DATA MANAGEMENT PLAN

Ecosystem-scale responses of coupled C-N-P cycles to dramatic shifts in benthic communities: The Upper Great Lakes

The project will generate data on the geochemistry and benthic biology of Upper Great Lakes sediments and the accompanying dataset for the chemical composition of bottom waters. It will characterize samples from sediments and benthic invertebrates collected from 10 locations in Lakes Superior, Michigan and Huron and samples obtained during laboratory incubations of natural sediments. Data management will follow the guidelines set forward by the relevant offices, such as Biological and Chemical Oceanography Data Management Office (BCO-DMO).

Sampling and fieldwork

Event logs will be filled by hand during sampling trips, scanned, and used to create a digital event log for data management and archiving purposes. Digital data routinely collected during field trips aboard the *R/V Blue Heron* typically include ship log, Conductivity Temperature Depth (CTD) profiles and dissolved oxygen, chlorophyll fluorescence and transmissometry profiles in the water column at each sampling location, and sometimes records from the underway flow-through surface water sampling system and Knudsen echosounder. Information about samples and files generated during sampling (such as water column profiles) will be entered into an electronic database as soon as possible after collection. The database will include metadata about sample collection and information about sample processing stage. Information about samples will be stored on university computers, backed up onto physical electronic storage media and uploaded to UMD backup servers and cloud storage services such as Google Drive on a regular basis. Additionally, paper copies of the sample tracking database will be stored at the Large Lake Observatory together with field notebooks for at least 5 years. Physical samples will be labelled with all relevant information on waterproof plastic labels and stored at the Large Lakes Observatory. Samples will be processed as soon as possible to minimize possibility of accidental damage and loss. Once processed, samples will be retained for a period of at least 5 years.

PIs Ozersky and Katsev, with help from the postdoctoral researcher, will serve as the data management coordinators. Field trip reports and data will be submitted to BCO-DMO. Physical, chemical, and biological properties collected during the project will be submitted, with their metadata, to BCO-DMO or NOAA where applicable, and will be available online through the BCO-DMO data system within one year of acquisition. Additionally, data will be made available to interested parties from the PIs upon request within the first 2 years of the project's duration. After a period of two years (or after publication in refereed journals) the data will be made publically and freely available. The PIs will work with the University of Minnesota Libraries Data Repository (https://www.lib.umn.edu/datamanagement/drum) to make data publically available and accessible over the long term.

Sediment cores, geochemical and biological data

Data generated as part of this work will be stored on university computers and electronic storage media and on a cloud storage service such as Google Drive. Geochemical and biological data, sediment geochemistry models and result of modeling efforts generated in this project will be disseminated through peer-reviewed scientific journals. Where applicable, data will be archived in the SedDB/LDEO and IEDA databases, or registered under the IGSN/SESAR system. Data from instrumental analyses (IC, EA, etc.) will be backed up from instrumental software systems to UMD data servers, or recorded in notebooks, digitized, and backed up. Sediment samples will be archived at the LacCore sediment core

repository on the University of Minnesota Twin Cities campus, subject to standard access and sample request protocols established by this national, NSF-funded facility.

Numerical codes and electronic data

All digital data will be backed-up to UMD information technology systems and made publically and freely available as described above. Data processing and model numerical codes and scripts will be freely available by an email request to the PI, submitted as electronic annexes as parts of publications in peer reviewed journals, to be archived in perpetuity, and made available freely from the project's web site.

The data acquired and preserved in the context of this proposal will be further governed by the University of Minnesota Duluth (UMD) policies pertaining to intellectual property, record retention, and data management.