

## DATA MANAGEMENT PLAN

### 1. GENERAL INFORMATION

This Data Management Plan (DMP) was created on February 11, 2014 for submission to the National Science Foundation as required by NSF guidelines. The purpose of this DMP is to ensure the preservation and sharing of data collected during the proposed research to develop and apply a multi-proxy approach (boron isotopes, pH microelectrodes, confocal microscopy of pH-sensitive dyes) for the chemical analysis of organisms' internal calcifying media that would be conducted at the University of California at Los Angeles and at Northeastern University. In addition to serving as the DMP for this proposal, a modified form of this plan would also be provided to and reviewed by all participants in the proposed research.

### 2. PROJECT INFORMATION

This Data Management Plan (DMP) covers data that would be collected by the PIs, the co-PIs, as well as their postdoctoral fellows, graduate students, and undergraduate research assistants, whom would carry out the proposed research.

### 3. DATA RECORDING, STORAGE, BACK-UP, AND SECURITY

All experimental and analytical activity will be logged in designated high-quality laboratory notebooks that will be digitized, entered into spreadsheets, and archived on laboratory data drives and automatically backed-up daily on both external university servers and through offsite third-party *Iron Mountain* and/or *CrashPlan* servers. Laboratory notebooks will also be permanently stored in secure fire- and water-proof safes. The University of California's and Northeastern University's experience with and commitment to secure data archiving is well established and is in keeping with the participating Universities' Information Security Policies (<https://www.it.ucla.edu/it-policy-resources>; [http://www.northeastern.edu/securenu/?page\\_id=128](http://www.northeastern.edu/securenu/?page_id=128)). This includes storage of the primary data drives in secure locations and password protection of these drives.

### 4. ACCESS, SHARING AND RE-USE OF DATA

Pursuant to the NSF Award & Administration Guide (AAG) Chapter VI.D.4., the investigators would encourage and facilitate sharing with other researchers, at no more than incremental cost and within a reasonable time following publication of the research, the primary data, samples, physical collections and other supporting materials created or gathered in the course of the proposed research. The data collector, creator or principal investigator shall have rights to first use of the data. There should be no additional restrictions or permissions required for accessing the data once the research has been published. Privileged or confidential information would be released only in a form that protects the privacy of individuals and subjects involved. The researchers associated with this study are not aware of any reasons that might prohibit the sharing and re-use of the data once it has been published.

Data obtained through the proposed projects would be archived and made openly available to the public through the NSF-funded Biological and Chemical Oceanography Data Management Office (BCO-DMO; <http://www.bco-dmo.org/>), as well as through one or more of the following specialized databases (depending on the specific type of data collected): the NSF-sponsored US Ocean Carbon and Biogeochemistry Data Management Office (<http://ocb.whoi.edu/>), the European Project on Ocean Acidification Observation Data Management System (EPOCA; <http://www.epoca-project.eu/index.php/What-do-we-do/Science/Data/Data-policy.html>), the World Data Center for Marine Environmental Sciences (<http://www.wdc-mare.org/>), the Publishing Network for Geoscientific and Environmental Data (PANGAEA; <http://doi.pangaea.de/>), the Atlantic Oceanographic and Meteorological Laboratory (AOML) Environmental Data Server (<http://www.aoml.noaa.gov/envids/index.php>), the Carbon Dioxide Information Analysis Center (CDIAC; <http://cdiac.esd.ornl.gov/home.html>), the Ocean Biogeographic Information System (OBIS; <http://iobis.org/>), the Woods Hole Oceanographic Institute Data Center (<http://www.whoi.edu/page.do?pid=7140>), and/or the NOAA Paleoclimatology Program data repository administered by the National Climatic Data Center (<http://www.ncdc.noaa.gov/paleo/>).

#### 5. PUBLICATION OF DATA

Pursuant to the NSF Award & Administration Guide (AAG) Chapter VI.D.4., the investigators performing the proposed research would, in a timely manner, prepare and submit for publication all significant findings that result from this research. Authorship of the resulting publications would reflect the relative contributions of those involved. Publication would occur primarily through peer-reviewed journals, but also through non-peer reviewed articles, government reports, the investigators' professional webpages, and through presentations at international meetings, workshops, universities, and research centers. The investigators would also communicate the findings through public outreach activities, including presentations to local K-12 audiences, continuing education programs, community colleges, and state and federal legislatures.

#### 6. DATA QUALITY CONTROL

Certified or inter-laboratory calibrated standards that are matrix-matched to the investigated material would be used for all geochemical analyses. A maximum of 10 analyses would be bracketed by duplicate analyses of the appropriate certified standards along with procedural blanks. Samples would always be analyzed in duplicate, and in triplicate when possible. As a further measure to control analytical quality, randomly selected samples would be run as blind replicates within single sessions and also across different analytical sessions.

#### 7. PRESERVATION AND LONG-TERM MANAGEMENT OF DATA

All data collected through the proposed research (including scanned copies of the laboratory notebooks) would be permanently archived on Northeastern and UCLA secure servers and on third-party servers as described above. The investigators are aware of no specific financial considerations that would impact the long-term management and preservation of these data. The research staff at Northeastern and UCLA involved in the proposed research, as well as the Universities' archival staff, would review this DMP annually to ensure that data management protocols are up-to-date and compliant with university, state and federal policies.

#### 8. LEGAL GUIDELINES AND REQUIREMENTS

The investigators are not aware of any sensitive data, including personal identifiers, which would be collected through the proposed research. The investigators are also not aware of any copyright or licensing issues associated with the data to be generated from the proposed research.