# Geotagged sea-floor images and location of bottom images collected in Long Island Sound, Connecticut and New York, in fall 2017 and spring 2018 by the U.S. Geological Survey, University of Connecticut, and University of New Haven during field activities 2017-056-FA and 2018-018-FA (JPEG images, point shapefile, and CSV file)

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Geotagged sea-floor images and location of bottom images collected in Long Island Sound, Connecticut and New York, in fall 2017 and spring 2018 by the U.S. Geological Survey, University of Connecticut, and University of New Haven during field activities 2017-056-FA and 2018-018-FA (JPEG images, point shapefile, and CSV file)
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***Title:***
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***Edition:*** 1.0
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## *Description:*

### *Abstract:*

Two marine geological surveys were conducted in Long Island Sound, Connecticut and New York, in fall 2017 and spring 2018 by the U.S. Geological Survey (USGS), University of Connecticut, and University of New Haven through the Long Island Sound Mapping and Research Collaborative. Sea-floor images and videos were collected at 210 sampling sites within the survey area, and surficial sediment samples were collected at 179 of the sites. The sediment data and the observations from the images and videos are used to identify sediment texture and sea-floor habitats.

### *Purpose:*

This dataset provides access to the geotagged sea-floor images and locations of bottom images acquired with a Nikon D300 digital still camera, GoPro HERO4 Black camera, and Kongsberg Simrad OE1365 video camera on the SEABed Observation and Sampling System (SEABOSS) aboard the Research Vessel (R/V) Connecticut during USGS field activities 2017-056-FA (November 28 to December 3, 2017) and 2018-018-FA (May 8 to 15, 2018). These data were collected to explore the nature of the sea floor and to characterize the seabed by identifying sediment texture. Bottom images serve as a means to visually classify grain size and identify sea-floor habitats, and they are especially important for sample sites where no physical sediment sample was collected.

### *Supplemental Information:*

See the larger work citation to view the sea-floor videos, location of bottom video tracklines, and locations and grain-size analysis results of sediment samples collected during the surveys. For more information about these field activities, see https://cmgds.marine.usgs.gov/fan_info.php?fan=2017-056-FA and https://cmgds.marine.usgs.gov/fan_info.php?fan=2018-018-FA. These data were collected as part of a larger collaborative project, the Long Island Sound Habitat Mapping Initiative; for more information about this project, see https://lismap.uconn.edu/.

***Time Period of Content:***

***Time Period Information:***

***Range of Dates/Times:***

***Beginning Date:*** 11/28/2017
***Ending Date:*** 05/15/2018

***Currentness Reference:***
Data were collected on the following dates: 20171128-20171203 and 20180508-20180515

***Status:***

***Progress:***

Complete

***Maintenance and Update Frequency:*** None planned

***Spatial Domain:***

***Description of Geographic Extent:***
***Bounding Coordinates:***

***West Bounding Coordinate:*** -72.430108
***East Bounding Coordinate:*** -71.866848
***North Bounding Coordinate:*** 41.324696
***South Bounding Coordinate:*** 41.193234

***Keywords:***

***Theme:***

***Theme Keyword Thesaurus:*** None
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***Theme Keyword:*** USGS
***Theme Keyword:*** Coastal and Marine Hazards and Resources Program
***Theme Keyword:*** CMHRP
***Theme Keyword:*** Woods Hole Coastal and Marine Science Center
***Theme Keyword:*** WHCMSC
***Theme Keyword:*** University of Connecticut
***Theme Keyword:*** UConn
***Theme Keyword:*** Northeast Underwater Research, Technology and Education Center
***Theme Keyword:*** NURTEC
***Theme Keyword:*** University of New Haven
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***Theme Keyword:*** Long Island Sound Mapping and Research Collaborative
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***Theme Keyword:*** bottom photographs
***Theme Keyword:*** seabed photographs

***Theme Keyword:*** photos
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***Theme Keyword:*** GoPro HERO4 Black
***Theme Keyword:*** Kongsberg Simrad OE1365
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***Theme Keyword:*** R/V Connecticut

***Theme:***

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***Theme Keyword:*** sea-floor characteristics

***Theme:***

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***Theme Keyword:*** geoscientificInformation
***Theme Keyword:*** location

***Theme:***

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***Place Keyword Thesaurus:*** None
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***Place Keyword:*** United States
***Place Keyword:*** Atlantic Ocean
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***Place Keyword:*** New York
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***Stratum Keyword Thesaurus:*** None
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***Stratum Keyword:*** seafloor
***Stratum Keyword:*** seabed

***Temporal:***

***Temporal Keyword Thesaurus:*** None
***Temporal Keyword:*** 2017
***Temporal Keyword:*** 2018

***Access Constraints:*** None
***Use Constraints:***
Public domain data from the U.S. Government are freely redistributable with proper metadata and source attribution. Please recognize the U.S. Geological Survey as the originator of the dataset.
***Point of Contact:***

***Contact Information:***

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***Address:*** 384 Woods Hole Rd.
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***Browse Graphic:***

***Browse Graphic File Name:*** https://www.sciencebase.gov/catalog/file/get/5de9bd31e4b02caea0eeda42/?name=2017-056-FA_and_2018-018-FA_photos_browse.jpg
***Browse Graphic File Description:***
Map of sea-floor image locations in the survey area in Long Island Sound, Connecticut and New York.
***Browse Graphic File Type:*** JPEG

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## Data Quality Information:

### *Attribute Accuracy:*

#### *Attribute Accuracy Report:*

Most of the sea-floor images were acquired with a 12-megapixel Nikon D300 digital still camera (with a Photosea strobe) using the default settings; file sizes are generally between 1 and 7 MB on disc. During field activity 2018-018-FA in spring 2018, the strobe stopped working consistently, so an additional light was attached next to the strobe at site 2018-018-089. The Nikon photos were too dark and underexposed without the strobe, so a downward-looking 12-megapixel GoPro HERO4 Black camera set to capture images every 10 seconds was attached to the Nikon housing for sites 2018-018-089 through 2018-018-117. Default settings were used with the GoPro camera, and the image file sizes are generally between 2 and 3 MB on disc. Camera time drift and the precision with which the camera time can be set often result in a time offset. Both the Nikon and GoPro camera times were set to Coordinated Universal Time (UTC). During image processing, calibration photographs indicated that the Nikon camera time was 6 seconds behind the Global Positioning System (GPS) time for the first Julian day of surveying in fall 2017 (Julian day 332), between 1 second behind and 1 second ahead of the GPS time for the remainder of the fall 2017 survey (Julian days 333-337), and 0 to 2 seconds behind the GPS time throughout the spring 2018 survey. The GoPro calibration photographs showed that the GoPro camera time was up to 1 second behind the GPS time on Julian day 133, 5 to 6 seconds ahead of the GPS time on Julian day 134, and 10 to 11 seconds ahead of the GPS time on Julian day 135. For the Nikon photos, the time offset from the first Julian day of surveying during fall 2017 (Julian day 332) was corrected during image processing. The time offsets for the remainder of the Nikon photos were negligible and were not corrected. For the GoPro photos, the time offset from Julian day 133 was negligible and was not corrected. The time offsets for Julian days 134 and 135 were corrected during GoPro image processing.

### *Logical Consistency Report:*

Sea-floor images were acquired with a Nikon D300 digital still camera, a GoPro HERO4 Black camera, and a Kongsberg Simrad OE1365 video camera on the SEABOSS. Most sites have images from only one of the cameras, but 14 sites have images from both the Nikon and GoPro cameras. These 14 sites (sites 2018-018-091, 2018-018-093, 2018-018-097, 2018-018-103, 2018-018-104, 2018-018-107, 2018-018-108, 2018-018-109, 2018-018-111, 2018-018-112, 2018-018-113, 2018-018-114, 2018-018-116, and 2018-018-117) have images from both the Nikon and GoPro cameras because the strobe to light the Nikon photos still occasionally worked after the GoPro camera was added at site 2018-018-089. For the Nikon photos, gaps in sequential photo numbers exist because photos collected within the water column, on deck, or without a clear view of the sea floor were deleted. For the GoPro photos, gaps exist because only the best photos with a clear view of the sea floor were chosen for publication. For those sites that were primarily targeted for a sediment grab, one GoPro photo per site was selected for publication; for those sites that were targeted for both a video transect of the sea floor and a sediment grab, a photo was generally selected every few minutes for a total of 5 to 15 GoPro photos per video transect. Five sites (sites SB60_abort, 2018-018-013, 2018-018-051, 2018-018-077, and 2018-018-080) did not have any usable photographs, generally because the strobe was not working, so still-image frame grabs were captured from the sea-floor video to supplement this dataset. The images acquired with the Nikon, GoPro, and Kongsberg cameras have different fields of view and image dimensions. The fields of view of the GoPro and Kongsberg cameras are roughly the same, and they overlap the Nikon camera but show a slightly larger extent. The image dimensions of the Nikon photos are 4288 x 2848 pixels, the GoPro photos are 4000 x 3000 pixels, and the Kongsberg video frame grabs are 1280 x 720 pixels. For the spring 2018 survey, the University of Connecticut's Northeast Underwater Research, Technology and Education Center (NURTEC) assigned different names to the sites, which are available in the comments field (COMMENTS). Some USGS site numbers (FIELD_NO) have the same NURTEC site name (e.g., sites 2018-018-011 and 2018-018-012 are both NURTEC site NB64-T) because the NURTEC site names are based on the target sampling site names.

### *Completeness Report:*

This dataset includes geotagged sea-floor images in JPEG format and a shapefile and CSV file of the locations of images collected during field activities 2017-056-FA and 2018-018-FA. Two hundred ten sites were occupied within the study area. Each deployment of the SEABOSS is generally considered a unique site. However, five sites (sites SB64_2, 2018-018-024, 2018-018-089, 2018-018-094, and 2018-018-104)

had two separate deployments because a sediment grab was not successfully collected during the first deployment; photos were taken during both deployments at all but one of these sites (all but site 2018-018-094). Sea-floor images were acquired at most sites with a Nikon D300 digital still camera (with a Photosea strobe) mounted on the SEABOSS. Nikon photos collected within the water column, on deck, or without a clear view of the sea floor were deleted. The strobe was occasionally not working, so some Nikon photos are very dark. These photos are included in the publication and can be edited in a photo editor to adjust the exposure so that the sea floor can be viewed. During the spring 2018 survey, the strobe stopped working consistently, so an additional light was attached next to the strobe at site 2018-018-089. The Nikon photos were generally too dark and underexposed without the strobe, so a downward-looking 12-megapixel GoPro HERO4 Black camera set to capture images every 10 seconds was attached to the Nikon housing for sites 2018-018-089 through 2018-018-117. For those sites that were primarily targeted for a sediment grab, one GoPro photo per site was selected for publication; for those sites that were targeted for both a video transect of the sea floor and a sediment grab, a photo generally every few minutes was selected for a total of 5 to 15 GoPro photos per video transect. At one site (site 2018-018-102), none of the GoPro photos had a clear view of the sea floor, so no GoPro photos for this site are included in this publication (Nikon photos, however, are available for this site). Five sites (sites SB60_abort, 2018-018-013, 2018-018-051, 2018-018-077, and 2018-018-080) did not have any usable photographs, so still-image frame grabs were captured from the video to supplement this dataset. A total of 8,670 images for all 210 sites are included in this dataset.

### *Positional Accuracy:*

#### *Horizontal Positional Accuracy:*

##### *Horizontal Positional Accuracy Report:*

The original JPEG images alone do not represent spatial data; however, the images were geolocated during post-processing by linking the time the image was taken to the corresponding time in the navigation data. Sources of horizontal inaccuracy may be due to the camera time or navigation data. In fall 2017, the Nikon camera time was 6 seconds behind the GPS time on Julian day 332, and in spring 2018, the GoPro camera time was 5 seconds ahead of the GPS time on Julian day 134 and 10 seconds ahead on Julian day 135, so these time offsets were corrected during image processing. For all other survey days, the Nikon and GoPro camera times were off by up to 2 seconds; this time offset was negligible, accounting for +/- 1 meter of horizontal uncertainty, and was not corrected during image processing. Navigation for field activities 2017-056-FA and 2018-018-FA used Wide Area Augmentation System (WAAS)-enabled GPS. The GPS was set to receive fixes at a 2-second interval in geographic coordinates (World Geodetic System of 1984 [WGS 84]). If the time an image was taken is between two known fixes, then the image location was interpolated when it was geotagged. The recorded position of each image is the position of the GPS antenna on the survey vessel, located on the aft port side of the R/V Connecticut, not the location of the SEABOSS. The antenna was located approximately 5 meters from the SEABOSS deployment location in fall 2017 and 3 meters in spring 2018. No layback or offset was applied to the recorded position. In addition, the SEABOSS may drift away from the survey vessel when deployed to the sea floor. Based on the various sources of horizontal offsets, a conservative estimate of the horizontal accuracy of the bottom image locations is 10 meters. In fall 2017, the navigation dropped out for 154 seconds on Julian day 333 at site NB32, so the missing navigation was interpolated using the last and first known fixes around this gap (between GPS times 22:49:38 and 22:52:12).

### *Lineage:*

### *Process Step:*

#### *Process Description:*

Step 1: Collected data.

Two marine geological surveys were conducted in Long Island Sound, Connecticut and New York, in fall 2017 and spring 2018. The R/V Connecticut occupied one of the target sites and the SEABOSS was

deployed off the vessel's A-frame on the stern of the ship. The SEABOSS was equipped with a modified Van Veen grab sampler, a Nikon D300 digital still camera with a Photosea strobe, two video cameras (one forward-looking so that a shipboard operator could monitor for proper tow depth and obstacles, and one downward-looking, a Kongsberg Simrad OE1365 in this setup, that overlapped with the field of view of the still camera) with a topside feed, a GoPro HERO4 Black camera recording backup video, and lights to illuminate the sea floor for video and photograph collection. During field activity 2018-018-FA in spring 2018, the strobe stopped working consistently, so an additional light was attached next to the strobe at site 2018-018-089. The Nikon photos were too dark and underexposed without the strobe, so a downward-looking 12-megapixel GoPro HERO4 Black camera set to capture images every 10 seconds was attached to the Nikon housing for sites 2018-018-089 through 2018-018-117. The elements of this particular SEABOSS were held within a stainless-steel frame that measured 1.15 x 1.15 meters. The frame had a stabilizer fin that oriented the system as it drifted over the seabed. Two red lasers were set 20 centimeters apart (both as they are mounted on the SEABOSS frame and as seen in photographs and video on the seabed) for scale measurements. The red laser dots can usually be seen in the sea-floor images and videos depending on the bottom type and distance to the sea floor. A third laser is positioned at an angle so that when it intersects the other lasers, the SEABOSS is at the optimum height (approximately 75 centimeters) off the bottom for a photograph. The winch operator lowered the SEABOSS until the sea floor was observed in the topside live video feed. For those sites that were primarily targeted for a sediment grab, the vessel and SEABOSS then drifted with wind and current for up to a few minutes to ensure a decent image with a clear view of the sea floor was acquired; for those sites that were targeted for both a video transect of the sea floor and a sediment grab, the vessel was navigated along a planned transect for up to an hour. A scientist monitored the real-time bottom video and acquired bottom photographs at points of interest by remotely triggering the Nikon camera shutter. The imaged area is most often within 0.5 to 1.25 meters from left to right. Bottom video was also recorded during the drift from the downward-looking Kongsberg video camera directly to hard drives using an Odyssey7 video recorder. Five sites did not have any usable photographs, usually because the strobe was not working, so still-image frame grabs were captured from the bottom videos for these sites in a subsequent process step. Then, at most sites the winch operator lowered the Van Veen grab sampler until it rested on the sea floor. When the system was raised, the Van Veen grab sampler closed and collected a sample as it was lifted off the sea floor. The sampler was recovered to the deck of the survey vessel where a subsample was taken for grain-size analysis at the sediment laboratory at the USGS Woods Hole Coastal and Marine Science Center. A total of 210 sites were occupied aboard the R/V Connecticut with the SEABOSS: 93 sites were occupied in fall 2017 during field activity 2017-056-FA, and 117 sites were occupied in spring 2018 during field activity 2018-018-FA. Bottom images were collected at all 210 sites.

***Process Date:*** 05/15/2018
***Source Produced Citation Abbreviation:***
Original JPEG photographs
***Source Produced Citation Abbreviation:***
Bottom video
***Process Contact:***

***Contact Information:***

***Contact Person Primary:***

***Contact Person:*** Seth Ackerman
***Contact Organization:*** U.S. Geological Survey

***Contact Position:*** Geologist
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***Address:*** 384 Woods Hole Rd.
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***Country:*** USA

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***Process Step:***

***Process Description:***

Step 2: Acquired and processed navigation.

During the surveys, WAAS-enabled GPS navigation from a Garmin GPSMAP 76C receiver was logged through a DataBridge data logger and ArcMap GPS. The GPS was set to receive fixes at a 2-second interval in geographic coordinates (WGS 84). Dates and times were recorded in UTC. Log files were saved for each Julian day in text format. An AWK script (parse_gprmc17056.awk for the fall 2017 log files and parse_gprmc18018.awk for the spring 2018 log files) was used to parse the GPRMC navigation string from the log files for each survey and create ASCII Comma Separated Values (CSV) text files. The output files were merged for each survey and then reformatted using an AWK script (nav_time_reformat.awk), creating a processed navigation CSV text file for each sampling survey.

***Process Date:*** 09/2018
***Source Produced Citation Abbreviation:***
Processed DataBridge navigation files
***Process Contact:***

***Contact Information:***

***Contact Person Primary:***

***Contact Person:*** Seth Ackerman
***Contact Organization:*** U.S. Geological Survey

***Contact Position:*** Geologist
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***Address Type:*** mailing and physical address
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***Process Step:***

***Process Description:***

Step 3: Identified camera time offsets for images.

The original JPEG images do not represent spatial data; however, they were geotagged in a subsequent process step by linking the time the image was taken, which was recorded in the JPEG files' Exchangeable image file format (Exif) metadata tags, to the corresponding time in the navigation files. Before geotagging the images, the Nikon and GoPro camera times, which were both set to UTC, were compared to the GPS time using calibration photos to see if a time offset should be applied to the camera time of the photos. Camera time drift and the precision with which the camera time can be set often result in a time offset. Throughout the surveys, photos of an accurate UTC time (as shown on the video, which had an overlay of the GPS time, or on the Time.is website [https://time.is/], which has a precise time synchronized with an

atomic clock) were taken with the Nikon and GoPro cameras so that the camera times could be calibrated to the GPS time during image processing. These calibration photographs indicated that the Nikon camera time was 6 seconds behind the GPS time for the first Julian day of surveying in fall 2017 (Julian day 332), between 1 second behind and 1 second ahead of the GPS time for the remainder of the fall 2017 survey (Julian days 333-337), and 0 to 2 seconds behind the GPS time throughout the spring 2018 survey. The GoPro calibration photographs showed that the GoPro camera time was up to 1 second behind the GPS time on Julian day 133, and 10 to 11 seconds ahead of the GPS time on Julian day 135. GoPro calibration photographs were not available for Julian day 134, so four images from that day were visually compared to the sea-floor video (which was recorded with an overlay of the GPS time) and found to have a camera time 5 to 6 seconds ahead of the GPS time. For the Nikon photos, the time offset from the first Julian day of surveying during fall 2017 (Julian day 332) was corrected in a later process step. The time offsets for the remainder of the Nikon photos were negligible and were not corrected. For the GoPro photos, the time offset from Julian day 133 was negligible and was not corrected. The time offsets for Julian days 134 and 135 were corrected in a later process step.

***Source Used Citation Abbreviation:***
Original JPEG photographs
***Process Date:*** 09/2018
***Source Produced Citation Abbreviation:***
Original JPEG photographs
***Process Contact:***

***Contact Information:***

***Contact Person Primary:***

***Contact Person:*** Emily Huntley
***Contact Organization:*** U.S. Geological Survey

***Contact Position:*** Geographer/Database Specialist
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***Process Step:***

***Process Description:***

Step 4: Prepared navigation for geotagging application.

Before geotagging the images, the navigation files were checked for erroneous and missing fixes and then converted to a GPS track log file format supported by ExifTool. To prepare the navigation data, first, a column of the original source filename was deleted from each processed navigation CSV text file (DataBridgeNav_GPRMC_ALL.csv for fall 2017 and 2018018_AllDataBridgeNav_parsed.csv for spring 2018), and the time field was formatted to a fixed-length number with six digits in Microsoft Excel 2016 for Mac, which added leading zeros as necessary. Rows with no coordinates were then deleted, and typos in the time and date were corrected as needed. Next, shapefiles were created from each CSV file in Esri ArcGIS (version 10.3.1) and used to identify erroneous fixes, which were deleted from the CSV text files. The shapefiles were also used to identify gaps in the navigation. For the fall 2017 data, missing navigation was interpolated in Esri ArcGIS to get 2-second navigation for site NB32 where the navigation dropped out for

154 seconds on Julian day 333. To do this, a line segment was created between the last and first known fixes around this gap (between GPS times 22:49:38 and 22:52:12). The Construct Points editing tool was used to create 153 evenly spaced points along the line segment so that a point was created for each second. The coordinates of the points were calculated using the Calculate Geometry tool (Property=X Coordinate of Point and Y Coordinate of Point; Use coordinate system of the data source=WGS 1984; Unit=Decimal Degrees). The interpolated points with even seconds were selected and exported as a CSV file (points with even seconds were extracted so that the navigation was interpolated at a 2-second interval), the coordinates were rounded to seven decimal places in Microsoft Excel 2016 for Mac, and the points were added to the processed navigation CSV text file. For the spring 2018 survey, the navigation was also logged using ArcMap GPS, so shapefiles of the ArcMap GPS logs were used to fill in gaps. Any feature from the ArcMap GPS logs not within 0.1 meters of the original navigation was selected, exported, and added to the navigation CSV file. Concurrent fixes were deleted, and any gaps 6 seconds or larger were filled in using data from the ArcMap GPS logs if available (these points intersect other fixes and were not originally exported). Finally, the CSV text files (now named DataBridgeNav_GPRMC_ALL_for_gpx.csv for fall 2017 and 2018018_AllDataBridgeNav_parsed_w_ArcMap_GPS_Logs_for_gpx.csv for spring 2018) were converted to GPX files (DataBridgeNav_GPRMC_ALL.gpx and 2018018_AllDataBridgeNav_parsed_w_ArcMap_GPS_Logs.gpx) using GPS Visualizer (http://www.gpsvisualizer.com/convert_input?convert_format=gpx, accessed September 15, 2019, for the fall 2017 data and October 7, 2018, for the spring 2018 data).

***Source Used Citation Abbreviation:***
Processed DataBridge navigation files
***Source Used Citation Abbreviation:***
ArcMap GPS logs
***Process Date:*** 09/15/2019
***Source Produced Citation Abbreviation:***
GPX navigation files
***Process Contact:***

***Contact Information:***

***Contact Person Primary:***

***Contact Person:*** Emily Huntley
***Contact Organization:*** U.S. Geological Survey

***Contact Position:*** Geographer/Database Specialist
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***Address Type:*** mailing and physical address
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***Process Step:***

***Process Description:***

Step 5: Geotagged the images.

To geotag the images, the following commands were used with ExifTool (version 10.17) to populate the GPS tags (GPSLatitudeRef, GPSLatitude, GPSLongitudeRef, GPSLongitude, GPSTimeStamp, and GSPDateStamp) in the Exif header of each JPEG image. Since the images were acquired during two

surveys and various time offsets were applied, different commands were run using slightly different tags.

Fall 2017 Nikon photos from Julian day 332:

exiftool -api GeoMaxIntSecs=66 -api GeoMaxExtSecs=0 -P -geotag ./DataBridgeNav_GPRMC_ALL.gpx -geosync=+6 '-geotime<${DateTimeOriginal}+00:00' ./photos

Fall 2017 Nikon photos from Julian days 333-337:

exiftool -api GeoMaxIntSecs=66 -api GeoMaxExtSecs=0 -P -geotag ./DataBridgeNav_GPRMC_ALL.gpx '-geotime<${DateTimeOriginal}+00:00' ./photos

Spring 2018 Nikon photos:

exiftool -api GeoMaxIntSecs=10 -api GeoMaxExtSecs=0 -P -geotag ./2018018_AllDataBridgeNav_parsed_w_ArcMap_GPS_Logs.gpx '-geotime<${DateTimeOriginal}+00:00' ./photos

Spring 2018 GoPro photos from Julian day 133:

exiftool -api GeoMaxIntSecs=10 -api GeoMaxExtSecs=0 -P -m -geotag ./2018018_AllDataBridgeNav_parsed_w_ArcMap_GPS_Logs.gpx '-geotime<${DateTimeOriginal}+00:00' ./photos/LISMaRC_Spring2018_20180513*

Spring 2018 GoPro photos from Julian day 134:

exiftool -api GeoMaxIntSecs=10 -api GeoMaxExtSecs=0 -P -m -geotag ./2018018_AllDataBridgeNav_parsed_w_ArcMap_GPS_Logs.gpx -geosync=-5 '-geotime<${DateTimeOriginal}+00:00' ./photos/LISMaRC_Spring2018_20180514*

Spring 2018 GoPro photos from Julian day 135:

exiftool -api GeoMaxIntSecs=10 -api GeoMaxExtSecs=0 -P -m -geotag ./2018018_AllDataBridgeNav_parsed_w_ArcMap_GPS_Logs.gpx -geosync=-10 '-geotime<${DateTimeOriginal}+00:00' ./photos/LISMaRC_Spring2018_20180515*

In the above commands, the "-api GeoMaxIntSecs" option sets the maximum interpolation time for geotagging. For the fall 2017 Nikon photos, the maximum interpolation time was set to 66 seconds since the navigation dropped out for 66 seconds on Julian day 336. The maximum interpolation time was set to 10 seconds for the spring 2018 Nikon and GoPro photos since the GPS was set to receive fixes at a 2-second interval and occasionally several consecutive fixes were missing. The "-api GeoMaxExtSecs" option sets the maximum extrapolation time to 0 seconds for geotagging. The "-P" option preserves the FileModifyDate. The "-m" option was used for the GoPro photos to ignore a warning given by ExifTool when reading or writing a file containing unknown MakerNotes. If this option is not used, the following warnings are issued since ExifTool does not recognize the MakerNotes in the GoPro images: "Warning: [minor] Unrecognized MakerNotes; Warning: [minor] Maker notes could not be parsed." The "-geosync" option is used when the image timestamps are not properly synchronized with the GPS time and is equal to the time offset identified in a previous process step; it is the time difference in seconds that is added to the camera time before determining the image's GPS time and location with a leading "+" or "-" added for positive or negative differences (negative if the camera clock was ahead of the GPS time). Finally, the "-geotime<${DateTimeOriginal}+00:00" argument is added to geotag images for which the camera clock was set to UTC. For more information about the ExifTool commands, see https://exiftool.org/geotag.html and https://exiftool.org/faq.html.

***Source Used Citation Abbreviation:***

Original JPEG photographs

***Source Used Citation Abbreviation:***

GPX navigation files

***Process Date:*** 2019
***Source Produced Citation Abbreviation:***
Geotagged JPEG photographs
***Process Contact:***

***Contact Information:***

***Contact Person Primary:***

***Contact Person:*** Emily Huntley
***Contact Organization:*** U.S. Geological Survey

***Contact Position:*** Geographer/Database Specialist
***Contact Address:***

***Address Type:*** mailing and physical address
***Address:*** 384 Woods Hole Rd.
***City:*** Woods Hole
***State or Province:*** MA
***Postal Code:*** 02543-1598
***Country:*** USA

***Contact Voice Telephone:*** 508-548-8700
***Contact Facsimile Telephone:*** 508-457-2310
***Contact Electronic Mail Address:*** ehuntley@contractor.usgs.gov

***Process Step:***

***Process Description:***

Step 6: Culled the images.

Ten of the fall 2017 Nikon photos had no corresponding navigation data and were removed from the dataset. These photos were taken on deck. The remaining Nikon bottom photographs from both surveys were culled to remove photos collected within the water column, on deck, or without a clear view of the sea floor. The GoPro HERO4 Black camera was set to capture images every 10 seconds during a SEABOSS deployment. GoPro photos that intersected a bottom video trackline were selected to remove photos collected within the water column or on deck. The selected photos were then reviewed to choose representative photos for each site with a clear view of the sea floor for publication. For those sites that were primarily targeted for a sediment grab, one GoPro photo per site was selected; for those sites that were targeted for both a video transect of the sea floor and a sediment grab, a representative photo generally every few minutes was selected for publication for a total of 5 to 15 GoPro photos per video transect.

***Source Used Citation Abbreviation:***
Geotagged JPEG photographs
***Process Date:*** 2019
***Source Produced Citation Abbreviation:***
Selected geotagged JPEG photographs
***Process Contact:***

***Contact Information:***

***Contact Person Primary:***

***Contact Person:*** Emily Huntley
***Contact Organization:*** U.S. Geological Survey

***Contact Position:*** Geographer/Database Specialist
***Contact Address:***

***Address Type:*** mailing and physical address
***Address:*** 384 Woods Hole Rd.
***City:*** Woods Hole
***State or Province:*** MA
***Postal Code:*** 02543-1598
***Country:*** USA

***Contact Voice Telephone:*** 508-548-8700
***Contact Facsimile Telephone:*** 508-457-2310
***Contact Electronic Mail Address:*** ehuntley@contractor.usgs.gov

***Process Step:***

***Process Description:***

Step 7: Incorporated survey information into the images' metadata tags.

The following commands were used with ExifTool (version 10.17) to incorporate additional survey information into the appropriate metadata tags of each JPEG image. Since the images were acquired during two surveys, different commands were run for each survey's photos using slightly different tags. Information is duplicated in some tags because various software packages access different tags. Please note that depending on the software used to view the metadata tags, only a subset of these tags may be extracted.

Fall 2017 Nikon photos:

exiftool -P -Artist="Seth D. Ackerman, Dann S. Blackwood" -Copyright="Public Domain - please credit U.S. Geological Survey" -ImageDescription="Photograph of the sea floor in Long Island Sound, New York and Connecticut, from survey 2017-056-FA" -Caption-Abstract="Photograph of the sea floor in Long Island Sound, New York and Connecticut, from survey 2017-056-FA" -Contact="WHSC_data_contact@usgs.gov" -CopyrightNotice="Public Domain - please credit U.S. Geological Survey" -Credit="U.S. Geological Survey" -sep ", " -keywords="Long Island Sound, New York, Connecticut, 2017-056-FA, SEABOSS, sea floor, USGS" -comment="Photo from down-looking camera on the USGS SEABOSS deployed from the R/V Connecticut during survey 2017-056-FA (https://cmgds.marine.usgs.gov/fan_info.php?fan=2017-056-FA)." -Caption="Photograph of the sea floor in Long Island Sound, New York and Connecticut, from survey 2017-056-FA" *.JPG

Spring 2018 Nikon and GoPro photos:

exiftool -P -Artist="Seth D. Ackerman, Dann S. Blackwood" -Copyright="Public Domain - please credit U.S. Geological Survey" -ImageDescription="Photograph of the sea floor in Long Island Sound, New York and Connecticut, from survey 2018-018-FA" -Caption-Abstract="Photograph of the sea floor in Long Island Sound, New York and Connecticut, from survey 2018-018-FA" -Contact="WHSC_data_contact@usgs.gov" -CopyrightNotice="Public Domain - please credit U.S. Geological Survey" -Credit="U.S. Geological Survey" -sep ", " -keywords="Long Island Sound, New York, Connecticut, 2018-018-FA, SEABOSS, sea floor, USGS" -comment="Photo from down-looking camera on the USGS SEABOSS deployed from the R/V Connecticut during survey 2018-018-FA (https://cmgds.marine.usgs.gov/fan_info.php?fan=2018-018-FA)." -Caption="Photograph of the sea floor in Long Island Sound, New York and Connecticut, from survey 2018-018-FA" *.JPG

The following tags were populated in the JPEG image headers using the above ExifTool commands:

Exif tags and the information used to populate these tags:

Artist: Seth D. Ackerman, Dann S. Blackwood

Copyright: Public Domain - please credit U.S. Geological Survey

ImageDescription (fall 2017 Nikon photos): Photograph of the sea floor in Long Island Sound, New York

and Connecticut, from survey 2017-056-FA

ImageDescription (spring 2018 Nikon and GoPro photos): Photograph of the sea floor in Long Island Sound, New York and Connecticut, from survey 2018-018-FA

International Press Telecommunications Council (IPTC) tags and the information used to populate these tags:

Caption-Abstract (fall 2017 Nikon photos): Photograph of the sea floor in Long Island Sound, New York and Connecticut, from survey 2017-056-FA

Caption-Abstract (spring 2018 Nikon and GoPro photos): Photograph of the sea floor in Long Island Sound, New York and Connecticut, from survey 2018-018-FA

Contact: WHSC_data_contact@usgs.gov

CopyrightNotice: Public Domain - please credit U.S. Geological Survey

Credit: U.S. Geological Survey

Keywords (fall 2017 Nikon photos): Long Island Sound, New York, Connecticut, 2017-056-FA, SEABOSS, sea floor, USGS

Keywords (spring 2018 Nikon and GoPro photos): Long Island Sound, New York, Connecticut, 2018-018-FA, SEABOSS, sea floor, USGS

JPEG tag and the information used to populate this tag:

Comment (fall 2017 Nikon photos): Photo from down-looking camera on the USGS SEABOSS deployed from the R/V Connecticut during survey 2017-056-FA (https://cmgds.marine.usgs.gov/fan_info.php?fan=2017-056-FA).

Comment (spring 2018 Nikon and GoPro photos): Photo from down-looking camera on the USGS SEABOSS deployed from the R/V Connecticut during survey 2018-018-FA (https://cmgds.marine.usgs.gov/fan_info.php?fan=2018-018-FA).

Extensible Metadata Platform (XMP) tag and the information used to populate this tag:

Caption (fall 2017 Nikon photos): Photograph of the sea floor in Long Island Sound, New York and Connecticut, from survey 2017-056-FA

Caption (spring 2018 Nikon and GoPro photos): Photograph of the sea floor in Long Island Sound, New York and Connecticut, from survey 2018-018-FA

To extract the information from the image metadata tags using ExifTool, the following command can be used (tested with ExifTool version 10.17):

exiftool -csv -f -filename -GPSTimeStamp -GPSDateStamp -GPSLatitude -GPSLongitude -n -Artist -Copyright -ImageDescription -Caption-Abstract -Contact -CopyrightNotice -Credit -keywords -comment -Caption *.JPG > out.csv

The "-csv" option writes the information to a CSV file. The "-n" option formats the latitude and longitude as signed decimal degrees. Please note that the above command was tested on macOS; Windows users may need to use "exiftool.exe" instead of "exiftool." Also note that the argument list may be too long if this command is used in a directory with all of the images. As a workaround, the command may be run separately on the fall 2017 and spring 2018 images by using a wildcard to select the images for each year in the directory (e.g., end the above command with LISMaRC_Fall2017*.JPG > out2017.csv to run it on the fall 2017 images and LISMaRC_Spring2018*.JPG > out2018.csv for the spring 2018 images).

***Source Used Citation Abbreviation:***
Selected geotagged JPEG photographs
***Process Date:*** 2019
***Source Produced Citation Abbreviation:***
Geotagged JPEG photographs with updated metadata tags
***Process Contact:***

***Contact Information:***

***Contact Person Primary:***

***Contact Person:*** Emily Huntley
***Contact Organization:*** U.S. Geological Survey

***Contact Position:*** Geographer/Database Specialist
***Contact Address:***

***Address Type:*** mailing and physical address
***Address:*** 384 Woods Hole Rd.
***City:*** Woods Hole
***State or Province:*** MA
***Postal Code:*** 02543-1598
***Country:*** USA

***Contact Voice Telephone:*** 508-548-8700
***Contact Facsimile Telephone:*** 508-457-2310
***Contact Electronic Mail Address:*** ehuntley@contractor.usgs.gov

***Process Step:***

***Process Description:***

Step 8: Captured frame grabs from the bottom video.

Five sites with no usable photographs were identified (sites SB60_abort, 2018-018-013, 2018-018-051, 2018-018-077, and 2018-018-080). For these sites, one to two still-image frame grabs per site were captured from the bottom video. This was a manual process whereby the video was viewed in VLC media player (version 2.2.6) and one or two clear images of the sea floor throughout the drift were captured.

***Source Used Citation Abbreviation:***
Bottom video
***Process Date:*** 2019
***Source Produced Citation Abbreviation:***
Video frame grabs
***Process Contact:***

***Contact Information:***

***Contact Person Primary:***

***Contact Person:*** Seth Ackerman
***Contact Organization:*** U.S. Geological Survey

***Contact Position:*** Geologist
***Contact Address:***

***Address Type:*** mailing and physical address
***Address:*** 384 Woods Hole Rd.
***City:*** Woods Hole

***State or Province:*** MA
***Postal Code:*** 02543-1598
***Country:*** USA

***Contact Voice Telephone:*** 508-548-8700 x2315
***Contact Facsimile Telephone:*** 508-457-2310
***Contact Electronic Mail Address:*** sackerman@usgs.gov

***Process Step:***

***Process Description:***

Step 9: Geotagged the video frame grabs and incorporated survey information into the images' metadata tags.

To geolocate the bottom video frame grabs, a CSV file was created with fields for the filename, GPS date, and GPS time. The videos were recorded with an overlay of the GPS date and time, so this information was entered using the date and time shown on each frame grab. The latitude and longitude of each video frame grab were added to the CSV file by matching the frame grab time with a CSV file of the final processed navigation in Microsoft Excel 2016 for Mac. A Python script (MCZM_writeexif_2_readfile.py) was then run that incorporated the matched-up location data, along with additional survey information, into the appropriate metadata tags of each JPEG image. Since the images were acquired during two surveys, the script was run separately for each survey's images using slightly different tags. The Python script uses ExifTool (version 10.17) to write the information to the image metadata tags. Information is duplicated in some tags because various software packages access different tags. Please note that depending on the software used to view the metadata tags, only a subset of these tags may be extracted. The following tags were populated in the JPEG image headers:

GPS tags (these values are unique for each image and based on the matched-up location data):

GPSLatitudeRef
GPSLatitude
GPSLongitudeRef
GPSLongitude
GPSTimeStamp
GSPDateStamp

Exif tags and the information used to populate these tags:

Artist: Seth D. Ackerman, Dann S. Blackwood

Copyright: Public Domain - please credit U.S. Geological Survey

ImageDescription (fall 2017 video frame grabs): Image of the sea floor in Long Island Sound, New York and Connecticut, from survey 2017-056-FA

ImageDescription (spring 2018 video frame grabs): Image of the sea floor in Long Island Sound, New York and Connecticut, from survey 2018-018-FA

International Press Telecommunications Council (IPTC) tags and the information used to populate these tags:

Caption-Abstract (fall 2017 video frame grabs): Image of the sea floor in Long Island Sound, New York and Connecticut, from survey 2017-056-FA

Caption-Abstract (spring 2018 video frame grabs): Image of the sea floor in Long Island Sound, New York and Connecticut, from survey 2018-018-FA

Contact: WHSC_data_contact@usgs.gov

CopyrightNotice: Public Domain - please credit U.S. Geological Survey

Credit: U.S. Geological Survey

Keywords (fall 2017 video frame grabs): Long Island Sound, New York, Connecticut, 2017-056-FA, SEABOSS, sea floor, USGS

Keywords (spring 2018 video frame grabs): Long Island Sound, New York, Connecticut, 2018-018-FA, SEABOSS, sea floor, USGS

JPEG tag and the information used to populate this tag:

Comment (fall 2017 video frame grabs): Video frame grab from down-looking camera on the USGS SEABOSS deployed from the R/V Connecticut during survey 2017-056-FA (https://cmgds.marine.usgs.gov/fan_info.php?fan=2017-056-FA).

Comment (spring 2018 video frame grabs): Video frame grab from down-looking camera on the USGS SEABOSS deployed from the R/V Connecticut during survey 2018-018-FA (https://cmgds.marine.usgs.gov/fan_info.php?fan=2018-018-FA).

Extensible Metadata Platform (XMP) tag and the information used to populate this tag:

Caption (fall 2017 video frame grabs): Image of the sea floor in Long Island Sound, New York and Connecticut, from survey 2017-056-FA

Caption (spring 2018 video frame grabs): Image of the sea floor in Long Island Sound, New York and Connecticut, from survey 2018-018-FA

To extract the information from the image metadata tags using ExifTool, the following command can be used (tested with ExifTool version 10.17):

exiftool -csv -f -filename -GPSTimeStamp -GPSDateStamp -GPSLatitude -GPSLongitude -n -Artist -Copyright -ImageDescription -Caption-Abstract -Contact -CopyrightNotice -Credit -keywords -comment -Caption *.JPG > out.csv

The "-csv" option writes the information to a CSV file. The "-n" option formats the latitude and longitude as signed decimal degrees. Please note that the above command was tested on macOS; Windows users may need to use "exiftool.exe" instead of "exiftool." Also note that the argument list may be too long if this command is used in a directory with all of the images from this publication. As a workaround, the command may be run separately on the fall 2017 and spring 2018 images by using a wildcard to select the images for each year in the directory (e.g., end the above command with LISMaRC_Fall2017*.JPG > out2017.csv to run it on the fall 2017 images and LISMaRC_Spring2018*.JPG > out2018.csv for the spring 2018 images). This process step and all subsequent process steps were performed by the same person, Emily Huntley.

***Source Used Citation Abbreviation:***
Video frame grabs
***Source Used Citation Abbreviation:***
Final processed navigation files
***Process Date:*** 2019
***Source Produced Citation Abbreviation:***
Geotagged video frame grabs with updated metadata tags
***Process Contact:***

***Contact Information:***

***Contact Person Primary:***

***Contact Person:*** Emily Huntley
***Contact Organization:*** U.S. Geological Survey

***Contact Position:*** Geographer/Database Specialist
***Contact Address:***

***Address Type:*** mailing and physical address
***Address:*** 384 Woods Hole Rd.
***City:*** Woods Hole
***State or Province:*** MA
***Postal Code:*** 02543-1598
***Country:*** USA

***Contact Voice Telephone:*** 508-548-8700
***Contact Facsimile Telephone:*** 508-457-2310
***Contact Electronic Mail Address:*** ehuntley@contractor.usgs.gov

***Process Step:***

***Process Description:***

Step 10: Renamed the images.

The images were renamed to include LISMaRC (which stands for Long Island Sound Mapping and Research Collaborative), season, year, and GPS date and time in the ISO 8601 standard (YYYYMMDD T [time separator] HHMMSS Z [Zulu/UTC time]) in the filename. The fall 2017 Nikon and spring 2018 GoPro photo filenames end in the original filename, and the video frame grabs end in "OdysseyFrameGrab." Renaming the images was done by creating a shell script with the original image name and the new filename with the GPS date and time information parsed from the image's Exif metadata tags.

***Source Used Citation Abbreviation:***
Geotagged JPEG photographs with updated metadata tags
***Source Used Citation Abbreviation:***
Geotagged video frame grabs with updated metadata tags
***Process Date:*** 09/2019
***Source Produced Citation Abbreviation:***
Final JPEG images

***Process Step:***

***Process Description:***

Step 11: Created a CSV file of the bottom image locations.

The information from the image metadata tags was extracted using the following ExifTool (version 10.17) commands (the argument list was too long when it was run in a directory with all of the images, so a wildcard was used to run the command separately on the fall 2017 and spring 2018 images):

Command for fall 2017 images:

exiftool -csv -f -filename -GPSTimeStamp -DateTimeOriginal -GPSDateStamp -GPSLatitude -GPSLongitude -n -comment LISMaRC_Fall2017*.JPG > out2017.csv

Command for spring 2018 images:

exiftool -csv -f -filename -GPSTimeStamp -DateTimeOriginal -GPSDateStamp -GPSLatitude -

GPSLongitude -n -comment LISMaRC_Spring2018*.JPG > out2018.csv

Microsoft Excel 2016 for Mac was used to merge the two output CSV files into one file; rename the field names for the filename (PICNAME), GPS time (GPSTIME), original camera time (CAMR_TIME), GPS date (DATE), latitude (LAT), and longitude (LONG); add new fields for the camera (CAMERA), time offset applied to the camera time (TIMEOFFSET), Julian day of collection (JD), year of collection (YEAR), survey ID (FA_ID), sampling device used to collect the image (DEVICE_ID), and survey vessel (VEHICLE_ID); and remove additional fields extracted from the ExifTool command.

***Source Used Citation Abbreviation:***
Final JPEG images
***Process Date:*** 09/2019
***Source Produced Citation Abbreviation:***
Bottom image locations CSV file

***Process Step:***

***Process Description:***

Step 12: Created a final shapefile and CSV file of the bottom image locations.

A shapefile was created from the bottom image locations CSV file in Esri ArcGIS (version 10.3.1). XTools Pro (version 12.0) for Esri ArcGIS was used to modify field parameters (Table Operations - Table Restructure) in the point shapefile. The Spatial Join tool was then run to calculate the site number (FIELD_NO), video trackline (LINENAME), and University of Connecticut's NURTEC site name for the spring 2018 survey (COMMENTS). These attributes were added to each bottom image using the Spatial Join tool by joining the attributes of the bottom video tracklines shapefile using the intersect match option with a search radius of 0.01 meters. Nine images intersected two tracklines, so the site number and video trackline name were edited if needed to match the GPS time of the image to the corresponding bottom video trackline. Forty-two of the bottom images did not intersect a bottom video trackline, so the site number and NURTEC site name, if applicable, were assigned to these images using information from the survey logs. These images were taken during the second deployment with no video or shortly before the video trackline, so a no data value of -9999 was added to the blank video trackline attributes. Unnecessary fields created when running the Spatial Join tool were deleted (i.e., Join_Count and TARGET_FID). Finally, the shapefile's attribute table was exported in Esri ArcGIS and saved as a CSV file. The FID field was deleted in the CSV file.

***Source Used Citation Abbreviation:***
Bottom image locations CSV file
***Source Used Citation Abbreviation:***
Bottom video tracklines shapefile
***Source Used Citation Abbreviation:***
Survey logs
***Process Date:*** 10/2019
***Source Produced Citation Abbreviation:***
Final bottom image locations shapefile
***Source Produced Citation Abbreviation:***
Final bottom image locations CSV file

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## Spatial Data Organization Information:

### Direct Spatial Reference Method:

Vector
***Point and Vector Object Information:***

***SDTS Terms Description:***

***SDTS Point and Vector Object Type:*** Entity point
***Point and Vector Object Count:*** 8670

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## Spatial Reference Information:

***Horizontal Coordinate System Definition:***

***Geographic:***

***Latitude Resolution:*** 0.00000001
***Longitude Resolution:*** 0.00000001
***Geographic Coordinate Units:*** Decimal degrees

***Geodetic Model:***

***Horizontal Datum Name:*** D_WGS_1984
***Ellipsoid Name:*** WGS_1984
***Semi-major Axis:*** 6378137.000000
***Denominator of Flattening Ratio:*** 298.257224

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## Entity and Attribute Information:

***Detailed Description:***

***Entity Type:***

***Entity Type Label:*** 2017-056-FA_and_2018-018-FA_photos
***Entity Type Definition:***
Bottom image locations and bottom images collected in Long Island Sound, Connecticut and New York, in fall 2017 and spring 2018 during USGS field activities 2017-056-FA and 2018-018-FA.
***Entity Type Definition Source:***
U.S. Geological Survey

***Attribute:***

***Attribute Label:*** FID
***Attribute Definition:***

Internal feature number.

***Attribute Definition Source:***
Esri
***Attribute Domain Values:***

***Unrepresentable Domain:***

Sequential unique whole numbers that are automatically generated.

***Attribute:***

***Attribute Label:*** Shape

***Attribute Definition:***

Feature geometry.

***Attribute Definition Source:***
Esri
***Attribute Domain Values:***

***Unrepresentable Domain:***

Coordinates defining the features.

***Attribute:***

***Attribute Label:*** PICNAME
***Attribute Definition:***

Name of bottom image used to uniquely identify between surveys, cameras, and images: e.g., LISMaRC_Fall2017_20171128T125459Z_DSC_1978.JPG where LISMaRC_Fall2017 refers to the Long Island Sound Mapping and Research Collaborative survey season and year, 20171128T125459Z refers to the image GPS date and time in the ISO 8601 standard (YYYYMMDD T [time separator] HHMMSS Z [Zulu/UTC time]), and DSC_1978 refers to the sequential photo number assigned to the image by the camera. The fall 2017 Nikon and spring 2018 GoPro photo filenames end in the original filename, and the video frame grabs end in "OdysseyFrameGrab."

***Attribute Definition Source:***
U.S. Geological Survey
***Attribute Domain Values:***

***Unrepresentable Domain:***

String used to distinguish images.

***Attribute:***

***Attribute Label:*** CAMERA
***Attribute Definition:***

Camera used to collect bottom image.

***Attribute Definition Source:***
U.S. Geological Survey
***Attribute Domain Values:***

***Unrepresentable Domain:***

String used to distinguish between different camera models mounted on the sampling system.

***Attribute:***

***Attribute Label:*** GPSTIME
***Attribute Definition:***

UTC time of bottom image from GPS navigation file in the format HH:MM:SS.

***Attribute Definition Source:***
U.S. Geological Survey
***Attribute Domain Values:***

***Unrepresentable Domain:***

String used to distinguish the UTC times of the bottom images determined by the GPS.

***Attribute:***

***Attribute Label:*** CAMR_TIME
***Attribute Definition:***

Camera time of bottom image in UTC in the format HH:MM:SS. The camera time is not applicable to the video frame grabs, so a no data value of 99:99:99 was used for these images.

***Attribute Definition Source:***
U.S. Geological Survey
***Attribute Domain Values:***

***Unrepresentable Domain:***

String used to distinguish the camera times of the bottom images determined from the camera's internal clock.

***Attribute:***

***Attribute Label:*** TIMEOFFSET
***Attribute Definition:***

Offset applied, if any, to match the bottom image to the correct time determined by the GPS navigation. This field is the time difference between the camera time and the GPS time in UTC in the format HH:MM:SS. A value of "00:00:00" indicates no offset was applied in processing. If the camera time were X seconds behind the GPS time, a positive offset of +X would be applied. If the camera were Y seconds ahead of the GPS time, a negative offset of -Y would be applied. The time offset is not applicable to the video frame grabs, so a no data value of 99:99:99 was used for these images.

***Attribute Definition Source:***
U.S. Geological Survey
***Attribute Domain Values:***

***Unrepresentable Domain:***

String used to distinguish the time offsets of the bottom images.

***Attribute:***

***Attribute Label:*** JD
***Attribute Definition:***

Julian day that the bottom image was collected based on UTC time; Julian day is the integer number representing the interval of time in days since January 1 of the year.

***Attribute Definition Source:***
U.S. Geological Survey
***Attribute Domain Values:***

***Range Domain:***

***Range Domain Minimum:*** 128
***Range Domain Maximum:*** 337
***Attribute Units of Measure:*** Julian days
***Attribute Measurement Resolution:*** 1

***Attribute:***

***Attribute Label:*** YEAR
***Attribute Definition:***

Year that the bottom image was collected.

***Attribute Definition Source:***
U.S. Geological Survey
***Attribute Domain Values:***

***Range Domain:***

***Range Domain Minimum:*** 2017
***Range Domain Maximum:*** 2018
***Attribute Units of Measure:*** years
***Attribute Measurement Resolution:*** 1

***Attribute:***

***Attribute Label:*** DATE
***Attribute Definition:***

Date based on UTC time that the bottom image was collected in the format YYYYMMDD.

***Attribute Definition Source:***
U.S. Geological Survey
***Attribute Domain Values:***

***Unrepresentable Domain:***

String used to distinguish dates.

***Attribute:***

***Attribute Label:*** LAT
***Attribute Definition:***

Latitude of bottom image in geographic coordinates, WGS 84.

***Attribute Definition Source:***
U.S. Geological Survey
***Attribute Domain Values:***

***Range Domain:***

***Range Domain Minimum:*** 41.19323415
***Range Domain Maximum:*** 41.32469580
***Attribute Units of Measure:*** decimal degrees
***Attribute Measurement Resolution:*** 0.00000001

***Attribute:***

***Attribute Label:*** LONG
***Attribute Definition:***

Longitude of bottom image in geographic coordinates, WGS 84.

***Attribute Definition Source:***
U.S. Geological Survey

***Attribute Domain Values:***

***Range Domain:***

***Range Domain Minimum:*** -72.43010830
***Range Domain Maximum:*** -71.86684833
***Attribute Units of Measure:*** decimal degrees
***Attribute Measurement Resolution:*** 0.00000001

***Attribute:***

***Attribute Label:*** FIELD_NO
***Attribute Definition:***

Site number as assigned in the field.

***Attribute Definition Source:***
U.S. Geological Survey
***Attribute Domain Values:***

***Unrepresentable Domain:***

String used to distinguish site numbers.

***Attribute:***

***Attribute Label:*** LINENAME
***Attribute Definition:***

Name of bottom video used to uniquely identify between surveys and video files: e.g., LISMaRC_Fall2017_20171128T125443Z_CLIP0000414.mp4 where LISMaRC_Fall2017 refers to the Long Island Sound Mapping and Research Collaborative survey season and year, 20171128T125443Z refers to the date and start time in the ISO 8601 standard (YYYYMMDD T [time separator] HHMMSS Z [Zulu/UTC time]), and CLIP0000414.mp4 refers to the sequential video number assigned to the video by the camera. A no data value of -9999 indicates that the image is not within 0.01 meters of a bottom video trackline.

***Attribute Definition Source:***
U.S. Geological Survey
***Attribute Domain Values:***

***Unrepresentable Domain:***

String used to distinguish bottom videos.

***Attribute:***

***Attribute Label:*** FA_ID
***Attribute Definition:***

Serial number assigned to the field activity during which the bottom image was collected. This value is in the format YYYY-XXX-FA where YYYY is the survey year, XXX is the number assigned to the activity within that year, and FA indicates Field Activity.

***Attribute Definition Source:***
U.S. Geological Survey
***Attribute Domain Values:***

***Unrepresentable Domain:***

String used to distinguish field activities by year and ID number.

***Attribute:***

***Attribute Label:*** DEVICE_ID
***Attribute Definition:***

Sampling device used to collect the bottom image.

***Attribute Definition Source:***
U.S. Geological Survey
***Attribute Domain Values:***

***Unrepresentable Domain:***

String used to identify the sampling configuration used during the survey.

***Attribute:***

***Attribute Label:*** VEHICLE_ID
***Attribute Definition:***

Vehicle (ship) used to collect data during the field activity.

***Attribute Definition Source:***
U.S. Geological Survey
***Attribute Domain Values:***

***Unrepresentable Domain:***

String used to identify the survey vessel.

***Attribute:***

***Attribute Label:*** COMMENTS
***Attribute Definition:***

Comments field with the USGS site number and University of Connecticut's Northeast Underwater Research, Technology and Education Center (NURTEC) site name for the spring 2018 survey.

***Attribute Definition Source:***
U.S. Geological Survey
***Attribute Domain Values:***

***Unrepresentable Domain:***

String used to distinguish NURTEC spring 2018 site names.

***Overview Description:***

***Entity and Attribute Overview:***

The CSV file has the same attributes, except for FID (which is not included), with the same definitions.

***Entity and Attribute Detail Citation:***
U.S. Geological Survey

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## Distribution Information:

***Distributor:***

***Contact Information:***

***Contact Organization Primary:***

***Contact Organization:*** U.S. Geological Survey - ScienceBase

***Contact Address:***

***Address Type:*** mailing and physical address
***Address:*** Denver Federal Center, Building 810, Mail Stop 302
***City:*** Denver
***State or Province:*** CO
***Postal Code:*** 80225
***Country:*** USA

***Contact Voice Telephone:*** 1-888-275-8747
***Contact Electronic Mail Address:*** sciencebase@usgs.gov

***Resource Description:*** Geotagged sea-floor images and location of bottom images collected in Long Island Sound, Connecticut and New York, in fall 2017 and spring 2018 by the U.S. Geological Survey, University of Connecticut, and University of New Haven during field activities 2017-056-FA and 2018-018-FA. This dataset contains the following files: a shapefile of the bottom image locations (2017-056-FA_and_2018-018-FA_photos.shp); a CSV file of the bottom image locations (2017-056-FA_and_2018-018-FA_photos.csv); 8,670 geotagged bottom images from a Nikon D300 digital still camera, GoPro HERO4 Black camera, and Kongsberg Simrad OE1365 video camera; a browse graphic of bottom image locations (2017-056-FA_and_2018-018-FA_photos_browse.jpg); and a Federal Geographic Data Committee (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM) metadata file (2017-056-FA_and_2018-018-FA_photos_meta.xml).

***Distribution Liability:***

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***Standard Order Process:***

***Digital Form:***

***Digital Transfer Information:***

***Format Name:*** Shapefile
***Format Version Number:*** Esri ArcGIS 10.3.1
***Format Specification:***
Shapefile
***Format Information Content:***
This dataset contains a shapefile and CSV file of bottom image locations and geotagged JPEG images of the sea floor collected by the U.S. Geological Survey, University of Connecticut, and University of New Haven in Long Island Sound, Connecticut and New York, in fall 2017 and spring 2018 and the associated metadata. The transfer size of the shapefile, CSV file, browse graphic, and associated metadata is 12.6 MB. The JPEG images are available in 11 zip files with a total transfer size of 43.0 GB.
***Transfer Size:*** 43046

***Digital Transfer Option:***

***Online Option:***

***Computer Contact Information:***

***Network Address:***

***Network Resource Name:***https://www.sciencebase.gov/catalog/item/5de9bd31e4b02caea0eeda42
***Network Resource Name:***https://doi.org/10.5066/P9GK29NM

***Access Instructions:***
The first link is to the page containing the data. The second link is to the publication landing page. The data page (first link) may have additional data access options, including web services.

***Digital Form:***

***Digital Transfer Information:***

***Format Name:*** Comma-delimited text
***Format Version Number:*** Microsoft Excel 2016 for Mac
***Format Specification:***
Comma Separated Values (CSV) text file
***Format Information Content:***
This dataset contains a shapefile and CSV file of bottom image locations and geotagged JPEG images of the sea floor collected by the U.S. Geological Survey, University of Connecticut, and University of New Haven in Long Island Sound, Connecticut and New York, in fall 2017 and spring 2018 and the associated metadata. The transfer size of the shapefile, CSV file, browse graphic, and associated metadata is 12.6 MB. The JPEG images are available in 11 zip files with a total transfer size of 43.0 GB.
***Transfer Size:*** 43046

***Digital Transfer Option:***

***Online Option:***

***Computer Contact Information:***

***Network Address:***

***Network Resource Name:***https://www.sciencebase.gov/catalog/item/5de9bd31e4b02caea0eeda42
***Network Resource Name:***https://doi.org/10.5066/P9GK29NM

***Access Instructions:***
The first link is to the page containing the data. The second link is to the publication landing page. The data page (first link) may have additional data access options, including web services.

***Digital Form:***

***Digital Transfer Information:***

***Format Name:*** JPEG
***Format Information Content:***
This dataset contains a shapefile and CSV file of bottom image locations and geotagged JPEG images of the sea floor collected by the U.S. Geological Survey, University of Connecticut, and University of New Haven in Long Island Sound, Connecticut and New York, in fall 2017 and spring 2018 and the associated metadata. The transfer size of the

shapefile, CSV file, browse graphic, and associated metadata is 12.6 MB. The JPEG images are available in the following 11 zip files with a total transfer size of 43.0 GB: jpg_20171128-20171129.zip, which contains 861 images collected on November 28-29, 2017 (Julian days 332-333), and has a file size of 4.2 GB; jpg_20171130.zip, which contains 793 images collected on November 30, 2017 (Julian day 334), and has a file size of 3.8 GB; jpg_20171201.zip, which contains 926 images collected on December 1, 2017 (Julian day 335), and has a file size of 4.1 GB; jpg_20171202.zip, which contains 1,211 images collected on December 2, 2017 (Julian day 336), and has a file size of 5.4 GB; jpg_20171203.zip, which contains 775 images collected on December 3, 2017 (Julian day 337), and has a file size of 4.1 GB; jpg_20180508.zip, which contains 849 images collected on May 8, 2018 (Julian day 128), and has a file size of 4.0 GB; jpg_20180509.zip, which contains 830 images collected on May 9, 2018 (Julian day 129), and has a file size of 4.1 GB; jpg_20180510.zip, which contains 531 images collected on May 10, 2018 (Julian day 130), and has a file size of 3.2 GB; jpg_20180511.zip, which contains 627 images collected on May 11, 2018 (Julian day 131), and has a file size of 3.5 GB; jpg_20180512.zip, which contains 571 images collected on May 12, 2018 (Julian day 132), and has a file size of 3.3 GB; and jpg_20180513-20180515.zip, which contains 696 images collected on May 13-15, 2018 (Julian days 133-135), and has a file size of 3.2 GB.

***File Decompression Technique:*** Use WinZip, 7-Zip, PeaZip, PKUNZIP, or other uncompressing software
***Transfer Size:*** 43046

***Digital Transfer Option:***

***Online Option:***

***Computer Contact Information:***

***Network Address:***

***Network Resource Name:***https://www.sciencebase.gov/catalog/item/5de9bd31e4b02caea0eeda42
***Network Resource Name:***https://doi.org/10.5066/P9GK29NM

***Access Instructions:***
The first link is to the page containing the data. The second link is to the publication landing page. The data page (first link) may have additional data access options, including web services.

***Fees:*** none

***Technical Prerequisites:***
This dataset contains data available as a point shapefile, a CSV file, and JPEG image files. The user must have software capable of reading shapefile format to use the point shapefile. The CSV file can be read with a text editor. An image viewer can be used to see the JPEG images.

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## Metadata Reference Information:

***Metadata Date:*** 11/23/2020
***Metadata Contact:***

***Contact Information:***

***Contact Person Primary:***

***Contact Person:*** Emily Huntley
***Contact Organization:*** U.S. Geological Survey

***Contact Position:*** Geographer/Database Specialist
***Contact Address:***

***Address Type:*** mailing and physical address
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***Metadata Standard Name:*** FGDC Content Standard for Digital Geospatial Metadata
***Metadata Standard Version:*** FGDC-STD-001-1998
***Metadata Time Convention:*** local time

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