

Descriptive data from Isaacs-Kidd midwater trawls (IKMT) from R/V New Horizon cruise NH1106 in the Guaymas Basin in 2011 (Jumbo Squid Physiology project)

Website: <https://www.bco-dmo.org/dataset/4010>

Data Type: Cruise Results

Version: 1

Version Date: 2013-08-08

Project

» [Hypoxia and the ecology, behavior and physiology of jumbo squid, *Dosidicus gigas*](#) (Jumbo Squid Physiology)

Contributors	Affiliation	Role
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Abstract

Sampling locations, depths, times, etc. from midwater trawls performed on the NH1106 cruise in the Guaymas Basin. Samples are archived in the biocuration facility at Oregon State University.

Table of Contents

- [Coverage](#)
 - [Dataset Description](#)
 - [Methods & Sampling](#)
 - [Data Processing Description](#)
 - [Data Files](#)
 - [Parameters](#)
 - [Instruments](#)
 - [Deployments](#)
 - [Project Information](#)
 - [Funding](#)
-

Coverage

Spatial Extent: N:28.6382 E:-111.3798 S:27.2981 W:-113.0509

Temporal Extent: 2011-06-09 - 2011-06-22

Dataset Description

Sampling locations, depths, times, etc. from midwater trawls performed on the NH1106 cruise in the Guaymas Basin. Samples are archived in the biocuration facility at Oregon State University.

Methods & Sampling

Tows with a 2m x 2m Isaacs-Kidd Midwater trawl (IKMT), 7m in length, with a 1mm mesh were conducted periodically throughout the cruise. The net was fitted with a Simrad PI depth sensor that provides net depth information in real time acoustically. Trawls were targeted to depths of interest based on acoustic sampling with the goal of achieving 20 minutes of tows at the target depth at a target speed of 4 knots. Samples were preserved in 5% buffered formalin in seawater and are archived in the biocuration facility at Oregon State University.

Data Processing Description

BCO-DMO Processing Notes:

- Modified parameter names to conform with BCO-DMO naming conventions.
- Created separate min and max columns for sog, depth_btm, and target_depth.

[[table of contents](#) | [back to top](#)]

Data Files

File
trawl.csv (Comma Separated Values (.csv), 4.46 KB) MD5:d0d67e414d03fc4766706d6b5ce1e55f
Primary data file for dataset ID 4010

[[table of contents](#) | [back to top](#)]

Parameters

Parameter	Description	Units
cruise_id	Cruise identifier.	text
instrument	Type of sampling instrument. IKMT = Isaacs-Kidd midwater trawl.	text
tow	Tow number.	integer
location	General location of sampling.	text
lat_start	Latitude at start of tow.	decimal degrees
lon_start	Longitude at start of tow.	decimal degrees
target_depths	Target depth(s).	meters
target_depth_min	Minimum of the target depth(s).	meters
target_depth_max	Maximum of the target depth(s).	meters
day_or_night	Time of day (Day or Night).	text
depth_btm_min	Minimum bottom depth. (Note: gt = "greater than")	meters
depth_btm_max	Maximum bottom depth. (Note: gt = "greater than")	meters

date_start	Date when the net entered the water (GMT) in mm/dd/YYYY format.	unitless
time_start	Time when the net entered the water (UTC).	HH:MM
time_end	Time when the net exited the water (UTC).	HH:MM
time_start_target_depth	Start time at target depth (UTC).	HH:MM
time_end_target_depth	Stop time at target depth (UTC).	HH:MM
sog_min	Minimum speed over ground.	knots
sog_max	Maximum speed over ground.	knots
wire_out_max	Maximum wire out.	meters
portion_cod_end_filled	Portion (fraction) of cod end filled. (Note: lt = "less than")	fraction
pcnt_catch_preserved	Percent of catch preserved.	percent (%)
no_jars_preserved	Number of jars preserved.	integer
notes	Free-text notes about the tow.	text

[[table of contents](#) | [back to top](#)]

Instruments

Dataset-specific Instrument Name	Isaacs-Kidd Midwater Trawl
Generic Instrument Name	Isaacs-Kidd Midwater Trawl
Dataset-specific Description	IKMT with 2-meter by 2-meter mouth opening; 7 meters in length.
Generic Instrument Description	A trawl with a pentagonal mouth opening and a dihedral depressor vane as part of the mouth opening. IKMTs come in various dimensions (refer to individual dataset documentation). The original IKMTs were 10 foot (304 cm) and 15 foot (457 cm) at the mouth. The 10 foot IKMT net was 31 feet (9.45 m) in length (Wiebe and Benfield 2003).

Deployments

NH1106

Website	https://www.bco-dmo.org/deployment/59060
Platform	R/V New Horizon
Start Date	2011-06-04
End Date	2011-06-22
Description	Cruise information and original data are available from the NSF R2R data catalog. Additional pre-cruise information is available from Scripps Institution of Oceanography Ship Operations & Marine Technical Support.

Project Information

Hypoxia and the ecology, behavior and physiology of jumbo squid, *Dosidicus gigas* (Jumbo Squid Physiology)

Coverage: Guaymas Basin, Gulf of California, Mexico (27 N 112 W) and Monterey Bay, CA (36 N 123 W)

This project concerns the ecological physiology of *Dosidicus gigas*, a large squid endemic to the eastern Pacific where it inhabits both open ocean and continental shelf environments. Questions to be addressed include:

- 1) How does utilization of the OML by *D. gigas* vary on both a daily and seasonal basis, and how do the vertical distributions of the OML and its associated fauna vary?
- 2) What behaviors of squid are impaired by conditions found in the OML, and how are impairments compensated to minimize costs of utilizing this environment? and
- 3) What are the physiological and biochemical processes by which squid maintain swimming activity at such remarkable levels under low oxygen conditions?

The investigators will use an integrated approach involving oceanographic, acoustic, electronic tagging, physiological and biochemical methods. *D. gigas* provides a trophic connection between small, midwater organisms and top vertebrate predators, and daily vertical migrations between near-surface waters and a deep, low-oxygen environment (OML) characterize normal behavior of adult squid. Electronic tagging has shown that this squid can remain active for extended periods in the cold, hypoxic conditions of the upper OML. Laboratory studies have demonstrated suppression of aerobic metabolism during a cold, hypoxic challenge, but anaerobic metabolism does not appear to account for the level of activity maintained. Utilization of the OML in the wild may permit daytime foraging on midwater organisms. Foraging also occurs near the surface at night, and *Dosidicus* may thus be able to feed continuously. *D. gigas* is present in different regions of the Guaymas Basin on a predictable year-round basis, allowing changes in squid distribution to be related to changing oceanographic features on a variety of time scales.

This research is of broad interest because *Dosidicus gigas* has substantially extended its range over the last decade, and foraging on commercially important finfish in invaded areas off California and Chile has been reported. In addition, the OML has expanded during the last several decades, mostly vertically by shoaling, including in the Gulf of Alaska, the Southern California Bight and several productive regions of tropical oceans, and a variety of ecological impacts will almost certainly accompany changes in the OML. Moreover, *D. gigas* currently supports the world's largest squid fishery, and this study will provide acoustic methods for reliable biomass estimates, with implications for fisheries management in Mexico and elsewhere.

This award is funded under the American Recovery and Reinvestment Act of 2009 (Public Law 111-5). This is a Collaborative Research project encompassing three NSF-OCE awards.

Background Publications:

Stewart, J.S., Field, J.C., Markaida, U., and Gilly, W.F. 2013. Behavioral ecology of jumbo squid (*Dosidicus gigas*) in relation to oxygen minimum zones. *Deep Sea Research Part II: Topical Studies in Oceanography*, 95, 197-208. doi:[10.1016/j.dsr2.2012.06.005](https://doi.org/10.1016/j.dsr2.2012.06.005).

Gilly, W.F., Zeidberg, L.D., Booth, J.A.T, Stewart, J.S., Marshall, G., Abernathy, K., and Bell, L.E. 2012. Locomotion and behavior of Humboldt squid, *Dosidicus gigas*, in relation to natural hypoxia in the Gulf of California, Mexico. *The Journal of Experimental Biology*, 215, 3175-3190. doi: [10.1242/jeb.072538](https://doi.org/10.1242/jeb.072538).

Related Project: [Physiological limits to vertical migrations of the pelagic, jumbo squid, *Dosidicus gigas* in the Gulf of California](#)

[[table of contents](#) | [back to top](#)]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0851239

[[table of contents](#) | [back to top](#)]