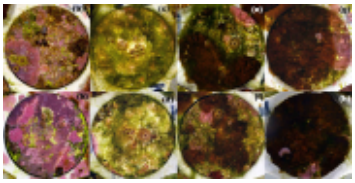
EATLAS DATA CATALOGUE (AIMS)

Light variability and CO2 effects on adults and juveniles of two coral species (NESP 2.3.1, AIMS)



Metadata | Metadata (XML)
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Title	Light variability and CO2 effects on adults and juveniles of two coral species (NESP 2.3.1, AIMS)
Date	
Date type	Publication
Abstract	This dataset consists of three data files (spreadsheets) from a two month aquarium experiment manipulating pCO2 and light, and measuring the physiological response (photosynthesis, growth, protein and pigment content) of the adult and juvenile stages of two species of tropical corals (Acropora tenuis and A. hyacinthus). **This dataset is currently under embargo until 21-Mar-2020. Methods: We conducted a two-month, 24-tank experiment at AIMS's SeaSim facility, in which recently settled juvenile- and adult-colonies of the corals Acropora tenuis and A. hyacinthus were exposed to four light treatments (high, medium, low and variable intensities), fully crossed with two levels of dissolved CO2 (400 and 900 ppm). The four light treatments used in the experiment (low, medium, high and variable) each had 12 hrs of light and a five hour ramp, but at different intensities. The high light treatment had a noon max of 500 µmol photon m-2 s-1 and a DLI of 12.6 mol photon m-2, the medium treatment had a noon max of 300 µmol photon m-2 s-1 and a DLI of 7.56 mol photon m-2, while the low light treatment had a noon max of 100 µmol photon m-2 s-1 and a DLI of 2.52 mol photon m-2. The variable treatment oscillated on a five day cycle, with four days at the low treatment intensity, a ramp day at the medium, then four days at the high treatment intensity. The mean DLI of the variable treatment was therefore the same as medium treatment. Light intensities were checked in each individual aquaria with a calibrated underwater light sensor (Licor, USA). The variable light treatment allowed us to investigate how these corals acclimate to a changing light environment, and to see if responses are due to limitation under low light, or inhibition under high light (i.e. coral responses in the variable treatment would resemble the low or high light treatments), or whether light has a cumulative effect regardless of variability (i.e. coral responses in the variable treatment would resemble the medium light treatment). Adult corals were collected from Davies Reef (18.30 S, 147.23 E) while juveniles were spawned from adults at AIMS's SeaSim facility. After two months of experiment exposure, growth (change in corallite number) and survivorship were assessed in the juvenile corals from photographs, while growth (buoyant weight changes), and protein and pigment content were assessed in the adults after tissue stripping following standard procedures. Briefly, each adult coral nubbin was water-picked in 10 mL of ultra-filtered seawater (0.04 µm) to remove coral tissue. This tissue slurry was then homogenised and centrifuged to separate coral and symbiont components following. Total coral protein content was quantified from the coral tissue supernatant with the DC protein assay kit (Bio-Rad Laboratories, Australia), while Symbiodinium pigments in the pellet were determined spectrophotometrically (Lichtenthaler 1987, Richie 2008). Protein content was standardised to nubbin surface area, estimated with the single wax-dipping technique (Veal et al. 2010), while pigment content was standardised by nubbin surface area, as well as by protein content. A series of photophysiological measurements for the effective (PhiPSII) and maximum (Fv/Fm) quantum yield of photosystem II were made on the adults with a pulse amplitude

	modulated fluorometer over the final ten days of the experiment. Photosynthetic pressure (Qm: 1 - PhiPSII / Fv/Fm) and relative electron transport rate (rETR: PhiPSII * PAR) were calculated (Ralph et al. 2016) to see how they were responding to their light environment. References: Lichtenthaler HK (1987) Chlorophylls and carotenoids: Pigments of photosynthetic biomembranes. Methods in Enzymology, 148, 350–382. Ralph PJ, Hill R, Doblin MA, Davy SK (2016) Theory and application of pulse amplitude modulated chlorophyll fluorometry in coral health assessment. In: Diseases of Coral, pp. 506–523. Ritchie RJ (2008) Universal chlorophyll equations for estimating chlorophylls a, b, c, and d and total chlorophylls in natural assemblages of photosynthetic organisms using acetone, methanol, or ethanol solvents. Photosynthetica, 46, 115–126. Veal CJ, Carmi M, Fine M, Hoegh-Guldberg O (2010) Increasing the accuracy of surface area estimation using single wax dipping of coral fragments. Coral Reefs, 29, 893–897.

Metadata language	eng
Character set	UTF8
Hierarchy level	Dataset

OnLine resource

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Linkage	https://eatlas.org.au/nesp-twq-2/benthic-light-2-3-1
Protocol	WWW:LINK-1.0-http--related

Point of contact

Individual name	Noonan, Sam Mr
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Role	Point of contact
Topic category	Biota

Extent

Description	Experiment – National Sea Simulator, AIMS

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Metadata author

Individual name	eAtlas Data Manager
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