

## **Data Management Plan**

### **I. Types of data**

Materials produced from this research will include data from chemical sensors (microsensors) from *in-situ* measurements at a very high-resolution ( $\mu\text{m}$ ), as well as measurements in intact cores under both natural and perturbed conditions. A high number of microelectrodes will be used ( $\text{O}_2$ ,  $\text{NO}$ ,  $\text{N}_2\text{O}$ ,  $\text{NO}_3$ ,  $\text{H}_2\text{S}$ , pH, redox potential and temperature), at each site and time point, which will generate a large data set. This data will also be used to calculate  $\text{N}_2\text{O}$  production and consumption rates, as well as net fluxes of  $\text{N}_2\text{O}$  in a comparison of different sites, sediment types, times of the year and under varying experimental conditions (changes in  $\text{O}_2$  and  $\text{NO}_3$  concentrations).

In addition data will be generated from chemical and isotope analyses measured on both field samples and samples taken over experimental core incubations conducted at the two field research stations (USC Wrigley Institute for Environmental Studies, AWI - Wadden Sea Station Sylt). Experiments will involve incubations of sediment cores under steady state conditions, with chemical and isotopic flux data generated by comparison of inflow/outflow fluid composition. Measurements will be taken over a time course of the varying lengths (determined by the nature of the experiment), with net flux data being calculated at steady state conditions. Analytical data will include stable isotopic composition and concentrations of nitrate, nitrite, ammonium and nitrous oxide. Standard deviations for replicate analyses will be reported. Any replicates with standard deviations higher than the normal range of precision (0.3‰ for  $\delta^{15}\text{N}$ , 0.6‰ for  $\delta^{18}\text{O}$  will be flagged – and if possible reanalyzed).

The combined datasets of the microprofiles, the calculated  $\text{N}_2\text{O}$  production and consumption rates, as well as net fluxes of  $\text{N}_2\text{O}$ , together with the pore-water and sediment geochemical data and the results of the stable isotope analyses will be transferred to a data-base for access to every researcher involved in the project and for the use in the metabolic modeling approach. Since these data sets are quite unique, an appropriate web based filing site does not exist yet. But publication of the entire datasets in for example Dataset Papers in Geosciences might be an option for releasing individual datasets or the Metadata. Dataset Papers in Geosciences is part of a new journal platform that Hindawi is developing called Datasets International (<http://www.datasets.com>). The main objective of Datasets International is to help researchers in all academic disciplines archive, document, and distribute the datasets produced in their research to the entire academic community. In addition to publishing a series of journals devoted to the dissemination of Dataset Papers, Datasets International hosts the underlying data behind these Dataset Papers and makes it accessible to all researchers worldwide.

### **II. Data and Metadata Standards**

A large amount of microsensor data will be generated by at least 4 persons involved in the projects. Nomenclature and storage of data files will be discussed and put down as guidelines, which will also include standardized protocols for documenting data collection and analytical procedures as well as contextual details (sampling site location, depth, water temperature, time, etc.). Initially all the information will be documented in the individual researchers laboratory notebooks. Raw data will be stored in the form of

Microsoft Excel spreadsheets. During the project a framework for the datasets will be generated where all the data will be stored in one place, to allow researchers access and for the use in the metabolic modeling approach. The chemical data sets will not be quite as large and will be stored similarly in a dedicated space. The involved researchers will use drop box ([www.dropbox.com](http://www.dropbox.com)) to easily store data initially and share it among all the people involved in the project.

### **III. Policies for access and sharing and provisions for appropriate protection/privacy**

The experimental data obtained in this research, stable isotopic composition of nitrogen-bearing compounds and biological information will be made available to the scientific community and general public through publication in peer-reviewed journals. There will be no embargo periods for political/commercial/patent reasons. Chemical and biological data will be made available following collection and analysis. Data dissemination will be noted in the publications within the Materials and Methods section to inform the scientific community of the data availability and accessibility. We will retain the right to hold data prior to publication only if a conflict of interest seems warranted. The dissemination of the chemical and biological data to be collected for this proposed research will not be restricted by any ethical or privacy issues, copyright concerns or restrictive licenses. As discussed above, all the data collected will be made readily available to the scientific community through various datacenters, published manuscripts in peer-reviewed journals, and by request to the affiliated researchers.

### **IV. Policies and provisions for re-use, re-distribution**

There will be no permission restrictions placed on the data. The data that will be collected through the proposed research will be of interest to a broad spectrum of environmental scientists, including chemical and biological oceanographers, biogeochemists, microbial ecologists, and environmental chemists. This data will be available for researchers to include in their analysis nitrogen biogeochemistry.

### **V. Plans for archiving and Preservation of access**

All relevant data will also be published through peer-reviewed journals provided in a usable manner.