

Brooded coral larval settlement competency (Cumbo, 2012) from Taiwan 2010 (MCR LTER project, Climate_Coral_Larvae project)

Website: <https://www.bco-dmo.org/dataset/528728>

Version: 2014-09-08

Project

» [Moorea Coral Reef Long-Term Ecological Research site](#) (MCR LTER)

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

Program

» [Long Term Ecological Research network](#) (LTER)

| Contributors | Affiliation | Role |
|-----------------------------------|---|------------------------|
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Table of Contents

- [Dataset Description](#)
 - [Methods & Sampling](#)
 - [Data Processing Description](#)
- [Data Files](#)
- [Parameters](#)
- [Deployments](#)
- [Project Information](#)
- [Program Information](#)
- [Funding](#)

Dataset Description

The physiological development of brooded larvae from the pocilloporid corals *Pocillopora damicornis* and *Seriatopora caliendrum* in southern Taiwan was examined.

These data include settlement competency from experiments conducted in June and July, 2010.

Related datasets:

[brooded coral - carbonate chemistry](#)

[brooded coral - release](#)

[brooded coral - respiration](#)

[brooded coral - size July](#)

[brooded coral - size protein symbionts photosynth](#)

These data are published in Cumbo, VR, Fan TY, Edmunds PJ. (2012) Physiological development of brooded larvae from two pocilloporid corals in Taiwan. *Marine Biology* 159: 2853-2866. DOI 10.1007/s00227-012-2046-y. See Fig. 1e.

[Download complete data for this publication \(Excel file\)](#)

Methods & Sampling

In June, competency to settle within the first 24 h (*P. damicornis*) or 5 h (*S. caliendrum*) after release was assessed by preparing replicated trials ($n = 4$) of 10 larvae and a preconditioned porcelain tile (2 cm^2) in a 280-mL plastic container fitted with mesh windows (110 μm). These containers were retained in the same aquaria used for larval release, where they were exposed to light from metal halide lamps on a 12:12 h light/dark cycle at an intensity of $89 \pm 3 \text{ } \mu\text{mol quanta m}^{-2} \text{ s}^{-1}$ (mean \pm SE, $n = 44$). Settlement for *P. damicornis* was scored after 24 h and for *S. caliendrum* after 5 h, and the proportion settling was used as a measure of larval competence as a function of release day.

Data Processing Description

BCO-DMO processing notes:

- added conventional header with dataset name, PI name, version date, reference information

- added lab, lat, lon, expt columns

- renamed parameters to BCO-DMO standard

[[table of contents](#) | [back to top](#)]

Data Files

| File |
|--|
| brood_settle.csv (Comma Separated Values (.csv), 4.02 KB) MD5:c0787cbfea77d6f050f35e23005879c1 |
| Primary data file for dataset ID 528728 |

[[table of contents](#) | [back to top](#)]

Parameters

| Parameter | Description | Units |
|--------------|---|-----------------|
| expt | experiment id | unitless |
| lab | laboratory | unitless |
| lat | latitude; north is positive | decimal degrees |
| lon | longitude; east is positive | decimal degrees |
| species | coral species name | unitless |
| date | local date of measurement | yyyy-mm-dd |
| lunar_day | lunar day of measurement | integer |
| tank | tank id number | tank |
| plastic | number of larvae settling on plastic in experimental tank | integer |
| tile | number of larvae settling on tile in experimental tank | integer |
| rubble | number of larvae settling on rubble in experimental tank | integer |
| attached | number of larvae attached to substrate in experimental tank | integer |
| metamorph | number of larvae that have metamorphosed in experimental tank | integer |
| swim | number of larvae swimming in experimental tank | integer |
| dead | number of dead larvae in experimental tank | integer |
| total_settle | total number of settled larvae | integer |
| total | total number of larvae in the tank | integer |
| settle_prop | proportion of larvae settle:total larvae | unitless |

[[table of contents](#) | [back to top](#)]

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. |

[[table of contents](#) | [back to top](#)]

Project Information

Moorea Coral Reef Long-Term Ecological Research site (MCR LTER)

Website: <http://mcr.lternet.edu/>

Coverage: Island of Moorea, French Polynesia

From <http://www.lternet.edu/sites/mcr/> and <http://mcr.lternet.edu/>:

The Moorea Coral Reef LTER site encompasses the coral reef complex that surrounds the island of Moorea, French Polynesia (17°30'S, 149°50'W). Moorea is a small, triangular volcanic island 20 km west of Tahiti in the Society Islands of French Polynesia. An offshore barrier reef forms a system of shallow (mean depth ~ 5-7 m), narrow (~0.8-1.5 km wide) lagoons around the 60 km perimeter of Moorea. All major coral reef types (e.g., fringing reef, lagoon patch reefs, back reef, barrier reef and fore reef) are present and accessible by small boat.

The MCR LTER was established in 2004 by the US National Science Foundation (NSF) and is a partnership between the University of California Santa Barbara and California State University, Northridge. MCR researchers include marine scientists from the UC Santa Barbara, CSU Northridge, UC Davis, UC Santa Cruz, UC San Diego, CSU San Marcos, Duke University and the University of Hawaii. Field operations are conducted from the UC Berkeley Richard B. Gump South Pacific Research Station on the island of Moorea, French Polynesia.

MCR LTER Data: The Moorea Coral Reef (MCR) LTER data are managed by and available directly from the MCR project data site URL shown above. The datasets listed below were collected at or near the MCR LTER sampling locations, and funded by NSF OCE as ancillary projects related to the MCR LTER core research themes.

This project is supported by continuing grants with slight name variations:

LTER: Long-Term Dynamics of a Coral Reef Ecosystem
 LTER: MCR II - Long-Term Dynamics of a Coral Reef Ecosystem
 LTER: MCR IIB: Long-Term Dynamics of a Coral Reef Ecosystem
 LTER: MCR III: Long-Term Dynamics of a Coral Reef Ecosystem
 LTER: MCR IV: Long-Term Dynamics of a Coral Reef Ecosystem

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 environment 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 calandrum*. 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 PANGAEA: [doi:10.1594/PANGAEA.833913](https://doi.org/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 PANGAEA: [doi:10.1594/PANGAEA.831612](https://doi.org/10.1594/PANGAEA.831612)

[brooded coral larvae 2 - carbonate chemistry](#)

[brooded coral larvae 2 - larval release March 2003-2008](#)

[brooded coral larvae 2 - respiration_photosynth_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 calandrum* under ambient and elevated pCO₂. Journal Experimental Marine Biology and Ecology 443: 33-38 Data also at PANGAEA: [doi:10.1594/PANGAEA.821644](https://doi.org/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 PANGAEA: [doi:10.1594/PANGAEA.823582](https://doi.org/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 PANGAEA: [doi:10.1594/PANGAEA.830185](https://doi.org/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.

[CorallLarvae_comparison_respir](#)

[CorallLarvae_release](#)

[CorallLarvae_respir](#)

[CorallLarvae_size](#)

[- Download complete data for this publication \(Excel file\)](#)

[[table of contents](#) | [back to top](#)]

Program Information

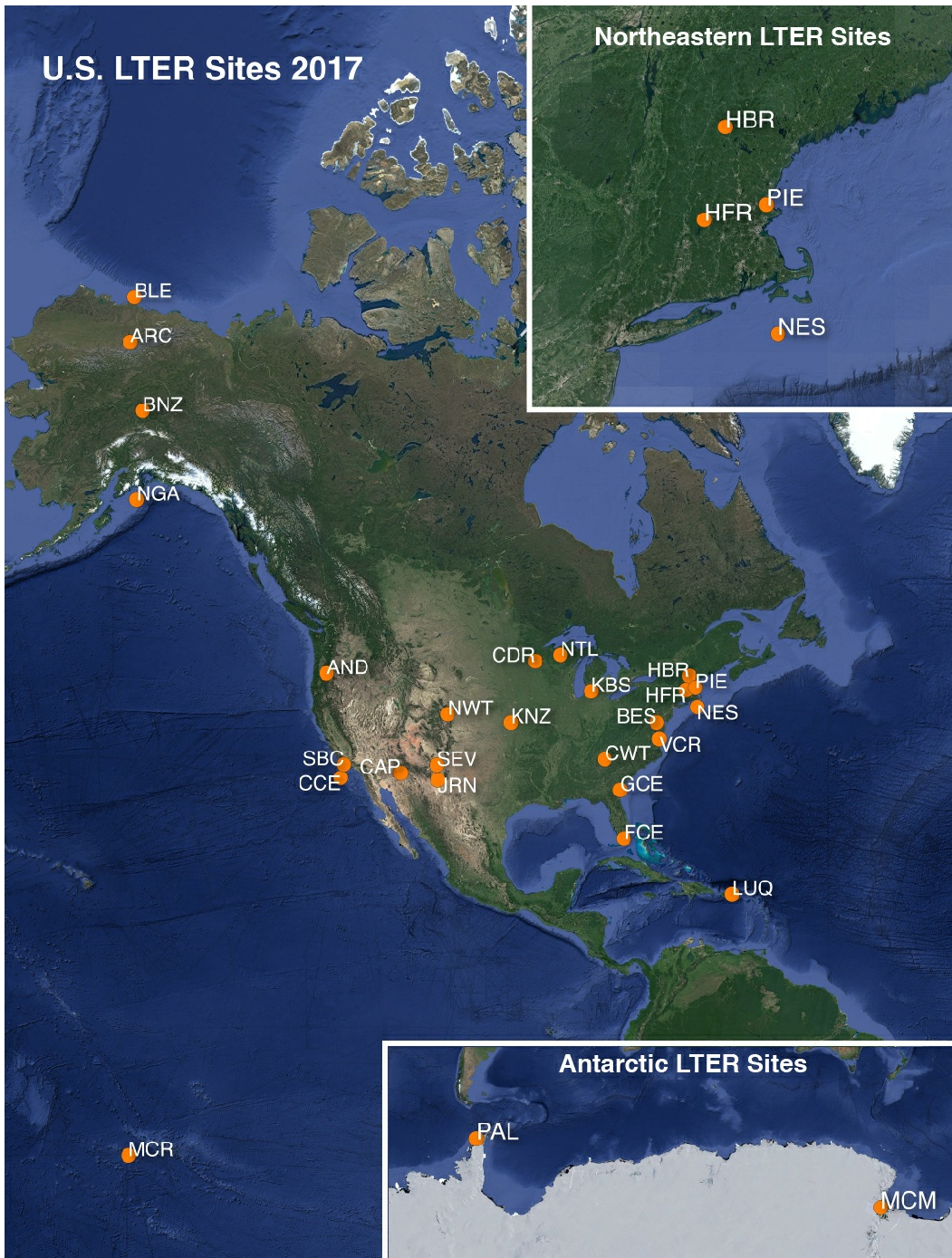
Long Term Ecological Research network (LTER)

Website: <http://www.lternet.edu/>

Coverage: United States

adapted from <http://www.lternet.edu/>

The National Science Foundation established the LTER program in 1980 to support research on long-term ecological phenomena in the United States. The Long Term Ecological Research (LTER) Network is a collaborative effort involving more than 1800 scientists and students investigating ecological processes over long temporal and broad spatial scales. The LTER Network promotes synthesis and comparative research across sites and ecosystems and among other related national and international research programs. The LTER research sites represent diverse ecosystems with emphasis on different research themes, and cross-site communication, network publications, and research-planning activities are coordinated through the LTER Network Office.



Site Codes

| | |
|-----|--|
| AND | Andrews Forest LTER |
| ARC | Arctic LTER |
| BES | Baltimore Ecosystem Stu |
| BLE | Beaufort Lagoon Ecosystems LTER |
| BNZ | Bonanza Creek LTER |
| CCE | California Current Ecosystem LTER |
| CDR | Cedar Creek Ecosystem Science Reserve |
| CAP | Central Arizona- Phoenix LTER |
| CWT | Coweeta LTER |
| FCE | Florida Coastal Everglades LTER |
| GCE | Georgia Coastal Ecosystems LTER |
| HFR | Harvard Forest LTER |
| HBR | Hubbard Brook LTER |
| JRN | Jornada Basin LTER |
| KBS | Kellogg Biological Station LTER |
| KNZ | Konza Prairie LTER |
| LUQ | Luquillo LTER |
| MCM | McMurdo Dry Valleys LT |
| MCR | Moorea Coral Reef LTER |
| NWT | Niwot Ridge LTER |
| NTL | North Temperate Lakes I |
| NES | Northeast U.S. Shelf LTER |
| NGA | Northern Gulf of Alaska I |
| PAL | Palmer Antarctica LTER |
| PIE | Plum Island Ecosystems LTER |
| SBC | Santa Barbara Coastal L |
| SEV | Sevilleta LTER |
| VCR | Virginia Coast Reserve L |

2017 LTER research site map obtained from <https://lternet.edu/site/lter-network/>

[[table of contents](#) | [back to top](#)]

Funding

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

[[table of contents](#) | [back to top](#)]