REMOTELY OPERATED VEHICLE (ROV) VIDEO FOR THE PHASE IIB ASSESSING ECOLOGICAL CHANGE AND RESILIENCY (AECR) PROJECT

METADATA

Dataset Originator: *University of Connecticut: Ivar G. Babb*
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Dataset Title: ***AECR Remotely Operated Vehicle Video***
Online Linkage:
LDEO Data Repository - http://www.marine-geo.org/portals/lis/
Data_doi=

Data url=

Abstract:
This dataset contains digitized video clips collected by remotely operated vehicles (ROV) within the Phase II area of the Long Island Sound Cable Fund Seafloor Habitat Mapping Initiative ranging from two time periods. The first is from 1989-2006, representing historical videos from the Northeast Underwater Research, Technology and Education Center (NURTEC) at the University of Connecticut's video archive, and therefore represents one element of the historical baseline of the Assessing Ecological Change and Resiliency in Long Island Sound project. The second time period, representing the current status of one of the key sites within the Phase II area, recorded 4K video in October, 2023 using the recently acquired Boxfish ROV. The first series of historical videos (24) were recorded on analog (VHS) and digital (DVCAM) video tapes by three ROVs (Benthos MiniRover MKII, Deep Ocean Engineering Phantom 300, modified DOE Phantom P3S2). These tapes were then digitized into the MPEG2 format by conversion from tape to DVD. The MPEG2 files were subsequently encoded to the .mp4 format using the Handbrake application, with tapes from 1989 to 1992 retaining the original VTS_*_ prefix and .mp4 naming convention with multiple files per dive, while the 2006 tapes were compiled into a single file (Dive0X.mp4) for the entire dive using Apple's Final Cut Pro X application. The 2023 Boxfish Alpha ROV 4K resolution videos were recorded directly into digital format using a Atomos Ninja5 recording device with the .mov wrapper. Video files were reviewed and the presence of the key taxa identified for the AECR project noted and saved to Excel spreadsheets.

Dataset purpose:
The historical ROV videos were reviewed to ascertain the historical conditions/taxa observed in the historical dive imagery as part of the Assessing Ecological Change and Resiliency (AECR) in Long Island Sound project. The genesis of the AECR project was that data collected by the Long Island Sound Mapping and Research Collaborative (LISMaRC) in both the Phase I (2012 and 2013) and Phase II (2017 and 2018) components of the Long Island Sound Seafloor Habitat Mapping Initiative revealed that significant ecological changes have occurred based upon historical knowledge of several of the Principal Investigators of the Long Island Sound Mapping and Research Collaborative (LISMaRC) team. Thirteen sites were identified, primarily in the eastern portion of the Phase II area where ROV video was present in the NURTEC archive, some of which were spatially adjacent (e.g. Seaflower Reef). A site in eastern Fishers Island Sound was selected for the modern-day survey primarily due to the noted observation of one of the key taxa, the blue mussel (Mytilus edulis), in the historical ROV videos.

Time period of content:

The historical ROV video was collected in 1989, 1990, 1991, 1992 and 2006.
The new acquired ROV video was collected in October, 2023.

Dataset Status: *Complete*

Update Frequency: *None planned. However, the possibility of periodic site revisitation has been proposed to the CT-DEEP to monitor future changes in the seafloor communities of LIS, given the changes observed from these historical images to recently collected images.*

Theme Keywords:
Connecticut, New York, Long Island Sound, University of Connecticut, UConn, Long Island Sound Mapping and Research Collaborative, LISMaRC, Long Island Sound Cable Fund, LISCF, epifauna, remotely operated vehicle, ROV, video.

Access Constraints: *None*

Use Constraints:
*Data and metadata are is licensed under a Creative Commons Attribution-Noncommercial-Share Alike 3.0 United States License. Appropriate acknowledgment with a byline/credit/link **must** be given to both the original scientists/data contributors by reference to their relevant publications and to the Marine Geoscience Data System (www.marine-geo.org) and/or the Long Island Sound Habitat Mapping website (https://lismap.uconn.edu). Where citation information has been provided to us by scientists it is included with the relevant database entries, and should be acknowledged when data are used. You may browse freely, but you may not circulate or publish materials you obtained from this site if you do not accept the terms of providing adequate citation. 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.*

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

Dataset Credit:
Historical ROV video from the Northeast Underwater Research, Technology and Education Center (NURTEC) at the University of Connecticut. Modern ROV video acquired by 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:
The quality of the ROV videos in this dataset varies dramatically, as they span a 34-year period that has witnessed remarkable technological advances in the audio/video industry. The oldest (1989-1992) of the ROV videos were recorded in standard definition (SD) on VHS tapes with a resolution of 640x480 pixels. This original lower resolution video was further degraded by the conversion process to DVD and further to the .mp4 format by the Handbrake application. These older analog tapes also experienced significant degradation/oxidation over the three+ decades of storage. The 2006 ROV videos were recorded on professional (higher track pitch, width and tape speed) DVCAM videotapes with a 5:1 compression ratio and 720x480 resolution, and have retained a higher quality resolution over time. The 2023 ROV was a Boxfish Alpha observation class ROV with a Sony 4K (3840x2160 pixel) camera that recorded directly to an Atomos Ninja digital recorder captured using Apple ProRes

422 HQ at a resolution of 3840x2160, illustrating the tremendous increase in video quality over the years.

Attribute accuracy:
See below for positional accuracy.

Completeness:
Complete – All ROV videos have been reviewed and analyzed for presence of the key AECR taxa.

Positional accuracy:
ROV Dive Site Positional Accuracy
As with the video quality, the positional accuracy of the ROV dive locations has improved dramatically with the improvements in technology. The 1989 to 1992 ROV dive positions were recorded as the position of the support vessel, typically anchored at the dive location using the ship's navigation system in latitude and longitude. The 2006 dives were conducted from the Research Vessel Connecticut and utilized an ultra-short baseline positioning (USBL) system interfaced to an integrated navigation system that allowed the position of the vessel and ROV to be tracked independently and recording a "snail-trail" of each. This system typically provided an accuracy of 2-3 meters. The Boxfish ROV was operated from the RV Weicker with a USBL, however neither ship nor ROV position was recorded due to technical problems. The position of these dives was considered to be the location of the vessel at the time of deployment, with an approximate location accuracy of 3 meters.

Process Steps:
ROV Video Encoding: The original analog tapes were digitized into the MPEG2 format by conversion from tape to DVD by a Panasonic DVD-R onto Taiyo Yuden archival grade DVD-R media. The MPEG2 files were subsequently encoded to the .mp4 format using the Handbrake application, with tapes from 1989 to 1992 retaining the original VTS_*_ prefix and .mp4 naming convention with multiple files per dive, while the 2006 tapes were compiled into a single file (Dive0X.mp4) for the entire dive using Apple's Final Cut Pro X application. The 2023 Boxfish ROV 4K resolution videos were recorded directly into digital format using a Atomos Ninja5 recording device with the .mov wrapper.

ROV Video Review:
Video files were reviewed and the presence of the key taxa (see below) identified for the AECR project noted and saved to Excel spreadsheets.

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

Attributes:
Video Files: Historic ROV video files were saved in the .mp4 file format using the process outlined above, with file sizes ranging from 155.3 to 890.1 MB for the 1989 to 1992 files, 1.53 to 3.66 GB for the compiled 2006 files. The newer Boxfish ROV direct digital recorded files ranged from 1.87 to 98.61 GB. File names for the historic ROV videos included the year recorded and a numeric extension (e.g. 1990-44) which indicated the project number (44) assigned to that particular project as part of the available NURTEC archive metadata.

Taxa Identified
A subset of taxa of interest were identified by the AECR project and included the following:

Common name	Taxonomic name
Slipper shell	Crepidula fornicata
Blue mussel	Mytilus edulis
Branching sponge	Haliclona oculata
Boring sponge	Cliona spp. (celata)
Carpet tunicate	Didemnum sp.
Northern star coral	Astrangia poculata
Frilled anemone	Metridium senile
Common sea star	Asterias rubens
Kelp	Phaeophyceae

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