Deep-sea benthos counts from cores (>300 micron), Pacific US continental rise from R/V Point Sur PS0819 from 2008-2008 (Species ranges project)

Website: https://www.bco-dmo.org/dataset/4029
Version: 1
Version Date: 2013-09-18

Project
» Do sediment-dwelling species have large ranges along a continental slope? (Species ranges)

Contributors	Affiliation	Role
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Dataset Description

This dataset contains counts of the following benthic taxonomic groups: Desmoscolecid nematodes, non-Desmoscolecidae, nauplii, copepods, kinorhynchs, and ostracods. Station data includes location, depth, distance between stations(km), depth difference between stations (m), distance between lowerings (km), oxygen, temperature, and salinity.

Methods & Sampling

Benthic cores were taken along a transect of the Pacific US continental rise from southern Oregon to San Diego. We sampled with an Ocean Instruments (San Diego, CA) MC 800 multiple corer. The multiple corer had eight 10-cm (inner diameter) core tubes. The team processed each core from a lowering in a predetermined, random order. The team imaged the sediment through the side of the transparent core tube, noted any unusual features, collected the water overlying the sediment, imaged the sediment surface, and collected the top 1 cm of sediment. The water and sediment samples were combined, preserved with cold, 95% ethyl alcohol, and stored at -20ºC.

Salinity, temperature, and oxygen data were collected at about 50 meters above the bottom at each station.

Data Processing Description

In the laboratory, we randomly selected a station, a lowering within that station, and an apparently undisturbed core from that lowering. We repeated this procedure three times, yielding 24 samples, which were processed in this order. For each sample, we measured its volume and separated the 300-µm fraction from the 30-µm fraction. After staining with rose bengal, one person sorted both fractions from each sample under a stereomicroscope at 25×. The sorter removed and counted nematodes, nauplii, benthic copepods,

kinorhynchs, and ostracods and noted which nematodes belonged to the family Desmoscolecidae. A second person sorted each sample a second time to ensure accuracy. We included the specimens of these groups retained by the 300-µm sieve in our counts.

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Data Files

File
benthos.csv (Comma Separated Values (.csv), 12.70 KB) MD5:f47ec801a2c0ef2bcf9aaa82e26c2731 Primary data file for dataset ID 4029

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Parameters

Parameter	Description	Units
cruise_id	cruise identification	unitless
date_local	date, local time	YYYYMMDD
sta	station number	unitless
lat	latititude; East is positive	decimal degrees
lon	longitude; North is positive	decimal degrees
depth	depth of core sample	meters
dist_bet_sta	distance between stations	kilometers
depth_diff_sta	depth difference between stations	meters
dist_bet_cores_km	distance between lowerings	kilometers
O2	dissolved oxygen concentration at about 50 meters above the bottom	nd
temp	temperature at about 50 meters above the bottom	degrees Celsius
sal	salinity at about 50 meters above the bottom	PSU
sample	sample number	unitless
taxon	taxonomic group	unitless
count	number of animals in sample	unitless

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Instruments

Dataset-specific Instrument Name	CTD Sea-Bird 911
Generic Instrument Name	CTD Sea-Bird 911
Dataset-specific Description	Sea Bird 911+CTD/Rosette (12 position) with standard sensor suite. These include the following: redundant temperature and conductivity sensors, Beckman-type oxygen sensor, transmissometer, fluorometer, PAR(scaler) sensor and altimeter. Standard Niskin bottle size is 10 liter. All sensors rated to 6000m except PAR sensor (1000m).
Generic Instrument Description	The Sea-Bird SBE 911 is a type of CTD instrument package. The SBE 911 includes the SBE 9 Underwater Unit and the SBE 11 Deck Unit (for real-time readout using conductive wire) for deployment from a vessel. The combination of the SBE 9 and SBE 11 is called a SBE 911. The SBE 9 uses Sea-Bird's standard modular temperature and conductivity sensors (SBE 3 and SBE 4). The SBE 9 CTD can be configured with auxiliary sensors to measure other parameters including dissolved oxygen, pH, turbidity, fluorescence, light (PAR), light transmission, etc.). More information from Sea-Bird Electronics.

Dataset-specific Instrument Name	Multi Corer
Generic Instrument Name	Multi Corer
Dataset-specific Description	Ocean Instruments (San Diego, CA) MC 800 multiple corer with eight 10-cm (inner diameter) core tubes.
Generic Instrument Description	The Multi Corer is a benthic coring device used to collect multiple, simultaneous, undisturbed sediment/water samples from the seafloor. Multiple coring tubes with varying sampling capacity depending on tube dimensions are mounted in a frame designed to sample the deep ocean seafloor. For more information, see Barnett et al. (1984) in Oceanologica Acta, 7, pp. 399-408.

Dataset-specific Instrument Name	SBE 43 Dissolved Oxygen Sensor
Generic Instrument Name	Sea-Bird SBE 43 Dissolved Oxygen Sensor
Generic Instrument Description	The Sea-Bird SBE 43 dissolved oxygen sensor is a redesign of the Clark polarographic membrane type of dissolved oxygen sensors. more information from Sea-Bird Electronics

Dataset-specific Instrument Name	Sea-Bird SBE-3 Temperature Sensor
Generic Instrument Name	Sea-Bird SBE-3 Temperature Sensor
Dataset-specific Description	Dual SBE 3Plus Temperature Sensor provided by the ship.
Generic Instrument Description	The SBE-3 is a slow response, frequency output temperature sensor manufactured by Sea-Bird Electronics, Inc. (Bellevue, Washington, USA). It has an initial accuracy of +/- 0.001 degrees Celsius with a stability of +/- 0.002 degrees Celsius per year and measures seawater temperature in the range of -5.0 to +35 degrees Celsius. more information from Sea-Bird Electronics

Dataset-specific Instrument Name	Sea-Bird SBE-4 Conductivity Sensor
Generic Instrument Name	Sea-Bird SBE-4 Conductivity Sensor
Generic Instrument Description	The Sea-Bird SBE-4 conductivity sensor is a modular, self-contained instrument that measures conductivity from 0 to 7 Siemens/meter. The sensors (Version 2; S/N 2000 and higher) have electrically isolated power circuits and optically coupled outputs to eliminate any possibility of noise and corrosion caused by ground loops. The sensing element is a cylindrical, flow-through, borosilicate glass cell with three internal platinum electrodes. Because the outer electrodes are connected together, electric fields are confined inside the cell, making the measured resistance (and instrument calibration) independent of calibration bath size or proximity to protective cages or other objects.

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Deployments

PS0819

Website	https://www.bco-dmo.org/deployment/59064
Platform	R/V Point Sur
Start Date	2008-09-13
End Date	2008-10-03
Description	NE Pacific continental rise between southern Oregon and San Diego, CA; 48N/134W, 32N/120W At each station, 7 multiple-corer lowerings to collect sediment for benthic ecological and molecular studies and one Seabird 911Plus CTD rosette lowering to measure near-bottom environmental parameters and to collect water samples from various depths.

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Project Information

Do sediment-dwelling species have large ranges along a continental slope? (Species ranges)

Coverage: Continental rise from southern Oregon to San Diego, CA

From proposal abstract:

The sediment-covered deep-sea floor is arguably the largest habitat on Earth. Despite the extreme conditions, the number of species present at a given location for some taxa can rival that of the most species-rich groups in the most species-rich habitats on Earth (e.g., insects in rain forests). The nature of this richness is controversial. Some studies have reported that a few species had ranges of 100's to 1,000's of kilometers, but many species were found at only a single location. In other work, many more species were reported to have large ranges. Worse, the existing data may not be completely informative because the decisions about the assignment of individuals to species were made on the basis of morphology, which can fail to distinguish species that are biologically separate, and commonly known as cryptic species. The question of how big is a species range in deep-sea sediments needs to be resolved because it matters profoundly to conceptual models of the ecology of deep-sea sediments. If most species have small ranges, students of the deep sea will want to understand, for example, how species' ranges are bounded in an environment that appears to have few physical barriers. Alternatively, if most species have large ranges, investigators will want to study issues related to the genetic connectivity of species over 100's to 1,000's of kilometers.

The primary objective of this project is to evaluate the possibility that some sediment-dwelling deep-sea species have large ranges. To do that these investigators will collect sediment samples from one station at 2,700 m and one at 3,700 m depth at each of four latitudes (47.6° N, 42.6° N, 36.5° N, and 32.6° N) on the continental slope off the west coast of the United States. The very common harpacticoid copepods will be the target group for this study. Each adult harpacticoid from each sample will be assigned to a species on the basis of traditional morphological characters. Each of these adult harpacticoid copepods will then be cut in two; the posterior portion will be used for DNA-sequence analysis, and the anterior will be retained as a voucher sample. The DNA-sequence analysis will be used to determine whether the individuals deemed to be the same species on the basis of morphology form a well-supported species group based on molecular data. The distribution of these species groups among stations will allow the investigators to know that its range is at least as large as the distance between the stations where they were found.

The proposed research could benefit society by helping policy makers evaluate the environmental cost of human disturbance of the deep-sea floor (e.g., ocean dumpingl) by beginning to clarify the relationship between species ranges and human disturbances. The investigators will also share their results with colleagues through presentations at scientific meetings and in publications and to a wider audience by means of public lectures and a web site. The project will also foster the participation of underrepresented groups in oceanography.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0727243

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