

# Data Management Plan: Mechanisms and Controls of Nitrous Oxide Production in the Eastern Tropical North Pacific Ocean

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## Data Policy Compliance

We will comply with the requirements of the National Science Foundation Division of Ocean Sciences Sample and Data Policy (May 2011). BCO DMO is the appropriate repository for most of our data, but any molecular data will be more suitable for submission to NCBI in the GEO (Gene Expression Omnibus functional genomics repository). Microarray data will comply with the MIAME standards.

## Pre-Cruise Planning

The proposed project involves one ~35-40 day research cruise in the Eastern Tropical North Pacific. Pre-cruise planning will be coordinated between the lead institution (Ward at Princeton University) and the collaborating institution (Casciotti at Stanford University) and other informal collaborators (some already identified: Aarhus University (Niels Peter Revsbech), and some likely to coalesce at the time of the cruise. Ward and Casciotti will meet regularly by Skype; all others will be coordinated by email and we will make use of DropBox for sharing shipping files, medical forms, foreign port information, etc.

The main sampling instrument is the CTD rosette for water samples.

We will keep two event logs in real time. We have experience with the R2R event logger application and will use that as the primary log. We also maintain an Excel spreadsheet as an event log for our own use because it is useful to enter notes and other custom information that is not convenient or helpful in the R2R record.

An informal cruise report for the participants will be prepared immediately after the cruise. It will contain mainly the event log and the sample inventory for all samples collected and experiments performed by all participants in order to coordinate later sample analysis and interpretation.

## Description of Data Types

We categorize the data to be collected into the following groups:

- (1) Observational data: Shipboard underway data; hydrographic cast data including STOX sensor O<sub>2</sub> concentrations, immediate NO<sub>2</sub><sup>-</sup> analyses which are used for selection of sampling depths, shipboard N<sub>2</sub>O analyses
- (2) Experimental data: Nutrient chemical depth profiles, dissolved gas concentrations, isotope measurements from tracer incubation experiments, natural abundance stable isotope data for dissolved inorganic nitrogen species, DNA and RNA sequences (quantitative PCR concentrations of functional genes, functional gene microarray data)
- (3) Simulations: biogeochemical model development and output to interpret the effect of environmental variables on measured and simulated rates of N<sub>2</sub>O production and consumption
- (4) Derived data products: publications, preliminary data reports, microarray data, sequence data.

The timing of all of these products depends on the cruise schedule, which is unknown at this time. The observational data will be compiled within 6 months of the end of the cruise. The experimental and simulation results will require 2 years or more for analysis.

## **Data and Metadata Formats and Standards**

The chemical and isotope components of the observational and experimental data will be provided as Excel spreadsheets for BCO DMO. Microarray data will be deposited at NCBI (GEO database) in the required format (usually Excel spreadsheets). Meta data include cruise ID, station ID, kind of deployment (e.g., CTD vs trap), date, time, lat, long, depth, contact person.

## **Data Storage and Access During the Project**

Data will be shared among project participants via shared DropBox folders managed by Ward, Casciotti and Jayakumar. DropBox also serves as a secure backup for multiple users and devices. The largest files are likely to be ODV plots or model output, but none of these are sufficiently large to pose serious data storage issues.

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

Data availability: Observational data will be made available to the project participants as soon as possible after the cruise, within no more than 6 months. Most of those data will be made available to BCO DMO within a year following the cruise.

Experimental data will be published in peer-reviewed publications and deposited at BCO DMO as appropriate or at NCBI (GenBank, GEO) as appropriate at the time of publication. After publication, the authors will make all data available to others upon request.

Data Sharing via BCO-DMO: We will work with BCO-DMO staff to manage the data. Data and model results generated during the proposed research project will be contributed to the BCO-DMO system. We will submit project metadata to BCO-DMO at the time the project is funded.

Underway Shipboard Data: All routine underway data collected by vessel-resident instrumentation aboard UNOLS-supported oceanographic research vessels will be submitted to the appropriate long-term archive through the Rolling Deck to Repository (R2R) program.

## **Plans for Archiving**

We do not plan to collect physical samples that require long term archiving. Particulate material collected for the purpose of molecular analysis will be preserved in -80oC Freezers at Princeton University; these are controlled and monitored by a central monitoring program. Some of these samples will probably be retained after the end of the project, but they do not constitute a formal permanent archive. Long term availability of the observational, experimental and derived data will be assured by its repository at BCO DMO and NCBI. All frozen seawater samples returned to Stanford for isotopic analysis will be retained in a -20 °C walk in freezer in Casciotti's lab until at least 2 years after publication of the data.

## **Roles and Responsibilities**

Ward is responsible for ensuring compliance with the Data Management Plan. Her group will be responsible for compiling the tracer incubation experimental data and the underway and observational data (CTD casts). Casciotti and Ward will be responsible for the chemical profiles (nutrients, chemistry, isotopes, gases) as appropriate for collaborative analyses and experiments.