:120.6985
Temporal Extent: 2010-03-18 - 2010-03-24

Dataset Description

Coral larvae respiration values obtained from laboratory experiments utilizing brooded coral larvae as part of a study that describes the effects of temperature on the respiration of brooded larvae of scleractinian corals, and evaluates the implications of these effects relative to seawater temperature when peak larval release occurs. These data were compared to published values extracted from literature; available in the dataset coral_larvae_comparison_respiration.

These data are published in *Edmunds et al. (2011)* (see p 2785 and Fig 2).

Related datasets:

- coral_larvae_size
- coral_larvae_release

Methods & Sampling

The aerobic respiration of larvae was measured between 18 and 24 March, using batches of six larvae in a glass vial. Respiration rates were measured in 2ml glass Wheaton vials filled with filtered seawater aerated and equilibrated to the treatment temperature.

Larval respiration was calculated from the O_2 concentration at the start and end of 1–2h incubations, as measured using an optrode attached to a spectrophotometer. O_2 concentrations were measured with the sample immersed in a water bath held at the same temperature as the incubation conditions. At the

conclusion of incubations, vials were removed from the water, inverted gently to ensure mixing, and analyzed for O_2 saturation using the optrode. The O_2 saturation in the seawater within the vial was then measured at the incubation temperature and converted to O_2 concentration, with the change in concentration serving as the measure of aerobic dark respiration after adjusting for O_2 fluxes in control vials. Larval respiration was expressed as nmol O_2 $larva^{-1}$ min^{-1}.

For additional information on materials and methods, see *Edmunds et al. (2011).*

Data Processing Description

BCO-DMO Processing Notes:

- Original file: "Date in Edmunds et al. JEB 2011 copy.xls" contained several sheets. This file was split into four separate datasets

- Resultant datasets were edited in excel by adding BCODMO convention header line, PI and comment lines. The following edits were made to the file coral_larvae_respir:

-Added BCO-DMO header
  -replaced space in genus species name with underscore
  -edited '# of Larvae' to 'number'
  -edited 'nmol/Larvae/min' to 'O2_respir_nmol'
-Added column for 'lat' and 'lon', using location for the National Museum of Marine Biology and Aquarium of Taiwan (experiment site)
-Added title, version, and PI lines
-Added line for publication reference information to file header

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Data Files

File	
CoralLarvae_respir.csv	(Comma Separated Values (.csv), 4.08 KB) MD5:bab1e9c5b383615d8ce8e1118576fc7c
Primary data file for dataset ID 3802	

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Related Publications

Edmunds, P. J., Cumbo, V., & Fan, T.-Y. (2011). Effects of temperature on the respiration of brooded larvae from tropical reef corals. Journal of Experimental Biology, 214(16), 2783–2790. doi:10.1242/jeb.055343
Results

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Parameters

Parameter	Description	Units
date_local	Date in local time on which measurements were made in human-readable alphanumeric format.	dd-XXX-yy
species	Taxonomic name of coral larvae employed in experiment.	dimensionless
lat	Latitude component of geographic position where experiments were conducted.	decimal degrees
lon	Longitude component of geographic position where experiments were conducted.	decimal degrees
number	Number of coral larvae in respiration chamber.	dimensionless
temp	Temperature at which incubation and trials were conducted.	degrees Celcius
O2_respir_nmol	Respiration rates as uptake of oxygen (by convention shown as a negative). Note: rates were converted to mass specific rates using the data in larval size dataset coral_larvae_size.dat	nmol O2/larva/min
yrday_local	Year day in local time, calculated by BCO-DMO.	

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Deployments

lab_Edmunds_NMMBA

Website	https://www.bco-dmo.org/deployment/58892
Platform	Natl Museum Mar. Bio. and Aquar. Taiwan
Start Date	2010-03-18
End Date	2010-03-24
Description	Experiments related to the research project: 'RUI- The ecophysiological basis of the response of coral larvae and early life history stages to global climate change' were conducted at the laboratories of the National Museum of Marine Biology and Aquarium in Southern Taiwan.

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Project Information

The ecophysiological basis of the response of coral larvae and early life history stages to global climate change (Climate_Coral_Larvae)

Coverage: Moorea, French Polynesia; Southern Taiwan; California State University Northridge

Tropical coral reefs face a suite of environmental assaults ranging from anchor damage to the effects of global climate change (GCC). The consequences are evident throughout the tropics, where many coral reefs have lost a substantial fraction of their coral cover in a few decades. Notwithstanding the importance of reducing the impacts of environmental stresses, the only means by which these ecosystems can recover (or simply persist) is through the recruitment of scleractinians, which is a function of successful larval development, delivery, settlement, metamorphosis, and post-settlement events. Despite wide recognition of the importance of these processes, there are few pertinent empirical data, and virtually none that address the mechanisms mediating the success of early coral life stages in a physical environmental varying at multiple spatio-temporal scales.

The objective of this research is to complete one of the first comprehensive ecophysiological analyses of the early life stages of corals through a description of: (1) their functionality under 'normal' conditions, and (2) their response to the main drivers of GCC. These analyses will be completed for 2 species representative of a brooding life history strategy, and the experiments will be completed in two locations, one (Taiwan) that provides unrivalled experience in coral reproductive biology, and superb microcosm facilities, and the other (Moorea), with access to a relatively pristine environment, a well described ecological and oceanographic context (through the MCR-LTER), and the capacity to bring a strong biogeographic contrast to the project. The results of the study will be integrated through modeling to explore the effects of GCC on coral community structure over the next century.

The following publications and data resulted from this project:

2013 Wall CB, Fan TY, Edmunds PJ. Ocean acidification has no effect on thermal bleaching in the coral *Seriatopora caliendrum*. Coral Reefs 33: 119-130.
Symbiodinium_Seriatopora photosynthesis
Symbiodinium_Seriatopora PI curve
Symbiodinium_Seriatopora temp-salinity-light
Symbiodinium_Seriatopora water chemistry
- Download complete data for this publication (Excel file)

2013 Wall CB, Edmunds PJ. *In situ* effects of low pH and elevated HCO3- on juvenile *Porites* spp. in Moorea, French Polynesia. Biological Bulletin 225:92-101.
Data at MCR and PANGEA: doi.pangaea.de/10.1594/PANGAEA.833913
- Download complete data for this publication (Excel file)

2013 Vivian R Cumbo, Peter J Edmunds, Christopher B Wall, Tung-Yung Fan. Brooded coral larvae differ in their response to high temperature and elevated pCO2 depending on the day of release. Marine Biology DOI 10.1007/s00227-013-2280-y.
Data also at PANGEA: doi.pangaea.de/10.1594/PANGAEA.831612
brooded coral larvae 2 - carbonate chemistry
brooded coral larvae 2 - larval release March 2003-2008
brooded coral larvae 2 - respiration_photosyth_mortality
- Download complete data for this publication (Excel file)

2013 Edmunds PJ, Cumbo VR, Fan TY. Metabolic costs of larval settlement and metamorphosis in the coral *Seriatopora caliendrum* under ambient and elevated pCO2. Journal Experimental Marine Biology and Ecology 443: 33-38 Data also at PANGEA: doi:10.1594/PANGAEA.821644
Coral post-settlement physiology
- Download complete data for this publication (Excel file)

2013 Aaron M Dufault, Aaron Ninokawa, Lorenzo Bramanti, Vivian R Cumbo, Tung-Yung Fan, Peter J Edmunds. The role of light in mediating the effects of ocean acidification on coral calcification. Journal of Experimental Biology 216: 1570-1577.
coral-light expt.- PAR
coral-light expt.- carbonate chemistry
coral-light expt.- temp_salinity
coral-light expt.- growth
coral-light expt.- protein
coral-light expt.- survival
- Download complete data for this publication (Excel file)

2012 Cumbo, VR, Fan TY, Edmunds PJ. Effects of exposure duration on the response of *Pocillopora damicornis* larvae to elevated temperature and high pCO2. J Exp Mar Biol Ecol 439: 100-107.
Data is also at PANGEA: doi:10.1594/PANGAEA.823582
brooded coral larvae 3 - carbonate chemistry
brooded coral larvae 3 - light

brooded coral larvae 3 - mortality
brooded coral larvae 3 - protein
brooded coral larvae 3 - respiration and protein
brooded coral larvae 3 - respiration raw data
brooded coral larvae 3 - symbiont density
brooded coral larvae 3 - tank temperature
- Download part 1 of data for this publication (Excel file)
- Download tank parameters data for this publication (Excel file)

2012 Cumbo, VR, Fan TY, Edmunds PJ. Physiological development of brooded larvae from two pocilloporid corals in Taiwan. Marine Biology 159: 2853-2866.
brooded coral - carbonate chemistry
brooded coral - release
brooded coral - respiration
brooded coral - settlement competency
brooded coral - size_July
brooded coral - size_protein_symbionts_photosynth
- Download complete data for this publication (Excel file)

2012 Dufault, Aaron M; Vivian R Cumbo; Tung-Yung Fan; Peter J Edmunds. Effects of diurnally oscillating pCO2 on the calcification and survival of coral recruits. Royal Society of London (B) 279: 2951-2958. doi:10.1098/rspb.2011.2545
Data is also at PANGEA: doi:10.1594/PANGAEA.830185
recruit_growth_area
recruit_growth_weight
recruit_seawater_chemistry
recruit_survival
- Download complete data for this publication (Excel file)

2011 Edmunds PJ, Cumbo V, Fan TY. Effects of temperature on the respiration of brooded larvae from tropical reef corals. Journal of Experimental Biology 214: 2783-2790.
CoralLarvae_comparison_respir
CoralLarvae_release
CoralLarvae_respir
CoralLarvae_size
- Download complete data for this publication (Excel file)

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0844785

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