DATA MANAGEMENT PLAN

Data Policy Compliance: The PI will comply with the data management and dissemination policies described by the NSF Award and Administration Guide (AAG, Chapter VI.D.4) and the NSF Division of Ocean Sciences Sample and Data Policy.

Description of Data Types

Observational datasets: Observational data will be collected every 4 months for five years from the reefs in Kaneohe Bay, Oahu. All data recorded by hand onto log sheets will be photographed and transcribed into Excel spreadsheets. File types: .jpg, .xlsx, .csv. Repository: BCO-DMO.

- Seawater temperature will be collected using HOBO Onset temperature loggers. All data will be downloaded and backed up locally immediately following instrument recovery. All relevant metadata (dates of deployment and collection, deployment depth and gps coordinates) will be recorded and saved with the data files. File types: .csv, .txt. Repository: BCO-DMO.
- Benthic community and individual colony data: Benthic community composition and individual coral colony change through time will be assessed from photographs taken with underwater digital cameras. Measures of colony size will be conducted in situ using measuring tape, and metadata including date, time, gps location, coral species and colony ID, and observer name, will be recorded by hand on log sheets. Images (.jpg, .tiff) will be archived on PennBox. Data extracted from the images will be exported as .xlsx or .csv files. Repository: BCO-DMO, PennBox.

Experimental datasets

- Experimental conditions: Light levels for mesocosms and during photosynthesis-irradiance curves conducted at HIMB will be measured using a Licor cosine sensor, and recorded by hand. Temperature will be controlled and recorded every 15 min using Neptune Apex controllers, and exported as Excel spreadsheets. Verification of Apex probe temperature probe readings with certified thermometers and transcribed to Excel files. Corals will be collected from the reef in Kaneohe Bay using metal clippers and transported in coolers with ambient seawater to HIMB. File types: .xls, .csv. Repository: BCO-DMO.
- Coral calcification: Coral calcification will be measured using the alkalinity anomaly technique. Seawater pH will be measured using a glass electrode, and data will be recorded by hand onto log sheets and transcribed to Excel spreadsheets. Total alkalinity of seawater samples, alongside CRMs, will be measured at HIMB via titration using a Metttler Toledo T5 Titrator and exported as .csv files. Calcification will also be measured using the buoyant weight technique, and coral weights will be recorded by hand. File types: .xlsx, .csv. Repository: BCO-DMO.
- Coral metabolism: Oxygen evolution and temperature will be measured simultaneously during thermal performance curves and photosynthesis-irradiance curves using oxygen optodes and PT-100 temperature sensors, and recorded 1 s-1 automatically (Presens). Data will be exported as Excel files. Repository: BCO-DMO.
- Coral bleaching: Corals in the acclimation and short-term heat stress experiments at HIMB will be photographed daily for assessment of color using a digital camera. Dark adapted yield will be measured using PAM fluorometry after sunset, with outputs recorded by hand and transcribed to Excel spreadsheets. File types: .xlsx, .jpg.. Repository: BCO-DMO.

Confocal microscopy images: All images will be saved in their full metadata formats, which can be analyzed with freely available software packages (e.g. ImageJ, LAS X Core). Fluorescent intensity data extracted from regions of interest in the images will be exported as .csv fils. File types: .czi, .csv, Repository: PennBox; external hard drive.

- Coral fragments: Coral fragments will be flash frozen in liquid nitrogen for later analysis of host tissue and symbiont metrics (symbiont abundance, chlorophyll content, host biomass, total protein, skeletal surface area) at the PIs lab in Philadelphia. Coral tissues will be analyzed for 13C enrichment by mass spectrometry at the UC Santa Cruz stable isotope facility. File types: .xlsx, .csv. Repository: BCO-DMO.

- Genetic sequencing. ITS2 amplicon sequencing of the algal symbionts will be performed at the University of Pennsylvania microbiome core facility. File types: .sra, .fasta. Repository: NCBI; accession numbers provided to BCO-DMO.
- Curriculum materials: The curriculum materials from the Global Change Biology CURE, the Penn Pre-Freshman Program, and the “Hands-On, Minds-On Professional Development for Local Teachers”, will be saved as Word documents (.docx) and PowerPoint files, and exported as .pdf. Repository: BCO-DMO.

Data and Metadata Formats and Standards: Field observation data (temperature, pH, salinity and light) will be stored in flat ASCII files, which can be read easily by different software packages. Field data will include date, time, latitude, longitude, and depth. Metadata will be prepared in accordance with BCO-DMO conventions (i.e. using the BCO-DMO metadata forms) and will include detailed descriptions of collection and analysis procedures.

Data Storage and Access During the Project: All data generated by this project will be stored on the investigators' computers, and backed up on the PennBox cloud storage system. PennBox allows free unlimited data storage and backup, and will be used to facilitate the sharing of data files and analyses between investigators.

Mechanisms and Policies for Access, Sharing, Re-Use, and Re-Distribution: Field observational data and metadata will be submitted to BCO-DMO upon submission of manuscripts. All datasets and statistical code will be uploaded and made publicly available on GitHub upon submission of manuscripts, and pushed to Zenodo for permanent doi upon acceptance for publication. DNA sequences will be deposited in the National Center for Biotechnology Information (NCBI) database GenBank upon submission of manuscripts. GenBank accession numbers will be provided to BCO-DMO in an Excel spreadsheet or .CSV file and metadata will be provided using the BCO-DMO Dataset Metadata submission form. Data sets produced will be made available through the BCO-DMO data system within two-years from the date of collection. The project investigators will work with BCO-DMO data managers to make project data available online in compliance with the NSF OCE Sample and Data Policy. Data, samples, and other information collected under this project can be made publicly available without restriction once submitted to the public repositories. Data produced by this project may be of interest to biological oceanographers, ecologists, and biologists. We will adhere to and promote the standards, policies, and provisions for data and metadata submission, access, re-use, distribution, and ownership as prescribed by the BCO-DMO Terms of Use (http://www.bco-dmo.org/terms-use).

Plans for Archiving: After data contributed to BCO-DMO are online and fully documented, BCO-DMO ensures that the data are archived properly at the appropriate National Data Center (e.g. NCEI) for long-term archive preservation. The PI will work to ensure data are archived appropriately with the complete metadata. Archived coral samples will be made available two years after the end of the project, or following publication of the data in the peer-reviewed literature, whichever is sooner. Because corals are listed under Appendix II of the Convention on International Trade in Endangered Species (CITES), we are obligated to ensure that all samples comply with CITES regulations when shipped internationally.

Roles and Responsibilities: The PI will be responsible for ensuring the data are shared among the project participants in a timely fashion. The PI will submit the resulting sequences to the National Center for Biotechnology Information’s (NCBI) GenBank database, and will coordinate the overall data management and sharing process, and will work along with the postdoc to submit the project data, including GenBank accession numbers, and metadata to the Biological and Chemical Oceanography Data Management Office (BCO-DMO), who will be responsible for forwarding these data and metadata to the appropriate national archive.