

Data Management Plan

1. Existing Data and Data Products to be Utilized

Ocean Station Papa Mooring Data:

- Non-Carbon Data, (<https://www.pmel.noaa.gov/ocs/Papa>)
 - Upper-ocean salinity, temperature, current speed, wind speed and direction
- Carbon Data, (https://www.nodc.noaa.gov/oceanacidification/stewardship/data_portal.html, http://cdiac.ornl.gov/oceans/Moorings/Papa_145W_50N.html)
 - Atmospheric boundary layer and surface ocean carbon dioxide partial pressures

Biogeochemical Profiling Float Data, (<http://www.mbari.org/science/upper-ocean-systems/chemical-sensor-group/floatviz/>)

- Nitrate, temperature, salinity, oxygen, pressure (floats 5143, 6400, 6972, 7601, 6811, 7641)

National Centers for Environmental Prediction Reanalysis Data, (<http://www.ncep.noaa.gov/>)

- Wind speed, atmospheric boundary layer oxygen partial pressures and total pressure, relative humidity

Earth System Research Laboratory Observatory Data, (<https://www.esrl.noaa.gov/gmd/>)

- Atmospheric boundary layer carbon dioxide partial pressures from the Ochsenkopf, Germany Site

Satellite Products:

- Net Primary Productivity, (<http://www.science.oregonstate.edu/ocean.productivity/>)
 - VGPM, Eppley-VGPM, Updated CbPM
- Export Efficiency, (<https://oceancolor.gsfc.nasa.gov/data/aqua/>)
 - Sea surface temperature and chlorophyll concentration products from the Moderate Resolution Imaging Spectroradiometer (MODIS) Aqua R2014 at 1/6° resolution, following Laws et al., 2000, 2011, Dunne et al., 2007, and Henson et al., 2011

2. Data to be Produced

Biogeochemical Profiling Float Data: Biogeochemical sensor data from two new biogeochemical profiling floats will be produced as part of the proposed project. Measured parameters include: oxygen, nitrate, pH, bio-optical properties (chlorophyll, fluorescence, and optical backscatter), downwelling irradiance, temperature, salinity, and pressure.

Discrete Samples: Discrete samples for dissolved organic carbon (DOC), total organic carbon (TOC), particulate organic carbon (POC), particulate inorganic carbon (PIC), and colored dissolved organic matter (CDOM) collected during Line P cruises.

3. Standards for Data and Metadata Formats

Biogeochemical Profiling Float Data: The processing of biogeochemical sensor data from profiling floats has recently been described by *Johnson et al.*, [in press]. Data are processed according to Argo protocols for biogeochemical sensor data, including sensor metadata. All measured values in the Argo data files are accompanied by error estimates. These error estimates are based on long-term sensor performance, as described in *Johnson et al.*, [in press].

Discrete Samples: For DOC and TOC analyses, blanks and standard reference water samples will be analyzed repeatedly throughout each sample run to ensure and assess data quality. The analytical uncertainty associated of the Shimadzu DOC/TOC analyzer is $\pm 1.5\%$. The reproducibility of the measurement will be determined using replicate samples. For CDOM absorbance measurements, calibration standards will be run at the beginning of each sample run to ensure and assess wavelength precision. The diode array spectrophotometer measures the absorbance spectrum 10 times for each sample measurement and reports an average value; the analytical uncertainty of the spectrophotometer is insignificant relative to sampling reproducibility, which will be assessed using replicate samples. The overall measurement uncertainty for DOC, TOC and CDOM, as well as PIC and PIC samples run at Stanford's Stable Isotope Biogeochemistry Laboratory, will be reported along with the final values for each parameter. The proposed budget will accommodate duplicate sample collection for all parameters, which will assist in quantifying sampling and measurement uncertainties. Metadata will provide the following details: investigator names, measurement method, description of instrumentation, frequency of instrument calibration, and measurement accuracy and precision.

4. Data-Sharing: Access to and Archiving of Data

All data used and produced as a part of the proposed project will be publically accessible. Historical and anticipated biogeochemical float data can be accessed from the MBARI FloatViz website (<http://www.mbari.org/science/upper-ocean-systems/chemical-sensor-group/floatviz/>) and will be submitted in real time to the Argo Global Data Assembly Center (<http://www.argo.ucsd.edu/>). Data are processed according to Argo protocols for biogeochemical sensor data. Similarly, historical and anticipated OSP mooring observations can be accessed from NOAA's Ocean Climate Stations website (<https://www.pmel.noaa.gov/ocs/Papa>). Discrete samples of DOC, TOC, CDOM, POC, and PIC collected during Line P cruises will be made available through the Line P Program (Institute of Ocean Sciences data archive; <http://www.pac.dfo-mpo.gc.ca/science/oceans/data-donnees/index-eng.html>) and Biological and Chemical Oceanography Data Management Office (BCO-DMO) data archives. To the extent that it is relevant, we will also look into submitting data to SeaBASS. All reanalysis products and satellite data used will be accessed via the web, and are therefore already publically accessible.

5. References Cited

- Dunne, J. P., J. L. Sarmiento, and A. Gnanadesikan (2007), A synthesis of global particle export from the surface ocean and cycling through the ocean interior and on the seafloor, *Global Biogeochem. Cycles*, 21(4), doi:10.1029/2006GB002907.
- Henson, S. A., R. Sanders, E. Madsen, P. J. Morris, F. Le Moigne, and G. D. Quartly (2011), A reduced estimate of the strength of the ocean's biological carbon pump, *Geophys. Res. Lett.*, 38(4), doi:10.1029/2011GL046735.
- Johnson, K. S. et al. (in press), Biogeochemical sensor performance in the SOCCOM profiling float array, *J. Geophys. Res. Ocean.*
- Laws, E. A., P. G. Falkowski, W. O. Smith, H. Ducklow, and J. J. McCarthy (2000), Temperature effects on export production in the open ocean, *Global Biogeochem. Cycles*, 14(4), 1231–1246, doi:10.1029/1999GB001229.