Variability of Deep-Sea Benthic Meiofauna Populations in the Gulf of Mexico

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Background

- In 2010, the Deepwater Horizon Oil Rig exploded, releasing 507 million liters of oil into the Gulf of Mexico.
- Researchers collected samples from the Gulf's deep-sea benthic ecosystems to monitor the environmental impact and recovery timeline.
- These samples were collected through 2010-2014 over different months, not considering potential effects of seasonality.
- Seasonality is the variability of sunlight, temperature, oxygen, salinity, and nutrients in the ocean throughout the year.
- Seasonality is observed in marine environments but its effects on deep-sea benthic communities are lightly explored.
- It is important to find out whether variations in deep-sea benthic meiofauna populations are a result of seasonality or ongoing environmental impact and to eliminate concerns of potential bias in the data originally collected after the oil spill.

Methods

- → Top 3 cm of sediment are sampled from 34 stations in the Gulf
- → Samples are preserved in 4% formalin and stained with rose Bengal for easier viewability under the microscope
- → Meiofauna are extracted from the sediment with Ludox and centrifugation
- → Taxonomic identification is performed under a stereomicroscope

Results & Discussion

Figure 2. Abundance and community composition of meiofauna in the 2-3 cm sediment layer in investigated stations: D062S, FFMT4, NF014, ALTNF001, LBNL7.

Figure 3. From left to right: nematode, nematode, harpacticoid, polychaete, ostracod, bivalve.

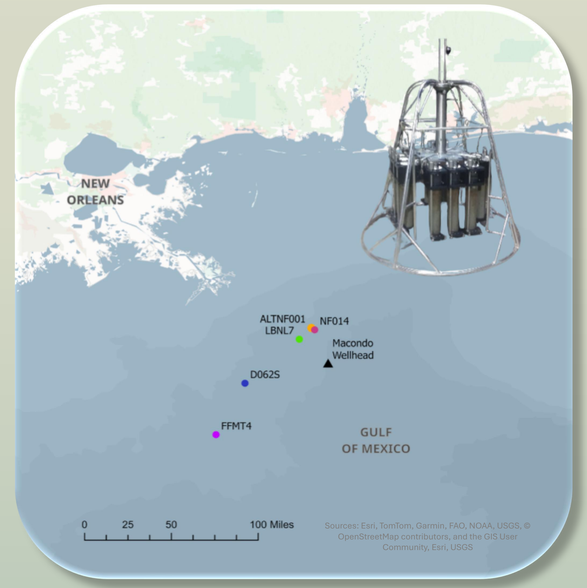

Figure 1. Locations of the five studied stations inside the Gulf of Mexico. The top right corner depicts the megacore used to collect samples.

- The stations in Figure 2 were sampled in April of 2025 and are the 2-3 cm layers from 5 cores extracted from depths of 1303 to 1577 m.
- The total meiofaunal abundances ranged from 123-243 n.ind/core. These are typical values reported from pre-impact sediments.
- The meiofaunal diversity ranged from 5 to 7 number of taxa per sample.
- Nematodes were the most abundant in all stations, making as much as up to 95% of the population in station LBNL7.
- Harpacticoids were the second-most abundant in all stations, making up 7% of all the individuals counted across the five samples; polychaetes made up 4% and nematodes made up 85% of all counted individuals.
- There is observable variability in abundance and diversity between stations- a typical characteristic of meiofaunal communities resulting from high turnover.
- The research on seasonality is still ongoing. More samples will be counted to complete the dataset that the assessment of potential seasonality effects will be drawn from.

Acknowledgements

This study is based upon work supported by the U.S. Geological Survey under Grant/Cooperative Agreement No. (G22AC00546-00).

Sample analysis and production of this paper was funded in part by contract DG133C06NC1729 from the National Oceanic and Atmospheric Administration (NOAA) via subcontract 1050-UNR.

Thank you to the Pack Research Experience Program at the University of Nevada, Reno for supporting undergraduate research.