

COLLABORATIVE RESEARCH: PROBING THE VENTILATION EFFICIENCY OF THE DEEP OCEAN WITH CONSERVATIVE DISSOLVED GAS TRACERS IN ARCHIVED SAMPLES

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).

The project investigators will comply with the data management and dissemination policies described in the document NSF 17-037 - Division of Ocean Sciences Sample and Data Policy.

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.

This project will produce three observational datasets. All three observational datasets will involve measurements of 100 total dissolved gas samples that were collected on cruises in 1981 (TTO/NAS) and in 1990 (WOCE A21) to the North Atlantic and Atlantic Section, respectively. Dissolved gases were extracted at sea from 250 L Gerard barrels by PI Smethie and have been archived in gas cylinders at LDEO since their collection.

1. **Sample integrity and major gas data:** At LDEO, each gas cylinder will be subsampled into 250 mL samples to be shipped to WHOI for analysis of noble gases and oxygen isotopes. At the time they are subsampled, they will be checked for integrity by measuring sample pressure as well as major air components (argon, nitrogen, and oxygen) via gas chromatography at LDEO. These sample integrity data (pressure, major gas abundances) as well as original cruise data (original sample collection pressure, oxygen concentration) will be compiled and publicly archived. File types: Excel and netCDF. Repository: BCO-DMO

2. **Noble gas data:** At WHOI, noble gas elemental ratios and isotope ratios will be measured on the same subsamples using two instruments in the Seltzer and Jenkins laboratories. All measurement data on replicate aliquots of gas measured on each instrument will be compiled and publicly archived. File types: Excel and netCDF. Repository: BCO-DMO.

3. **Triple Oxygen Isotope data:** In the Stanley lab at WHOI, each subsample will be analyzed for triple oxygen isotope composition of O₂ after purification (removal of Ar and N₂). These data will be compiled and publicly archived. File types: Excel and netCDF. 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?**

All measurement data will be stored as Excel files initially, before being converted to netCDF for easy manipulation in future analyses. Both file types will be archived. Regarding metadata, we will document all sample cruise names, station numbers, sample depths, dates of collection, dates of sampling from archived gas cylinders, and labs and institutions in which any given analysis was made. 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?**

During the project, data (spreadsheets, text documents) will be shared among collaborators via Google Drive, where all data will be continuously backed up. The PIs have established accounts with Google Drive through Woods Hole Oceanographic Institution providing several TB storage capacity (we expect the generated measurement data in the project to be relatively small, <1GB total).

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?**

Data sets produced by the PIs will be made available through the BCO-DMO data system within two years from the date of analysis. The project investigators will work with BCO-DMO data managers to make project data available online in compliance with the NSF OCE Sample and Data Policy. Data, samples, and other information collected under this project can be made publicly available without restriction once submitted to the public repositories. Data produced by this project may be of interest to chemical, biological, and physical oceanographers, and to climate scientists interested in air-sea exchange of radiative gases. We will adhere to and promote the standards, policies, and provisions for data and metadata submission, access, re-use, distribution, and ownership as prescribed by the BCO-DMO Terms of Use (<http://www.bco-dmo.org/terms-use>).

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?**

The PIs' long term strategy is to archive the data via BCO-DMO once measurements have been made, interpreted, and finalized (within two years of analysis, as described above). The PIs will work with 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 uploading data to a shared Google Drive folder through the project in a timely fashion. All PIs will meet regularly to discuss and interpret data, and to write and edit manuscripts. The Lead PI, A. Seltzer, 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.