**TITLE:** CTD profile data and nutrient samples were collected in the Chukchi and Bering Seas in September, 2015 during an ecosystems research cruise aboard F/V Aquila (aq15-01). Profiles were collected by NOAA/PMEL EcoFOCI project as part of the DOI/BOEM ARCWEST and CHAOZ-X programs.

**AUTHOR(S):** Dr. Phyllis J. Stabeno

-Name(s) of PI and all co-PIs: Phyllis J. Stabeno, Calvin W. Mordy

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**-Similar contact information for data questions (if different than above)**

 SAME AS ABOVE and

 Nutrients: Dr. Calvin Mordy, Calvin.w.mordy@noaa.gov

Data/documentation/metadata: Peggy Sullivan peggy.sullivan@noaa.gov

**FUNDING SOURCE INFORMATION:**

The studies were initiated and supported by the U.S. Department of Interior, Bureau of Ocean Energy Management (BOEM), Alaska Outer Continental Shelf Region, Anchorage, Alaska, through an Interagency Agreement between BOEM and the National Marine Mammal Laboratory (M09PG00016), as part of the BOEM Alaska Environmental Studies Program.

**DATA SET OVERVIEW:**

**-Introduction or abstract**

This CTD data set, consisting of 17 casts, was collected during a research cruise in the Chukchi Sea from the *F/V Aquila* (AQ15-01, September 8 - 28, 2015). The cruise was funded by DOI Bureau of Ocean Energy Management (BOEM) through the NOAA National Marine Mammal Laboratory. CTD operations on this cruise were managed by EcoFOCI personnel from NOAA/PMEL. Profile data from CTD instruments were processed at NOAA/PMEL using standard techniques. Data from bottle samples include phosphate, silicate, nitrate, nitrite, ammonium, and chlorophyll. Data are averaged to a 1-meter grid, and both averaged CTD profile data and bottle samples are included in each file. Missing data and non-sampled depths are listed as 1e+35.

CTD data contact: Phyllis Stabeno, Peggy Sullivan, and Shaun Bell.

Nutrient and bottle data contact: Calvin Mordy.

**-Time period covered by the data:**  September 13 - 24, 2015

**-Missing Data value:** 1e+35

**-Physical location of the measurement or platform (latitude/longitude/elevation)**

 17 CTD casts deployed within latitude 62.0 to 72.6 N and longitude 156.5W to 174.7W

**-Citation** (final report numbers pending final approval by BOEM**):**

ARCWEST:

Vate Brattström, L., J.A. Mocklin, J.L. Crance, and N.A. Friday, editors. 2017. Arctic Whale Ecology Study (ARCWEST): Use of the Chukchi Sea by Endangered Baleen and Other Whales (Westward Extension of the BOWFEST). Final Report of the Arctic Whale Ecology Study (ARCWEST), OCS Study BOEM 2018-022. Marine Mammal Laboratory, Alaska Fisheries Science Center, NMFS, NOAA, [7600 Sand Point Way NE, Seattle, WA 98115](https://maps.google.com/?q=7600+Sand+Point+Way+NE,+Seattle,+WA+98115&entry=gmail&source=g)-6349.

Email of corresponding editors: Jessica.Crance@noaa.gov and Nancy.Friday@noaa.gov

CHAOZ-X

Mocklin, J.A., and N.A. Friday, editors. 2017.  Chukchi Offshore Monitoring In Drilling Area (COMIDA): Factors Affecting the Distribution and Relative Abundance of Endangered Whales and Other Marine Mammals in the Chukchi Sea.  Final Report of the Chukchi Sea Acoustics, Oceanography, and Zooplankton Study: Hanna Shoal Extenstion (CHAOZ-X), OCS Study BOEM 2018-008. Marine Mammal Laboratory, Alaska Fisheries Science Center, NMFS, NOAA, [7600 Sand Point Way NE, Seattle, WA 98115](https://maps.google.com/?q=7600+Sand+Point+Way+NE,+Seattle,+WA+98115&entry=gmail&source=g)-6349.

Email of corresponding editors: Jessica.Crance@noaa.gov and Nancy.Friday@noaa.gov

**-Any World Wide Web address references**

Cruise Report:

<https://www.pmel.noaa.gov/foci/operations/2015/ARCWEST-CHAOZ-X.CruiseReport2015.pdf>

CTD logs:

<https://www.pmel.noaa.gov/foci/operations/2015/CTD_castLogs/AQ15-01%20CTD%20Log%20Sheets.pdf>

PMEL cruise links and info: <https://www.pmel.noaa.gov/foci/operations/2015/fieldops15.shtml>

NOAA/NMML ARCWEST and CHAOZ-X Annual Reports:

<https://www.afsc.noaa.gov/nmml/PDF/ARCWEST_AnnualReport_201601.pdf>

<https://www.afsc.noaa.gov/nmml/PDF/CHAOZ-X_AnnualReport_2015.pdf>

**INSTRUMENT DESCRIPTION:**

**-Brief text describing the instrument with references**

SeaBird SBE-911plus CTD unit with dual temperature and conductivity sensors.

PAR /Irradiance, Biospherical QSP2300

Fluorometer, WetStar

Oxygen sensor, SeaBird SBE-43

**-Figures (or links), if applicable**

Web reference to instrument:

<http://www.seabird.com/products/spec_sheets/911data.htm>

<http://www.seabird.com/sbe43-dissolved-oxygen-sensor>

<http://www.seabird.com/sites/default/files/documents/datasheet-wetstar_0.pdf>

ftp://ftp.biospherical.com/pub/manuals/PDF\_instrument/QSP\_QCP2300\_Manual.pdf

**-Table of specifications (i.e. accuracy, precision, frequency, etc.)**

Page 11 of Seabird instrument reference <http://www.seabird.com/sites/default/files/documents/9plus_018.pdf>

**DATA COLLECTION and PROCESSING:**

**-Description of data collection**

Data were collected via CTD platform using a Seabird 911plus and Seasoft software (Seasave, version 7.20c). At each CTD location, the rosette was lowered to 10 meters to equilibrate, brought to surface, then deployed to a close-to-bottom depth, at ~30 m/minute down to and ~50 m/minute below ~150 m depth. Water bottles were fired at desired depths on the upcast. Ascent was at the same or faster rate. Once on board, numerous water samples were taken from Niskin bottles. Samples collected included: salinity and oxygen for sensor calibration, chlorophyll, and nutrients.

**-Description of derived parameters and processing techniques used**

Salinity was calculated (PSS-78), from conductivity and temperature (ITS90). Sigma-t was calculated from temperature and salinity.

**-Description of quality control procedures and Processing**

Data were processed and calibrations applied using Seabird Seasoft CTD software. Post-processing at PMEL included filtering extreme outliers and extrapolation of top 3-10 meters to the surface. Each cast was visually reviewed for reasonableness, density inversions (greater than 0.02 sigma-t) caused by spurious measurements, and comparison of dual temperature and conductivity sensors. Profile data were bin-averaged to 1 meter. Nutrient samples were analyzed according to the methods of Gordon et al, 1993 and Mantoura, Woodward, 1983 (see references below). Samples were collected in 50 ml high-density polyethylene bottles that were rinsed first with 10% HCl prior to each station, and rinsed at least three times with sample before filling. Some samples were refrigerated for 3-12 hours prior to analysis, and some frozen for later analysis.

**DATA FORMAT:**

**-Data file structure, format and file naming conventions (e.g. column delimited ASCII, NetCDF, GIF, JPEG, etc.)**

CTD profiles are contained in a CSV file with a 1-line header of column labels. Profile data are at 1-meter intervals, surface to near-bottom. Nutrient data are at discreet depths, with non-sampled depths filled with missing-data value 1.0e+35. Lines of data include time (GMT) and location.

Data File Name: EcoFOCI\_2015BOEM\_CTD\_aq1501.csv

**-Data format and layout (i.e. description of header/data records, sample records)**

**List of Variables with Short Name and Units (included in header) \and grid definition**

Data are averaged to a 1-meter grid.

**Header fields – variables, units and definitions:**

cruise - cruise name AQ1501 (also AQ15-01)

cast - cast number

station\_name - station name

yyyy-mm-dd hh:mm - date and time (GMT)

depth - depth of CTD package in water column in meters

latitude [deg N] - latitude in degrees north

longitude [deg E] - longitude in degrees east, 0-360 degrees

bot depth - bottom depth, meters

temperature - degrees C

salinity - PSU

oxygen - in microMolar/kg

sigma t - in kg/m\*\*3

rFv\_971 - raw fluorometer volts

fWS\_973 - Wetlabs wetstar fluorometer chlorophyll, micrograms/Liter

niskin - Niskin bottle number on CTD rosette for discrete sample

PO4 (uM) - phosphate in microMolar/kg

Sil (uM) - silicate in microMolar/kg

NO3 (uM) - nitrate in microMolar/kg

NO2 (uM) - nitrite in microMolar/kg

NH4 (uM) - ammonium in microMolar/kg

**-Description of flags, codes used in the data, and definitions**

Missing data are denoted by 1e+35. Questionable data points are rejected (deleted) during processing, and data are all defined as good with no flags. Surface values down to 5-10 meters may be extrapolated.

**DATA REMARKS:**

**-Software compatibility (i.e. list of existing software to view/manipulate the data)**

Files are simple text with comma-separated values and a 1-line header. Data are readily viewable, and useable in Excel and any software that will intake csv values.

**REFERENCES:**

**-List of documents cited in this data set description**

**Cruise information:**

Cruise Report:

<https://www.pmel.noaa.gov/foci/operations/2015/ARCWEST-CHAOZ-X.CruiseReport2015.pdf>

CTD logs:

<https://www.pmel.noaa.gov/foci/operations/2015/CTD_castLogs/AQ1501%20CTD%20Log%20Sheets.pdf>

PMEL cruise links and info: <https://www.pmel.noaa.gov/foci/operations/2015/fieldops15.shtml>

**Science and results documents:**

NOAA/NMML ARCWEST Reports:

<https://www.afsc.noaa.gov/nmml/PDF/CHAOZ-X_QuarterlyReport_Oct2015.pdf>

<https://www.afsc.noaa.gov/nmml/PDF/ARCWEST_AnnualReport_201601.pdf>

**Instruments references including Seabird SBE 911plus CTD manual**:

<http://www.seabird.com/products/spec_sheets/911data.htm>

<http://www.seabird.com/sbe43-dissolved-oxygen-sensor>

<http://www.seabird.com/sites/default/files/documents/datasheet-wetstar_0.pdf>

ftp://ftp.biospherical.com/pub/manuals/PDF\_instrument/QSP\_QCP2300\_Manual.pdf

**Nutrients reference:**

 -- Gordon, L.I., Jennings, J.C., Jr., Ros, A.A. and Krest, J.M., 1993. A suggested protocol for continuous flow automated analysis of seawater nutrients (Phosphate, nitrate, nitrite and silicic acid) in the WOCE Hydrographic Program and the Joint Global Ocean fluxes Study. WOCE Operations Manual, Part 3.1.3 "WHP Operations and Methods" (WOCE Hydrographic Program Office, Methods Manual 91-1) Bundesamt für Seeschiffahrt und Hydrographie, Postfach 30 12 20, 2000 Hamburg 36 Germany.

 <https://geo.h2o.ucsd.edu/documentation/manuals/pdf/91_1/gordnut.pdf>

**Ammonium reference:**

-- Mantoura, R.F.C. and Woodward, E.M.S., 1983. Optimization of the indophenol blue method for the automated determination of ammonia in estuarine waters. Estuarine, Coastal and Shelf Science, 17(2), pp.219-224.

**METADATA INFORMATION:**

Metadata format is based on UCAR/NCAR - Earth Observing Laboratory template formulated for CADIS (Cooperative Arctic Data and Information Service) in 2008 with consideration of IPY 2007-08 metadata profile. The format and information fields support extraction of ISO-standard metadata (ISO-19115) and DIF-formatted metadata.

**VERSIONS:**

Data version: 0

Metadata version: 0

**ADDITIONAL DATA NOTES AND KEYWORDS**:

Distributed Biological Observatory (DBO) areas and stations:

<https://www.pmel.noaa.gov/dbo/>

One cast c017, is located near DBO-1.3 at long-term mooring site M8 in the northern Bering Sea.

Five casts in the Chukchi Sea, c011-c015, are part of the defined DBO-3 line as: c011 at DBO-3.1, c012 at DBO-3.2, c013 at DBO-3.3, c014 at DBO-3.4, and c015 at DBO-3.5. The DBO-3 region is near Point Hope, Alaska.

KEYWORDS:

NCEI - SeaName: Chukchi Sea; SeaCode: 12

NODC institutions keyword:

NODC: 313F

WOD: 446, US DOC; NOAA; OAR; Pacific Marine Environmental Laboratory (PMEL)

NODC/WOD Project code:

631, EcoFOCI, Ecosystems and Fisheries-Oceanography Coordinated Investigations

174, FOCI, FISHERIES-OCEANOGRAPHY COOPERATIVE INVESTIGATIONS

712, BOEM – ESP, Bureau of Ocean Energy Management - Environmental Studies Program