Collaborative Research: pH Dynamics and Interactive Effects of Multiple Processes in a River-Dominated Eutrophic Coastal Ocean

Data Policy Compliance

Identify any published data policies with which the project will comply, including the NSF OCE Data and Sample Policy as well as other policies that may be relevant if the project is part of a large coordinated research program (e.g. GEOTRACES).

We will share and archive data collected as part of this research project in compliance with NSF policy ([NSF11001](#)) and the Division of Ocean Science Sample and Data Policy ([NSF11060](#))--All data collected by projects funded through this solicitation will be freely and openly available to any interested investigator as soon as practical, but no later than 12 months following collection.

Pre-Cruise Planning

If the proposed project involves a research cruise, describe the cruise plans. (Skip this section if it is not relevant to your proposal.) Consider the following questions:

1. How will pre-cruise planning be coordinated? (e.g. email, teleconference, workshop)
2. What types of sampling instruments will be deployed on the cruise?
3. How will the cruise event log be recorded? (e.g. the Rolling Deck to Repository (R2R) event logger application, an Excel spreadsheet, or paper logs)
4. Will you prepare a cruise report?

Four cruises are planned for April, July, and October of 2017 and January of 2018 to the Mississippi River plume and northern Gulf of Mexico. In addition, six short cruises are planned for February, June and August 2017 and March, June and August 2018 to deploy and service the sensor packages at one site and to conduct additional surveys around the mooring area. During these cruises, surface water underway data, and water column ocean biogeochemistry data will be collected (see Table 1). Pre-cruise planning will be done in Cai's lab and with Rabalais lab via teleconferencing and email discussions. Detailed plans for station locations, instrument deployment, water sampling strategy and water sample allocation will be written up as a science implementation plan for the cruises and may be revised after the first cruise. Most of the measurements and model analysis in Table 1 have been done in the labs of all of the PIs and follow standard protocols and practices. The PIs listed in Table 1 will guide the activities of postdocs, students, or technicians responsible for data collection.

Type	Data to be collected	PI or source
Underway/continuous	Position, date, time, meteorological	Ship operator/NDBC, Cai
Underway/continuous	T,S, fluorometry, transmissometry, DO, pH, pCO$_2$ as well as O$_2$/Ar	Cai
Water column (CTD)	T,S, pressure, pH, DO	Cai

Water column (discrete samples)	DIC, alkalinity, Ca^{2+}, pH, Winkler DO, dissolved nutrients, DIC-C^{13}, chlorophyll	Cai, Rabalais,
Process studies	Mixing simulation, community respiration rates, & NCP, and *in situ* benthic flux data.	Cai (benthic flux by Kanchan Maiti)
In situ sensor package	T,S, DO, pH and pCO_2	Cai and Rabalais
Modeling & synthesis	Coupled physical-biological model; stoichiometry and acid-base model	Fennel, Cai and Rabalais

Description of Data Types

Provide a description of the types of data to be produced during the project. Identify the types of data, samples, physical collections, software, derived models, curriculum materials, and other materials to be produced in the course of the project. Include a description of the location of collection, collection methods and instruments, expected dates or duration of collection. If you will be using existing datasets, state this and include how you will obtain them.

The project will produce several observational datasets, described in the list below.

1. **CTD and Niskin bottle data:** CTD data collected using a SeaBird SBE CTD package; processing to be done using SeaBird's SeaSave software; data will include standard environmental measurements (such as pressure, temperature, salinity, dissolved oxygen, fluorescence). File types: Raw (.con, .hdr, .hex, .bl) and processed and .cnv, .asc, .btl) ASCII files. Repository: BCO-DMO
2. **Event log:** Cruise scientific sampling event log; will include event numbers, start/end dates, times & locations of instrument deployments. Will be recorded using the R2R event logger (if available) and on paper log sheets. File types: Excel file converted to .csv; scanned PDFs. Repository: BCO-DMO and Rolling Deck to Repository (R2R).
3. **Cruise underway data:** Routine underway data collected along the ship's track (including meteorological data, sea surface temperature, salinity, fluorescence, pCO2). Will be collected by the shipboard instrumentation. File types: .csv ASCII files. Repository: BCO-DMO and R2R.
4. **Inorganic carbon system sampling logs:** DIC, Alakalinity, pH will be sampled via CTD Rosette during the cruise. Information from log will be transferred into an Excel spreadsheet. File types: PDF files of scanned log sheets; Excel files of sampling logs; images (.jpg files). Repository: BCO-DMO.

Data and Metadata Formats and Standards

Identify the formats and standards to be used for data and metadata formatting and content. Where existing standards are absent or deemed inadequate, these formats and contents should be documented along with any proposed solutions or remedies. Consider the following questions:

1. Which file formats will be used to store your data?
2. What type of contextual details (metadata) will you document and how?
3. Are there specific data or metadata standards that you will be adhering to?
4. Will you be using or creating a data dictionary, code list, or glossary?
5. What types of quality control will be used? How will data quality be assessed and flagged?

Field observation data will be stored in flat ASCII files, which can be read easily by different software packages. Field data will include date, time, latitude, longitude, cast number, and depth, as appropriate. Quality flags will be assigned according to the ODS IODE Quality Flag scheme (IOC Manuals and Guides, 54, volume 3; http://www.iode.org/mg54_3).

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

Describe how project data will be stored, accessed, and shared among project participants during the course of the project. Consider the following:

1. How will data be shared among project participants during the data collection and analysis phases? (e.g. web page, shared network drive)
2. How/where will data be stored and backed-up?
3. If data volumes will be significant, what is the estimated total file size?

The investigators will store project data (including spreadsheets, ASCII files, images, and PDFs of scanned logs) on laboratory computers that are backed up by the University's central IT organization. Personal computers in all laboratories are backed up to multiple offsite hard drives.

Mechanisms and Policies for Access, Sharing, Re-Use, and Re-Distribution

Describe mechanisms for data access and sharing, and describe any related policies and provisions for re-use, re-distribution, and the production of derivatives. Include provisions for appropriate protections of privacy, confidentiality, security, intellectual property, or other rights or requirements. Consider the following:

1. When will data be made publicly available and how? Identify the data repositories you plan to use to make data available.
2. Are the data sensitive in nature (e.g. endangered species concerns, potential patentability)? If so, is public access inappropriate and how will access be provided? (e.g. formal consent agreements, restricted access)
3. Will any permission restrictions (such as an embargo period) need to be placed on the data? If so, what are the reasons and what is the duration of the embargo?
4. Who holds intellectual property rights to the data and how might this affect data access?
5. Who is likely to be interested in re-using the data? What are the foreseeable re-uses of the data?

1. **Submission of underway data.** Soon after the completion of the cruise, the original underway data will be contributed by the vessel operator to the UNOLS central data repository at http://www.rvdata.us/catalog/managed by the Rolling Deck to Repository (R2R) project. Also, R2R will ensure that the original underway measurements will be archived permanently at NODC and/or NGDC as appropriate for the data type.
2. **Submission of CO_2** We will submit $p$$CO_2$, DIC, TA and pH data to the Carbon Dioxide Information Analysis Center (CDIAC) (http://cdiac.ornl.gov/) as we have done in the past as well as to BCO-DMO (see #7). We have worked closely with CDIAC's data manager Mr. Alex Kozyr over the past decade to curate CO_2-related data from projects in the South Atlantic Bight, the northern Gulf of Mexico and the western Arctic Ocean. In submitting data to CDIAC, proper data and metadata formats will be observed as required by CDIAC data submission protocol. The pCO_2 data will go through secondary data quality control and feed into the Surface Ocean CO_2 Atlas (SOCAT) project (where Cai is one of the team leaders for the coastal ocean).
3. **Routine hydrographic data** from CTD casts and chemical analyses will be deposited with and archived by the Biological and Chemical Oceanography Data Management Office (BCO-DMO) (http://bco-dmo.org/data/). Chemical data to be submitted will include concentrations of nutrients (NH_4^+, NO_3^- and NO_2^-, phosphate and silicate), DIC, TA and pH data as well as underway O_2/Ar and pCO_2 data (also to CDIAC). Experimental results will also be submitted to BCO-DMO. Proper data and metadata formats will be observed as required by the BCO-DMO data submission protocol. We have discussed data submission requirements with BCO-DMO personnel at several occasions (OCB & AGU meetings) and followed up by emails. BCO-DMO will also submit all the data they manage to the appropriate national archive facility, such as NODC and NGDC. In addition, hydrographic and other oceanographic data and metadata from our research will also be supplied to the NODC. Project data and results will also be reported in peer-reviewed publications either as tabulated data in the publication or in supplementary

data tables. Complete records of these data, including notebooks or computer files, archived samples, and results of statistical or other data analyses or models will be maintained by the PIs in their laboratories or offices for at least 5 years past the end date of this project.

Plans for Archiving

Describe the plans for long-term archiving of data, samples, and other research products, and for preservation of access to them. Consider the following:

1. What is your long-term strategy for maintaining, curating, and archiving the data?
2. What archive(s) have you identified as a place to deposit data and other research products?

R2R will ensure that the original underway measurements are archived permanently at NCEI and/or NGDC as appropriate. BCO-DMO will also ensure that project data are submitted to the appropriate national data archive. The PI will work with R2R and BCO-DMO to ensure data are archived appropriately and that proper and complete documentation are archived along with the data.

Roles and Responsibilities

Describe the roles and responsibilities of all parties with respect to the management of the data. Consider the following:

1. If there are multiple investigators involved, what are the data management responsibilities of each person
2. Who will be the lead or primary person responsible for ultimately ensuring compliance with the Data Management Plan?

Each PI will be responsible for sharing his/her subset of data among the project participants in a timely fashion. Nancy Rabalais will be responsible for collecting and analyzing the nutrient data. Katja Fennel will oversee modeling of inorganic carbon and O2 dynamics. The Lead PI, Wei-Jun Cai, will coordinate the overall data management and sharing process and will submit the project data 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. Finally, we will encourage data sharing among PIs to promote prompt publication by responding to their requests for data as soon as is feasible. Co-authorships and acknowledgments will be discussed when the data are requested and revised as needed in light of contributions to subsequent data analyses and writing efforts.