

Data Management Plan

1. Types of data: Physical samples will include water samples. Water samples will be preserved and analyzed according to accepted standards and protocols (e.g., USEPA, 1993). Raw and processed sample analysis data (e.g., dissolved organic and inorganic carbon), raw and processed experimental, and numerical modeling codes, algorithms, and model inputs and outputs will also be produced.

2. Standards for data and metadata format: Specific plans and processes for data management, storage, archiving, and access will be developed by the co-investigators, in cooperation with BCO-DMO staff, as research activities progress. Initial efforts are outlined below.

Data: Raw data will be stored using the file formats native to the instruments or sensors, as well as transferred to spreadsheets (as Excel or text documents) for further analysis and processing. Experimental protocols will be stored both electronically (as Word documents) and in laboratory notebooks. Hand written observations and hard copies of raw and analyzed data, plots, and figures, will also be stored in laboratory notebooks, filed at the home institution, and saved for a minimum of 5 years beyond the conclusion of the project. All statistical and quantitative data will be stored in Matlab, SPSS, SAS, EXCEL or R formats. Photographic information will be stored as JPEG images and geospatial data will be stored in ArcGIS.

Metadata: PIs will work with the data management team at BCO-DMO to develop specific standard methods for formatting and storing metadata in a manner that can be easily searchable for other US investigators.

Modeling: Xue's coupled model will generate 3-dimensional physical (salinity, temperature, and velocity) and biogeochemical data (CO₂ flux, DIC, alkalinity, NO₃, NH₄, chlorophyll, etc.). The outcome of all analysis and the numerical model outputs will be stored in NetCDF format. All data formatting will be in compliance with NODC and NGDC recommendations based on widespread usage from the scientific community.

Data management: Data management will be done in partnership with BCO-DMO staff. The PIs will contact BCO-DMO within one month of receiving the award to develop a comprehensive data management plan. PIs have already placed data in this repository for the current NSF grant.

3. Mechanisms for access and sharing: In general, all final results will be published in peer-reviewed journals, preferably open-access, with supporting data being provided as supplementary information for these publications (downloadable from the journals' web pages). Every effort will be taken to publish data in a timely and incremental manner where appropriate. The electronic data will be maintained on computer hard drives and backed-up regularly on external hard drives, as well as contributed to BCO-DMO within 2 years of data creation to allow for access and sharing. One DODS server, available in the Center for Computation and Technology at LSU, will also be utilized to provide public access to the portion of our numerical simulations analyzed in publications once manuscripts are accepted (approximately 2TB of NetCDF data). Original laboratory notebooks will be secured by the co-investigators in the laboratory, and access to the data will be provided by the co-investigators. The data will be preserved for at least five years beyond the award period, or as required by NSF guidelines.

4. Policies and provision for re-use, re-distribution and products of derivatives:

Intellectual Property Rights: During the conduct of this project, all ownership rights rest with the institution (Louisiana State University). The sharing of research results will be consistent with Louisiana State University governing intellectual property, copyright and the dissemination of research products.

General day-to-day practice: All the data will be shared as outlined in the policies for sharing, therefore, no permission restrictions will be placed on the data. The data obtained will be of interest to a wide group of scientists and modelers who access publicly accessible data from this research. We do not anticipate that there will be any significant intellectual property issues involved with the acquisition of the data. However, in the event that discoveries or inventions are made in direct connection with these data, access to the data will be granted upon request once appropriate invention disclosures and/or provisional patent filings are made.

5. Archiving of data:

National Archiving: all electronic data, metadata, model images, and modeling outputs will be submitted to BCO-DMO within 2 years of production/creation. The PIs will work directly with BCO-DMO staff to ensure final archiving at the appropriate repository, such as NODC, in compliance with the Division of Ocean Sciences Sample and Data Policy.

Institutional Archiving: On completion of the project, the co-investigators, in consultation with the Louisiana State University Libraries, will identify which project materials are of probable long-term interest for archiving and preservation in the Institutional Repository. Whenever possible, primary materials will all be created *de novo* or transcribed into standard Microsoft Office (Word, Excel, and PowerPoint) files, and then stored and available as PDF documents. All the numerical simulation data produced within this project and used in publications in NetCDF format will be archived for 5 years beyond the completion of the project. After the first 5 years, only the model configurations used to generate the numerical integrations (to insure their reproducibility), figures, and animations will be maintained on the DODS server for at least another 5 years.

investigators' Archiving: Data will be stored in electronic formats on computers in the co-investigators' laboratories and when possible on servers operated by the co-investigators home department, which are backed up for redundant storage. The data acquired and preserved in the context of this proposal will be further governed by policies pertaining to intellectual property, record retention, and data management. Data will also be stored as hardcopy in laboratory notebooks, which the students must give to the co-investigators upon their departure from the laboratory. Laboratory notebooks will be stored for the duration of the co-investigators' tenure at the university.