

Databases are associated with the PhD thesis “**Environmental Drivers of spatial variability of Chilean Benthic Marine Invertebrates**”.

The University of Sheffield, Faculty of Science, School of Biosciences

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Research summary:

Chilean benthic ecosystems make an ideal test case for studying macroecological patterns in species distributions. Chile spans ~39° in latitude, an eco-geographical gradient encompassing five marine ecoregions, significant variation in temperature, salinity, oxygen, solar radiation, and primary productivity, all of which are potential factors driving benthic community structure. This thesis aims to understand how key environmental drivers and human activities influence the spatial variability of benthic marine invertebrates along this gradient. I compile a new integrated biodiversity database and use it to calculate diversity metrics related to species richness, taxonomic diversity and functional diversity, and combine this with data on environmental covariates and human activities. Species richness and functional richness peaked between 42°-46° S. Taxonomic diversity increased south 42° S. Functional evenness peaked toward extreme northern and southern latitudes. Major anthropogenic activities related to diversity were aquaculture and human population density; however, contrary to expectation, diversity increased with increasing levels of these human pressures. My results highlight the importance of the Humboldt Current System for functional diversity: environmental stress (depletion of oxygen at maximum bottom depth and increasing sea bottom nitrate) modulates the benthic communities in this region. Hydrographic variability driven by bottom temperature and salinity gradients in the Patagonian fjords system influences taxonomic and functional diversities of benthic communities. My research confirmed the importance of latitudes between 42°-46° S as an area of high diversity of benthic marine invertebrates. Here, diversity is mainly driven by peaks of primary productivity. I argue that benthic invertebrate assemblages are composed of communities presenting a small volume of functional traits space, formed mainly by species tolerant to the environmental conditions, using available resources such as food and space, and presenting lower competition per resource. These communities show moderate levels of resilience to environmental changes and resistance to species loss.

Databases summaries:

Diversity species database: Tabular and integrated database in csv format. It contains 11 variables composed. Each row corresponds to one georeferenced species' occurrences about benthic marine invertebrates from the Chilean coast and continental shelf within a distance of 100km from the coastline.

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Keywords: Benthic Marine Invertebrates, benthos, diversity, Chile, Marine Ecology

variable name	description	unit	data type
occurrence_id	UUID		numeric
ecoregion	Ecoregions according to Marine Ecosystems of the World classification.		categorical
decimal_longitude	Coordinates in the WGS84 coordinate system.	decimal degrees	numeric
decimal_latitude	Coordinates in the WGS84 coordinate system.	decimal degrees	numeric
sampling_year	Sampling year.	YYYY	numeric
original_species_name	The original name for the species given by the source.		categorical
worms_validated_name	The validated species name according to WoRMS.		categorical
worms_aphia_id	The AphiaID according to WoRMS.		numeric
phylum	Species phylum		categorical
class	Species class		categorical
data_source	Data source which provided the data. S1 to S4 were anonymised due to species occurrence being related to sensitive information such as geographical coordinates.		categorical

Traits Database: Tabular database in CSV format. It contains 35 trait modalities divided into eight biological traits for 762 species of benthos. Information for each trait was obtained from scientific papers, thesis, books and open source databases, for instance: WoRMS (<http://www.marinespecies.org>), Biotic (<https://www.marlin.ac.uk/biotic/>), and Polytraits (<http://polytraits.lifewatchgreece.eu>). A list of references for literature resources is available in Appendix 1. Data dictionary is available at 04-Metadata_Traits_Database.

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Keywords: Biological traits, Benthic Marine Invertebrates, Functional diversity, Marine ecology.