TITLE: **SWL2013 Bottle data_README.docx**

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ORIGINAL AWARD TITLE: Collaborative Research: The Distributed Biological Observatory (DBO)-A Change Detection Array in the Pacific Arctic Region

DATA ARCHIVE: DBO data archive link: http://dbo.eol.ucar.edu/

DATASET OVERVIEW:
This dataset includes measurements of water samples collected at hydrographic stations from the annual Canadian Coast Guard Service Sir Wilfrid Laurier cruise during July 2013. Data includes by column, Cruise #, Event #, Station Number (#), Station Name (Stn. Name), Station Water Depth (m), Date and time (UTC) (yy/mm/dd), UTC time (hh:mm), latitude (°N), and longitude (°W), nominal depth (w), Rosette Bottle #, Sample Number, bottle trip location, raw CTD data (pressure, temperature (°C), Salinity, dissolved Oxygen concentration, Chlorophyll a concentration, nutrients (Phosphate, Silica, Nitrite+Nitrate, Ammonium) and delta-O18 (stable oxygen isotope) values. Additional parameters in the columns from sensors and data descriptors are provided in this file and defined below.

INSTRUMENT DESCRIPTION:
Water samples were collected from rosette bottles attached to a Seabird Model SBE19 CTD for nutrients, chlorophyll and oxygen-18/16 ratios. Water temperature, salinity, and other data that were electronically measured with sensors on the CTD are also provided for the depths where each bottle was closed.

DATA COLLECTION AND PROCESSING
Water column collections included water sampling for inorganic nutrients, dissolved oxygen, oxygen-18/16 ratios of seawater, and chlorophyll *a* at up to 6 depths at each station from the rosette bottles. Sensor data for temperature and salinity are also included. Subsamples for inorganic nutrients were collected from the CTD rosette, filtered shipboard, and frozen for post cruise analyses. Nutrient samples were processed by either technical support at the Institute of Ocean Sciences (IOS), Department of Fisheries and Oceans Canada (DFO) and/or at the Nutrient Analytical Services Laboratory (NASL) at the Chesapeake Biological Laboratory (CBL), (http://nasl.cbl.umces.edu/) at the University of Maryland Center for Environmental Science (UMCES). Samples were processed for all 4 nutrients: phosphate (PO4), nitrite + nitrate (NO2+NO3), silica (SiO4), and to a limited extent, ammonia (NH4); data on dissolved oxygen are available also from the uncalibrated CTD sensor. Water samples for $^{18}O/^{16}O$ ratios were collected in small vials, sealed to prevent evaporation and returned for analysis. These samples were analyzed at the University of Maryland Center for Environmental Science using a Thermo DeltaPlus Stable Isotope Mass Spectrometer coupled to a Gasbench peripheral. Data are

reported in the delta notation relative to Vienna Standard Mean Ocean Water (V-SMOW). The water column chlorophyll was analyzed shipboard using a Turner Designs AU-20 fluorometer (non-acidification or Welschmeyer method) following a 24-hour in the dark incubation with 90% acetone at 4°C method (see Cooper et al. 2012, 2013 for further details).

Water samples for chromophoric dissolved organic carbon (CDOM) analysis were filtered using pre-rinsed (10% HCl and then Milli-Q (18 Ω) water) 0.2 *μ*m Whatman nuclepore polycarbonate track-etched membranes immediately after sampling. CDOM samples were stored in the dark at 4ºC in acid washed (10% HCl) pre-combusted (450°C for 6 hours) foil-covered Qorpack clear glass bottles and analyzed shipboard within 24 hours. CDOM absorbance was measured using a Shimadzu UV-1800 UV-Visible spectrophotometer at 1 nm intervals between 200 and 800 nm using a 10 cm quartz cuvette. All sample spectra were blank corrected and referenced against Milli-Q water**.** Measurements were made after samples had equilibrated to laboratory temperature in order to minimize temperature effects. CDOM absorbance was treated as zero above 750 nm, and the average absorbance between 750 nm and 800 nm was subtracted from the spectrum to correct for offsets owing to instrument baseline drift, temperature, scattering and refractive effects. CDOM absorption coefficients were calculated from:

$$a(\lambda) = 2.303A(\lambda)/l \quad (1)$$

where *a* is the Naperian absorbance coefficient (m^{-1}) at a specific wavelength, λ, in nanometers. *A* is the absorbance at the wavelength, and *l* is the cell path length in meters. The detection limit is approximately ± 0.05 m^{-1}, based upon instrument specifications and characteristics. The spectral slope (*S*, nm^{-1}) of each CDOM absorbance spectrum was calculated using a nonlinear fit of an exponential function,

$$a(\lambda) = a(\lambda_0)e^{-S(\lambda-\lambda_0)} \quad (2)$$

where $a(\lambda)$ is the absorption coefficient of CDOM (m^{-1}) at wavelength λ, and λ_0 the reference wavelength (in this case 250 nm). All slopes are reported as positive numbers such that higher (i.e., steeper) slopes indicate a greater decrease in absorption with increasing wavelength.

Data File Structure:
File Names (Formats): **SWL2013 Bottle data.xls**

Files Data Parameters by Column:

A	Cruise
B	Cast No.
C	DBO Line
D	DBO station name
E	Station Name
F	Cast Start Time [UTC]
G	LAT N (Latitude)
H	LON W (Longitude)
I	Water Depth [m]
J	Cast Depth [m]
K	Sample No. [All others match to this sample number]
L	Bottle Integrity [0=good, 1=leak, 2=bad]
M	Trip [US (up stop), UN (up no stop), USM (up stop mix) or DN (down no stop)]
N	Rosette Bot No. (Rosette Bottle Number)
O	Scan
P	Pressure (db)

Q	T0 90C (Temperature)
R	T1 90C (Temperature)
S	C0 mS/cm (Conductivity)
T	C1 mS/cm (Conductivity)
U	CTD Salinity 0
V	CTD Salinity 1
W	SBEox Volts (Dissolved oxygen)
X	SBEox mL/L (Dissolved oxygen)
Y	SBEox % Sat (Dissolved oxygen)
Z	FLSP
AA	Volt 0 (Fluorometer)
AB	Xmiss
AC	Alt M
AD	Salt Sample No.
AE	Salt-1
AF	IOS QF-1
AG	Salt-2
AH	IOS QF-2
AI	Analyst Comment
AJ	Salt
AK	IOS QF
AL	Nut Sample No. (Nutrient Sample Number)
AM	Frozen sample
AN	NO3-1 [mmol/m3]
AO	IOS QF-1
AP	NO3-2 [mmol/m3]
AQ	IOS QF-2
AR	Analyst Comment
AS	SiO4-1 [mmol/m3]
AT	IOS QF-1
AU	SiO4-2 [mmol/m3]
AV	IOS QF-2
AW	Analyst Comment
AX	PO4-1 [mmol/m3]
AY	IOS QF-1
AZ	PO4-2 [mmol/m3]
BA	IOS QF-2
BB	Analyst Comment
BC	Chl Sample No. (Chlorophyll Sample Number
BD	Filtered Volume [L] (Anal. @ UMCES)
BE	Extracted Volume [L] (Anal. @ UMCES)
BF	ChlTOT-1 [ug/L] (Anal. @ UMCES)
BG	Chl-a (ug/L)
BH	Pheophytin (ug/L)
BI	CDOM a250 (m-1) [Colored Dissolved Organic Matter]
BJ	CDOm a254 (m-1) [Colored Dissolved Organic Matter]
BK	CDOM a365 (m-1) [Colored Dissolved Organic Matter]
BL	CDOM a440 (m-1) [Colored Dissolved Organic Matter]
BM	CDOM aR [Colored Dissolved Organic Matter]
BN	CDOM s250-350 [Colored Dissolved Organic Matter]
BO	CDOM S275-295 [Colored Dissolved Organic Matter]

BP CDOM S350-400 [Colored Dissolved Organic Matter]
BQ CDOM SR [Colored Dissolved Organic Matter]
BR SPM (g/L) [Suspended Particulate Matter]
BS Nut Sample No. [Nutrient Sample Number]
BT NO2+NO3 [mmol/m3] (Anal. @ UMCES)
BU Si [mmol/m3] (Anal. @ UMCES)
BV PO4 [mmol/m3] (Anal. @ UMCES)
BW NH4 [mmol/m3] (Anal. @ UMCES)
BX O18-16 [‰ VSMOW]

Data Version Number and Date: Version 2, 07/02/2015

REFERENCES

Cooper, L.W., M.A. Janout, K.E. Frey, R. Pirtle-Levy, M.L. Guarinello, J.M. Grebmeier, and J.R. Lovvorn. 2012. The relationship between sea ice break-up, water mass variation, chlorophyll biomass, and sedimentation in the northern Bering Sea. Deep Sea Research Part II 65, 141-162; doi:10.1016/j.dsr2.2012.02.002.

Cooper, L.W, M.G. Sexson, J.M. Grebmeier, R. Gradinger, C.W. Mordy, J.R. Lovvorn. 2013. Linkages Between Sea Ice Coverage, Pelagic-Benthic Coupling and the Distribution of Spectacled Eiders: Observations in March 2008, 2009 and 2010 from the Northern Bering Sea, Deep Sea Research Part II, Topical Studies in Oceanography, 94, 31-43.