RAW GEOSWATH ACOUSTIC, TIDAL HEIGHT AND SOUND VELOCITY PROFILE DATA

METADATA

Dataset Originator: *University of Connecticut: Ivar G. Babb, Dennis Arbige*

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Dataset Title: ***Raw Geoswath Acoustic, Tidal Height And Sound Velocity Profile Data***

Online Linkage:

LDEO Data Repository - http://www.marine-geo.org/portals/lis/

Data_doi= 10.26022/IEDA/329913

Data url= https://www.marine-geo.org/tools/search/Files.php?data_set_uid=29913

Abstract:

This data set is a compilation of the raw acoustic data and attendant auxiliary files (tidal heights, sound velocity profiles) collected by the University of Connecticut as part of the Long Island Sound Cable Fund Initiative in the Phase II area of eastern Long Island Sound. The data were collected using UConn's Kongsberg Geoswath Phase Measuring Bathymetric Sonar mounted on UConn's Research Vessel Weicker in 2017 and 2018. Specifically, the data were collected in gap areas 23, 24 and 25 identified by NOAA within the Phase II area. The raw data was archived in the native Geoswath .rff format and binned in "A" and "B" collections for the survey blocks 24 and 25 and block 23, respectively.

Dataset purpose:

This dataset provides the first order acoustic data collected along with the necessary tidal height and sound velocity profile data collected during the surveys. As such this data set could be utilized by others for re-analysis or integration with other similar data from the Long Island Sound. The data should not be used for navigation.

Time period of content:

The acoustic surveys to map the Survey Blocks 23, 24 and 25 were conducted over the course of a little more than one year from April 31, 2017 through to July 19, 2018. Seasonal considerations, ship and crew schedules were the primary drivers for the protracted survey period. A total of 26 survey days were conducted over the time frame, with survey day trips averaging 4.6 hours, facilitated by the proximity of the survey area to the UConn Avery Point campus.

Dataset Status: *Complete*

Update Frequency: *None planned*

Theme Keywords:

Connecticut, New York, Long Island Sound, Fishers Island Sound, estuary, phase measuring bathymetric sonar, interferometric sonar, , Kongsberg Geoswath, RV Lowell Weicker, bathymetry, backscatter, side scan sonar, raw data, tidal height, sound velocity profile, University of Connecticut, UConn, Long Island Sound Mapping and Research Collaborative, LISMaRC

Access Constraints: *None*

Use Constraints:

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Data are provided with the express understanding that they will not be sold to third parties or included in commercial databases.

Users are strongly encouraged to contact the original investigators responsible for data made available on this site. Where appropriate, researchers are also encouraged to consider collaboration and/or co-authorship with original investigators.

Data should not be used for navigation purposes.

Point of Contact:

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Dataset Credit:

The Long Island Sound Mapping and Research Collaborative (LISMaRC). LISMaRC is the University of Connecticut, the University of New Haven and the US Geological Survey. Funding provided by the Long Island Sound Seafloor Mapping Fund administered cooperatively by the EPA Long Island Sound Study and the Connecticut Department of Energy and Environmental Protection (DEEP).

Data Quality Considerations: *See below*

Attribute accuracy:

Raw Acoustic Data – Data acquisition was performed with a Kongsberg Geoswath Phase Measuring Bathymetric Sonar operating at 250 kHz using the Geoswath+ acquisition software to save raw data as .rff files. The system recorded bathymetry and sidescan sonar data with the following attributes:

Sonar Frequency	*Max water depth*	*Max swath width*	*Range*	*Resolution across track*	*2-way beam width*	*Depth resolution*	*Swath update rate (max)*
250 kHz	*100 m*	*390 m*	*Up to 12x depth*	*1.5 cm*	*0.5° Azimuth*	*3 mm*	*Up to 30/s (range dependent)*

Heave, pitch and roll data were recorded from a Seatex MRU-5 mounted on the Geoswath transducer, with the following attributes:

Model	Roll/pitch	Acceleration	Heave	PFree Heave	Period	PFree Period
MRU 5	0.02^{O}	0.01 m/s2	5 cm	2 cm	25 s	50s

Positional was ensured by the process outlined below, and positional information for all equipment (GPS, transducer, MRU) offsets and latencies can be found in the CARIS vessel file included with the raw data.

Sound Velocity Profiles - Sound velocity profiles (SVP) were conducted every three hours to acquire sound speed data using UConn's Valeport MiniSVP (S/N 41907) probe which was last factory calibrated on 21/02/2013. The unit was checked for drift in UConn's seawater test tank against a currently calibrated YSI unit before surveys were conducted. The SVP data files were edited and formatted for CARIS processing.

Tide Data – Tides were corrected to MLLW based on tide gauge data from NOAA Tide Station at New London, Connecticut (Station ID: 8461490). The tide data files are edited and formatted for CARIS processing.

Completeness:

The acoustic data products are complete.

Positional accuracy:

To improve survey accuracy and precision LISMaRC utilized UConn's ACORN (Advanced Continuously Operating Reference Network) that is composed of several receivers (GPS) that stream data to on-campus computers. The computers distribute the information to surveyors and mappers to help them in their work. ACORN allows highly accurate positioning in real time. This means that a location anywhere on or above the earth can be pinpointed within the space of a dime. The ACORN maintains nine base stations in the state of Connecticut including two that provide coverage within the Phase II area. LISMaRC worked with ACORN staff to integrate this real-time network (RTN) into the navigation system on the Weicker to provide this much improved accuracy. A description of the ACORN can be found at: http://naturally.uconn.edu/2014/07/29/this-is-not-your-cars-gps/ and the site network is http://acorn.uconn.edu

Process Steps:

This data set was acquired with a 250 kHz Kongsberg Geoswath Phase Measuring Bathymetry Sonar (PMBS) system mounted in the moon pool of Research Vessel (RV) Lowell Weicker. With a PMBS system the acoustic energy is propagated from the transducer downward in a beam that is narrow in the along-track dimension and wide in the across-track dimension. This method produces a line of depth measurements across-track, i.e. perpendicular to the research vessel's trackline. As the vessel moves forward, these profiles sweep out a ribbon-shaped surface of depth measurement.

Horizontal accuracy was provided by DGPS augmented by RTK corrections from the Advanced Continuous Operation Reference Network (ACORN). This is a Connecticut statewide system of base stations that provides real-time corrections for GPS equipment, operated by the University of

Connecticut through a partnership with CTDOT (http://acorn.uconn.edu). Tides were corrected to MLLW based on tide gauge data from NOAA Tide Station at New London, Connecticut (Station ID: 8461490). Sound velocity profiles (SVP) were conducted every three hours to acquire sound speed data using UConn's Valeport SVP system. Data acquisition was performed using the Geoswath+ acquisition software and saved as .rff files for subsequent post-processing. The system recorded bathymetry and sidescan sonar data along with heave, pitch and roll data from a Seatex MRU-5 mounted on the Geoswath transducer. Positional information for all equipment (GPS, transducer, MRU) offsets and latencies can be found in the CARIS vessel file included with the raw data.

The surveys were conducted at a vessel speed between 4-5 knots (10 km/hr) to ensure data density sufficient to meet the NOAA recommendations. Due to the sampling gap at nadir generated by the interferometric (PMBS) system a 100% swath overlap was implemented to provide the recommended 100% coverage of bathymetric and backscatter data. The swath width (line spacing) was also maintained to not exceed the 5 x water depth, a conservative approach for an interferometric system. A survey line spacing of 25 meters/side was used in shallow areas, while a 30-meter spacing was adopted for deeper areas.

The acquired side scan sonar data were processed using CARIS software. The data were acquired and processed in two individual blocks. The final side scan sonar mosaics are in GeoTIFF (Raster) grid format, projected in WGS84 UTM 18N (EPSG: 32618) with 1m resolution. The data were collected and assembled as part of the "The Long Island Sound Seafloor Mapping Initiative Phase II – Eastern Long Island Sound" project conducted by the Long Island Sound Mapping and Research Collaborative (LISMaRC, Principal Investigator: Ivar G. Babb).

Process Contact: *Dennis Arbige, University of Connecticut, dennis.arbige@uconn.edu*

Attributes:

Raw Data Files: The Geoswath system recorded both bathymetry and sidescan sonar data

Sound Velocity Profiles: Data were recorded as .txt files, with columns for depth (meters), temperature (Celsius), and Sound Velocity (m/s).

Tide Data: Data are presented in multiple formats including .csv (comma separated values), with columns for date/time (GMT) and depth (meters MLLW Verified).

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