

This information file was generated on 2020-12-08 by Anna Wåhlin.

GENERAL INFORMATION

1. Title of Dataset: Hugin AUV Ran data from missions undertaken during Athaniel B Palmer cruise in 2019

2. Author Information

A. Principal Investigator Contact Information

Name: Anna Wåhlin

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3. Date of data collection: February and March 2019

4. Geographic location of data collection: Amundsen Sea, Antarctica

5. Information about funding sources that supported the collection of the data:

NERC

NSF

SSF SMARC

SHARING/ACCESS INFORMATION

1. Licenses/restrictions placed on the data:

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2. Links to publications that cite or use the data:

A. K. Wåhlin, A. Graham, K. A. Hogan, B. Y. Queste, L. Boehme, R. Larter, E. Pettit, J. Wellner and K. J. Heywood, Pathways and modification of warm water flowing beneath Thwaites ice shelf, West Antarctica. *Science Advances*, in press (2021).

3. Links to other publicly accessible locations of the data: -

4. Links/relationships to ancillary data sets:

CTD

5. Was data derived from another source? yes/no no

6. Recommended citation for this dataset:

A. K. Wåhlin, A. Graham, K. A. Hogan, B. Y. Queste, L. Boehme, R. Larter, E. Pettit, J. Wellner and K. J. Heywood, Pathways and modification of warm water flowing beneath Thwaites ice shelf, West Antarctica. Science Advances, in press (2021).

DATA & FILE OVERVIEW

1. File List:

CTDO2_NBP19_02_009.csv

CTDO2_NBP19_02_011.csv

NBP1902_009_SBE19.zip (raw data before merging of files)

NBP1902_011_SBE19.zip (raw data before merging of files)

2. Relationship between files, if important:

Each file contains data from one AUV mission during the cruise

CTDO2_NBP19_02_***.csv contains the post-cruise calibrated and 1-s binned data with data before pump was switched on removed

NBP1902_***_SBE19.zip contains all the raw files as they come out of the Hugin AUV, before merging the files and before binning the data

3. Additional related data collected that was not included in the current data package:

Coming: CTD, bathy

4. Are there multiple versions of the dataset?

No

METHODOLOGICAL INFORMATION

1. Description of methods used for collection/generation of data:

The autonomous underwater vehicle 'Ran' is a Kongsberg Hugin AUV depth-rated to 3000 m. It is equipped with a Honeywell Hg9900 inertial navigation unit, aided with Nortek 500 kHz upward- and downward-looking doppler velocity loggers (DVL). Navigation was also aided by deploying several underwater transponders (UTP, cNode maxi) at the sea floor. Using the DVL and UTP the maximum navigation error is $\leq 0.08\%$ of distance travelled, or 2 meters³⁷. The AUV was equipped with two SeaBird SBE19plus V2 systems for conductivity, temperature and depth (CTD) and two SeaBird SBE43 sensors for dissolved oxygen. The resolution of the sensors for temperature and conductivity is 0.0001 °C and 0.00005 S/m (equivalent to 0.00067 g/kg). The sensors were calibrated in July and August 2018, and against the ship CTD by co-locating CTD casts with the AUV missions during the cruise³⁸. The dissolved oxygen sensor has an initial accuracy of 2% of saturation (0.16 ml/l) but a higher accuracy was obtained by calibration against the ship CTD.

2. Methods for processing the data:

Bin averaged the data to every second (raw data is at 4 Hz)

Loop filtered staggered 5 s

3. Instrument- or software-specific information needed to interpret the data:

4. Standards and calibration information, if appropriate:

Calibration:

A Seabird 911 CTD with dual sensor systems for conductivity, temperature, and dissolved oxygen (SBE43) was used to get depth profiles of salinity, temperature and dissolved oxygen. Standard SeaBird Software Version Seasave V 7.26.1.8 was used for data collection and conductivity cell thermal mass correction (manufacturer recommended values were used: thermal anomaly amplitude, $\alpha=0.03$, thermal anomaly time constant $1/\beta=7.0$). Salinometry measurements were made from water samples in order to calibrate the primary and secondary conductivity sensors on the CTD rosette.

After intercomparison of the Hugin data and the post-cruise calibrated CTD data the Hugin raw data was shifted:

Dissolved oxygen (SBE43 snr 43-2637): -0.01 ml/l

Conservative temperature 1 (SBE5T snr 05-9444): 0 °C

Conservative temperature 1 (SBE5T snr 05-9443): 0 °C

Absolute salinity 1 (SBE19 snr 19-7880) = 0.029;

Absolute salinity 2 (SBE19 snr 19-7869) = 0.013;

5. Environmental/experimental conditions:

Polar seas

6. Describe any quality-assurance procedures performed on the data:

Cross calibration with ship borne CTD, a Seabird 911

Cross calibration with salinometer

Pre- and post cruise calibration of sensors

Data from dive until 15 minutes after dive are discarded (pumps not working for first minutes). For NBP009 this was after datenum(2019,02,28,22,40,00) and for NBP011 this was after datenum(2019,03,05,10,30,00)

7. People involved with sample collection, processing, analysis and/or submission:

Anna Wählin

DATA-SPECIFIC INFORMATION FOR:

CTDO2_NBP19_02_009.csv

CTDO2_NBP19_02_011.csv

1. Number of variables: 8

2. Number of cases/rows:

Time (UTC), Lat, Lon, P (dBar), S_A (g/kg), C_T (deg), diss O2 (ml/l), matlab time

3. Variable List:

Date and time (UTC)

Latitude (decimal degree)

Longitude (decimal degree)

Pressure (dBar)

Absolute salinity S_A (g/kg), calculated according to www.teos-10.org

Conservative temperature (degrees), calculated according to www.teos-10.org

Dissolved oxygen (ml/l)

Matlab time (numeric)

4. Missing data codes:

NaN