PONAR IMAGING AND SAMPLING SYSTEM FOR ASSESSING HABITAT (PISSAH) PHASE IIIA IMAGE ANALYSIS

METADATA

Dataset Originator: *University of Connecticut: Ivar G. Babb*

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Dataset Title: ***PISSAH Phase IIIA Image Analysis***

Online Linkage:

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

Data_doi=

Data url=

Abstract:

This dataset contains the results of image analyses of frame captures of video collected by the Ponar Imaging and Sampling System for Assessing Habitat (PISSAH) developed by the Long Island Sound Mapping and Research Collaborative (LISMaRC) to obtain both physical sediment grab samples and ultra-high definition (4K) video using the latest version of GoPro cameras. A four-day survey using the PISSAH deployed from the Research Vessel Weicker was conducted from June 12-16, 2023 including mobilization and demobilization. The PISSAH was used to acquire both physical sediment grab samples as well as the GoPro video from 60 sites in the Phase III area of the Long Island Sound Cable Fund (LISCF) Seafloor Habitat Mapping Initiative. Multiple GoPro cameras with lights captured both forward-looking and down-looking points of view. The down-looking video files were reviewed and two to five still images (frame grabs) were captured in the .tiff format for image analysis. The images were color corrected using the IrfanView software. Each image was then analyzed using the ImageJ software for point count and percent cover of observed taxa, biogenic features and sediment type. The results of this analysis and attendant maps were provided to the team led by Roger Flood from the Stony Brook University to assist with the interpretation of new and existing acoustic backscatter data in the area.

Dataset purpose:

This dataset represents the results of images acquired from the raw video obtained by the GoPro cameras. Individual video frames were captured as image files (.TIFF) using VLC's (v. 3.0.20, 2023) Snapshot Tool. These individual frame grabs were in turn analyzed using ImageJ (v. 1.53k, 2021) software to assess the nature of the seafloor taxa and seafloor sediment type. A total of 60 sites were identified in the Phase IIIA area based upon an analysis of existing acoustic backscatter data obtained from multiple surveys by NOAA that exhibited what appeared to be inconsistent gray scale settings. The video from the 60 sites produced 214 useable frame captures which were primarily limited due to the poor visibility in the Phase II area. The images were analyzed for percent cover of observed taxa, biogenic features and sediment type. Results were presented in an Excel spreadsheet containing tabs for cell counts and percent cover values for all 214 sites and a summary tab combining the frame captures analyzed for each of the 60 sites. Spatial data in the form of ESRI shapefiles and an ESRI ArcGIS map package file (.mpk) containing map documents, data, and other related resources were also developed. These results provided up to date ground truth data to assist

with the interpretation and integration of new acoustic data with the existing NOAA data to develop a seamless backscatter mosaic by the LISCF partner, Stony Brook University.

Time period of content:

The PISSAH imagery were reviewed and analyzed from July, 2023 to June, 2024.

Dataset Status: *Complete*

Update Frequency: *None planned*

Theme Keywords:

Connecticut, New York, Long Island Sound, estuary, RV Lowell Weicker, backscatter, multibeam sonar, raw data, GoPro, video, University of Connecticut, UConn, Long Island Sound Mapping and Research Collaborative, LISMaRC, Long Island Sound Cable Fund, LISCF, image analysis, ImageJ, epifauna, structure forming taxa, sediment type.

Access Constraints: *None*

Use Constraints:

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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.

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 Cable Fund Seafloor Habitat Mapping Initiative 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:

See below for positional accuracy.

Completeness:

Complete - Representative images from each of the 60 sites have been analyzed for attendant taxa and seafloor type and links to the images, data results and digital maps have been provided to the Stony Brook University team.

Positional accuracy:

Sample Site Positional Accuracy – As mentioned above, the 60 sites were chosen in the Phase III area based upon examination of the existing NOAA backscatter data imported into ESRI's ArcGIS Pro. The determinants for the site selection were for: 1) sites that showed vastly different backscatter values within a small area, hence needed groundtruthing to determine which reading was more accurate and 2) for sites within the two areas selected as reference areas that were the target of the new data acquisition, and would, therefore, provide a better sense of the true nature of the new backscatter data to aid in the interpretation of these data and to assist with normalizing the existing data with the new . The latitude and longitude of the sites were determined from the GIS, based upon the positional accuracy of the imported NOAA GeoTiff file of the backscatter mosaic.

Video File Positional Accuracy – The position of the sampler was assumed to be directly below the stern of the vessel, although there may have been some deviation from this position based upon the unit being pushed by any bottom currents. Given this assumption, a GPS antenna was mounted on the stern rail of the RV Weicker to provide an accurate record of the position of the PISSAH throughout the course of the deployment. The GPS receiver was a GlobalSat BU-353N5 connected via USB to a laptop operating ArcGIS Pro. The GlobalSat web site describes the receiver as: "very high sensitivity chipset (Tracking Sensitivity: -165 dBm), with extremely fast TTFF (Time To First Fix) at low signal level and support of NMEA 0183 data protocol. The USB GPS is WAAS/EGNOS capable, and for units sold in North America through authorized resellers, these units are WAAS/EGNOS enabled unless otherwise stated. Accuracy can be up to 5 meters 3D RMS with WAAS enabled and 10-15 meters 2D RMS WAAS disabled." The 3D RMS was enabled, therefore, the positional accuracy of the PISSAH and therefore the acquired video was assumed to be ~5 meters.

Process Steps:

Video Review and Frame Captures: Down looking GoPro video was reviewed and individual frames captured in .TIFF format using VLC (v. 3.0.20, 2023). Frame capture filenames included original GoPro video filenames and frame time code (i.e., hours, minutes, and seconds since the start of recording). During the initial review of each video, frames of clock time (Naval Observatory clock time from www.time.gov) and site ID (written on a white board) were captured and the timecode of deployment, the sediment grab, and retrieval were noted; additionally, observations on video quality and notable features or organisms were also recorded. Frames of the seafloor were captured when the seafloor was visible and clear during a subsequent review; care was taken to ensure frames provided representative images of the seafloor throughout the transect. At some sites, poor visibility inevitably reduced the number of usable frames available for analysis. Once saved as .TIFF files, frame captures were referred to as images.

Image (Frame Capture) Geolocating and Processing: Images were geolocated using time. Video timecode was converted to clock time (using the image of Naval Observatory clock time captured prior to deployment at each site), which was used to assign a latitude and longitude to each image

(using GPS clock time recorded by the GPS receiver). Images were batch processed to ensure consistent quality during analysis using IrfanView (v. 64 4.62, 2022).

Image Analysis: Images were analyzed using ImageJ (v. 1.53k, 2021). Image analysis consisted of overlaying a 8x5 cell grid (40 total cells) on the image (using ImageJ's Grid tool) and marking the occurrence of identifiable organisms, biogenic and artificial materials, and surficial sediment type within each cell (using ImageJ's MultiPoint Tool). Percent cover was determined as the number cells featuring the occurrence of an organism, material, or sediment type expressed as a percentage of total visible cells. Note the only cells featuring clearly visible seafloor were included. The resulting data was recorded in a MS Excel spreadsheet.

Process Contact: *Christopher Conroy, University of New Haven, cwconroy@newhaven.edu*

Attributes:

Frame Capture Image Files: The GoPro 10 cameras recorded the HEVC video format in the .MP4 wrapper at a resolution of 5312x2998 pixels and data rate of 60 megapixels/second. The frame grabs used for the analyses were using VLC (v. 3.0.20, 2023) and saved in .tiff format with PackBits compression at 3840x2160 pixels using the RGB color model.

All .tiff images were converted to .jpeg files to meet data standardization requirements of the Long Island Sound Cable Fund initiative prior to being sent to the Lamont Doherty Earth Observatory Long Island Sound data archive.

The vessel track was recorded every second into a .csv (comma separated value) file, with the date/time/time_ISO8601 and latitude and longitude in decimal degrees recorded.

Metadata reference: *Ivar G. Babb, University of Connecticut, Department of Marine Sciences, 401-529-4022, ivar.babb@uconn.edu*