

AR89 Lucky Strike ROV Jason Dive Log

Website: <https://www.bco-dmo.org/dataset/1009640>

Data Type: Cruise Results

Version: 1

Version Date: 2026-10-12

Project

» [Collaborative Research: Visual adaptations in hydrothermal vent shrimp and the role in feeding modalities and habitat selection](#) (Vent Shrimp Vision)

Contributors	Affiliation	Role
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Abstract

Dive locations and activities conducted during Jason ROV dives on RV Armstrong cruise AR89 during May 2025. All dives were conducted in various locations around the Lucky Strike vent field on the Mid-Atlantic Ridge.

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Coverage

Location: Mid-Atlantic Ridge; Lucky Strike vent field; sites: Sintra, Y3, Helene, White Chapel, Bairro Alto, and Elisabeth

Spatial Extent: N:-32.27485717 E:37.29258184 S:-32.28214278 W:37.28756859

Temporal Extent: 2025-05-17 - 2025-05-28

Dataset Description

The temporal and geospatial bounds noted on the metadata page for this dataset represent the bounds associated with the start and end of operations.

Methods & Sampling

ROV Jason dives were conducted daily. During the dives, video transects were conducted from a distance under white light. The lights were then turned out, and collections of vent shrimp were conducted under blue or red light using the slurp sampler. The slurp sampler tube and buckets were blacked out with tape to reduce light exposure.

Water samples were collected for eDNA analysis using an instrument called a Pufferfish. Organisms were tested repeatedly for bioluminescence using gentle mechanical stimulation with the claw, but none showed any

evidence of bioluminescence.

Water-column surveys were conducted 10 meters above the vents using an extremely sensitive low-light camera, but bioluminescence was virtually non-existent.

BCO-DMO Curation Notes

Curation Actions Performed on Data File

- Loaded Jason_Metadata_AR89_bco-dmo-dm.xlsx (sheet 1), using the first row as headers.
- Removed blank rows and treated empty strings and nd as missing values. The resource was named 1009640_v1_ar89_lucky_strike_rov_jason_dive_log.
- Standardized column names by replacing spaces, slashes, and other special characters with underscores, including fields for lowering identifiers, timestamps, site names, position data, and dive boundaries.
- Converted launch, operations, and on-deck timestamps from %Y/%m/%d %H:%M in the Atlantic/Azores timezone to UTC datetimes formatted as %Y-%m-%dT%H:%MZ.
- Assigned data types, including strings for activity, site, and lowering identifiers; time values for lowering and bottom times; integers for UTM zone and depth fields; numbers for latitude, longitude, and boundary coordinates; and datetimes for timestamp fields.
- Updated parameter metadata, including descriptions, standard names, units, and primary parameter designations. Maximum-depth latitude, longitude, and depth were flagged as primary parameters.
- Renamed the maximum-depth position fields to Latitude_Max_Depth_Position_During_Dive and Longitude_Max_Depth_Position_During_Dive.
- Saved the processed data as 1009640_v1_ar89_lucky_strike_rov_jason_dive_log.csv.

Problem Description

No problems or issues associated with this dataset have been reported by the dataset authors.

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Parameters

Parameter	Description	Units
Lowering_ID	Jason dive ID for each Jason deployment.	unitless
Start_Launch_Datetime	Date and time when ROV Jason was deployed into the water for a dive.	unitless
Start_Ops_Datetime	Date and time when ROV Jason was on the bottom to begin science.	unitless
End_Ops_Datetime	Date and time when ROV left the bottom to begin ascent to sea surface.	unitless
End_OnDeck_Datetime	Date and time when ROV Jason was back on deck after deployment.	unitless

Line_Area_Site_Name	Bottom site names where science surveys were conducted with ROV Jason.	unitless
Activity	Activities that were conducted during the survey at the seafloor (note: the Pufferfish mentioned in these activity notes was collecting water for eDNA samples).	unitless
Bottom	Time ROV Jason spend on the bottom during each science dive.	unitless
Lowering	Amount of time it took for ROV Jason to descend to study site during a dive.	unitless
Ops_Begin_Position_Longitude	Longitude at beginning of bottom operations.	decimal degrees
Ops_Begin_Position_Latitude	Latitude at beginning of bottom operations.	decimal degrees
Ops_Begin_Position_Depth	Bottom depth when operations began.	meters (m)
Ops_End_Position_Latitude	Latitude at end of bottom operations.	decimal degrees
Ops_End_Position_Longitude	Longitude at end of bottom operations.	decimal degrees
Ops_End_Position_Depth	Bottom depth when science operations finished.	meters (m)
Latitude_Max_Depth_Position_During_Dive	Latitude at maximum depth encountered during dive.	meters
Longitude_Max_Depth_Position_During_Dive	Longitude at maximum depth during dive.	decimal degrees
Max_Depth_Position_During_Dive_Depth	Maximum depth during dive.	meters (m)
Bounds_UTM	UTM zone where the dives took place. Universal Transverse Mercator - coordinate grid system that consists of 60 zones, each 6 degrees of longitude in width. 25 refers to a specific 6-degree geographic slice of the globe	unitless
Bounds_West	Western boundary for largest bounding box that Jason moved during the dive.	decimal degrees
Bounds_East	Eastern boundary for largest bounding box that Jason moved during the dive.	decimal degrees

Bounds_South	Southern boundary for largest bounding box that Jason moved during the dive.	decimal degrees
Bounds_North	Northern boundary for largest bounding box that Jason moved during the dive.	DecDeg

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Instruments

Dataset-specific Instrument Name	ROV Jason
Generic Instrument Name	ROV Jason
Dataset-specific Description	ROV Jason was equipped with navigation systems including USBL (TGT Sonardyne), a Nortek 500 kHz DVL, an iXblue PHINS system, and a Nortek 1000 kHz system used for testing. Standard sensors and instruments included a Sulis Z70 video/still camera, DSL SeaBird SBE-19 v2 CTD, DSL cabled temperature probe, Teledyne BlueView forward-looking sonar, magnetometer, and Andaraa oxygen optode.
Generic Instrument Description	The Remotely Operated Vehicle (ROV) Jason is operated by the Deep Submergence Laboratory (DSL) at Woods Hole Oceanographic Institution (WHOI). WHOI engineers and scientists designed and built the ROV Jason to give scientists access to the seafloor that didn't require them leaving the deck of the ship. Jason is a two-body ROV system. A 10-kilometer (6-mile) fiber-optic cable delivers electrical power and commands from the ship through Medea and down to Jason, which then returns data and live video imagery. Medea serves as a shock absorber, buffering Jason from the movements of the ship, while providing lighting and a bird's eye view of the ROV during seafloor operations. During each dive (deployment of the ROV), Jason pilots and scientists work from a control room on the ship to monitor Jason's instruments and video while maneuvering the vehicle and optionally performing a variety of sampling activities. Jason is equipped with sonar imagers, water samplers, video and still cameras, and lighting gear. Jason's manipulator arms collect samples of rock, sediment, or marine life and place them in the vehicle's basket or on "elevator" platforms that float heavier loads to the surface. More information is available from the operator site at URL. https://ndsf.whoi.edu/jason/

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Deployments

AR89

Website	https://www.bco-dmo.org/deployment/1009646
Platform	R/V Neil Armstrong
Start Date	2025-05-07
End Date	2025-06-05

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Project Information

Collaborative Research: Visual adaptations in hydrothermal vent shrimp and the role in feeding modalities and habitat selection (Vent Shrimp Vision)

Coverage: Mid-Atlantic Ridge Lucky Strike and Rainbow vent sites

NSF Award Abstract:

Hydrothermal vents have given rise to remarkable marine ecosystems that contain organisms with specific adaptations for surviving in this extreme environment. Alvinocarid decapod shrimp are among the most abundant animals inhabiting these habitats and can be found in massive swarms at Pacific, Indian and Atlantic vent sites. Different species are found at different vent sites; and when species occupy the same vent site, some species are found close to the vents, with others on the periphery. Previous studies have demonstrated that vent shrimp species with enlarged eyes on their backs rely primarily on carbon provided by bacteria on the sides of black smokers, while others with fused, forward-facing eyes are predators/scavengers, around the vent periphery, suggesting that there may be a correlation between eye structure, feeding mode and habitat selection. However, adult vent shrimp are thought to be blind, but this conclusion may have resulted from the eyes being severely damaged due to collections under extremely bright submersible lights. Using methods the PIs have developed over decades to collect deep-sea species with extremely sensitive visual systems without blinding them, the visual systems of vent shrimp will be examined. These studies will be coupled with a systematic survey of pelagic and benthic light production (luminescence ? both non-living chemiluminescence and triboluminescence as well as biological bioluminescence) at the vents to determine if vent shrimp can see any of these light sources. The results of this research will significantly advance the fields of vent biology and visual ecology, potentially transforming our current understanding of how light is generated at vent sites and how animals use this light to survive, as well as providing possible hypotheses as to how vent shrimp find these locations, and why different vents (diffuse, white smokers, black smokers) are dominated by different shrimp species. This proposal will support three graduate students, one postdoc and six undergraduate students, and outreach will be extended to secondary schools in three states by creating curriculum and activities correlated with this research that will help teachers blend this research into their STEM curricula.

Originally described as eyeless, vent shrimp are now known to undergo dramatic transformations in eye morphology with some species having massive fused eyes on their backs (dorsal eyes), while others have fused anterior eyes, and these different eye structures may be correlated with their feeding preferences. However, all the structural studies that have been undertaken on the benthic adults suggest that they are blind or the eyes are degenerating. In addition, the supposition that the vent environment lacked enough ambient light to make the metabolic costs of vision worthwhile supported this conclusion. Other structural studies, however, demonstrated that the pelagic post-larvae/juveniles have stalked eyes with normal ultrastructure, and it is therefore unlikely that the metamorphosis from normal stalked eyes (post-larvae) to the huge dorsal eyes (adults) results in a degenerated eye. The ?degeneration? likely resulted from photoreceptor destruction occurring during collections of benthic adults under extremely bright submersible lights. There may also be several sources of sufficient ambient light produced by both abiotic triboluminescence/chemiluminescence as well as bioluminescence. Although several studies suggest bioluminescence does not exist at these vent sites, incorrect methodology may have resulted in this conclusion. This project will use genetic techniques to allow for post-larvae-adult matching; physiological experiments to provide information on photosensitivity (absolute sensitivity as well as color sensitivity, as there has been speculation that the benthic adults may be able to see infrared light) in both post-larval and adult shrimp; ultrastructural techniques to characterize eyes collected in the dark as well as under bright submersible lights; and low-light imaging techniques to examine sources of abiotic and biotic light in the vent environments. These data will be utilized together with computation modeling to determine if vent light sources are visible to hydrothermal vent shrimp eyes over relevant distances. These unusual visual systems of vent shrimp, likely serving as extremely sensitive light receptors, may also serve as a model for low-light camera systems, much as the optics of lobster eyes served as a model for designing an ultra-sensitive X-ray telescope.

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-2154168
NSF Division of Ocean Sciences (NSF OCE)	OCE-2154144
NSF Division of Ocean Sciences (NSF OCE)	OCE-2154124
NSF Division of Ocean Sciences (NSF OCE)	OCE-2154146

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