Bathymetric analysis of meiofauna standing stocks across the West Florida Shelf

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Introduction

Background:

- Meiofauna are microscopic organisms ranging 63-500 µm in size
- The dominant taxa within this group are nematodes and copepods
- Nematodes fare better in sub-optimal conditions compared to copepods
- Literature has suggested that one way to assess the relative health of an ecosystem is to analyze the nematode to copepod ratios. A high ratio indicates a higher level of disturbance or degradation than a low ratio.
- Two bathymetric transects were sampled on the West Florida Shelf (Fig.1)

Purpose: to investigate whether clear meiofauna patterns can be established and whether the vicinity of urban St Petersburg affects meiofauna communities and hence environmental health of the sedimentary environment

Hypothesis: The nematode to copepod ratio within the St. Petersburg transect will be higher than for the Spring Hill transect due to the former's vicinity to urban influences that increase pollution.

Station	Nematode density (ind./10cm2)	Copepod density (ind./10cm2)	Total density (ind./10cm2)	N:C	water depth
1	393.0	149.3	542.3	2.6	25m
2	872.4	94.3	966.7	9.3	50m
3	172.9	94.3	267.2	1.8	75m
4	322.2	31.4	353.7	10.3	100m
5	314.4	55.0	369.4	5.7	200m
6	369.4	47.2	416.6	7.8	300m
12	565.9	86.5	652.3	4.0	25m
11	1021.7	102.2	1123.9	6.0	50m
10	715.2	39.3	754.5	8.8	75m
9	345.8	39.3	385.1	18.2	100m
8	141.5	23.6	165.0	10.0	200m
7	314.4	78.6	393.0	6.5	300m

Table 1 shows data collected from each station's subsample and the total estimated nematode and copepod densities.

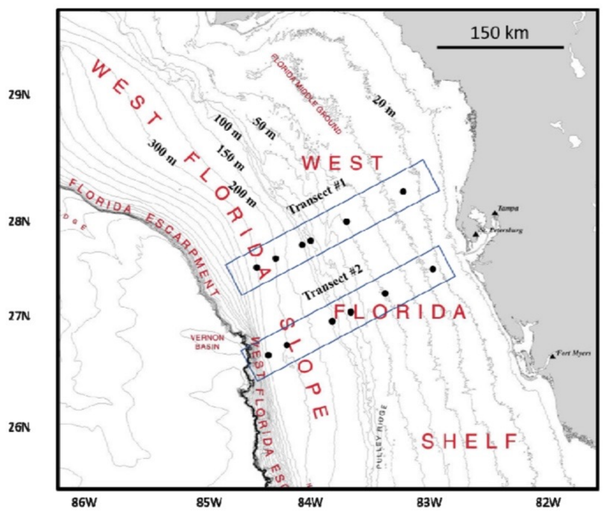

Figure 1. Map of sampling stations, with 1) Spring Hill bathymetric transect (50km North of St Petersburg) and 2) Tampa Bay transect, off St Petersburg.

METHODS

Procedure:

- Six sampling stations along two bathymetric transects (25-300m)
- Oceanic sediment was extracted using a Multicorer with four tubes (95mm inner diameter); samples preserved in 10% buffered formalin
- To separate meiofauna from sediment, samples were washed over 500 and 32 um sieves, meiofauna was extracted (density separation using Ludox HS40 with sp. gr. 1.18, three cycles of 10 min. at 3000 rpm), and preserved in 70% ethanol
- 2% of the sample was examined under a microscope to estimate the total number of nematodes and copepods in the sample
- From this, abundance per 10cm2 was calculated and nematode to copepod ratio was determined
- 120 nematodes and 50 copepods were picked from each sample to be mounted on slides
- Once on slides, biomass of the specimens was determined using an inverted microscope and Amscope software

Results:

- The copepod and nematode densities tended to rise and fall together, but nematode densities were always higher than copepod densities
- In most stations of equal depth, nematode to copepod ratios remained consistent and were almost identical between transects at 200m
- The most drastic difference occurs at 75m, with a much higher N:C ratio for the Tampa Bay/St Petersburg transect

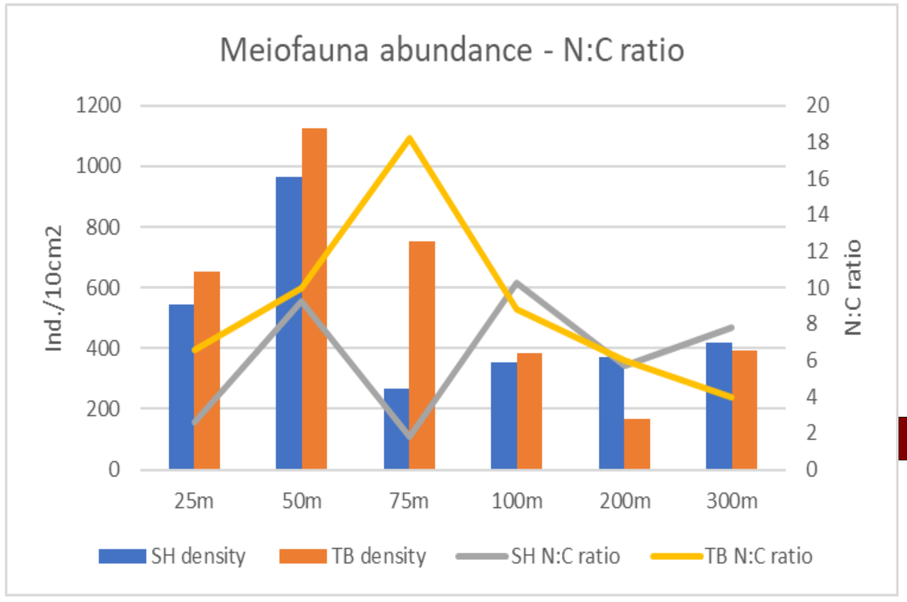

Figure 2. Meiofauna density per 10cm2 in the Spring Hill transect (blue) and Tampa Bay transect (orange) based on the data in Table 1. Nematode to copepod ratios for each transect are shown as line plots (right axis).

DISCUSSION

Figure 3a shows meiofauna specimen under the microscope, including copepods and nematodes.

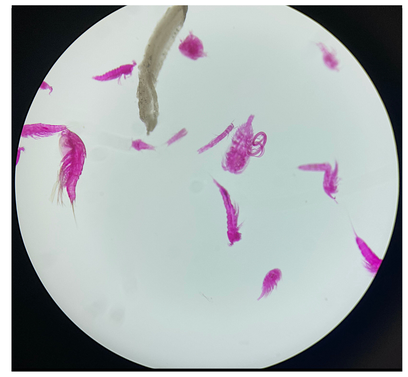

Figure 3b shows copepod specimens under the microscope.

Discussion:

- a high N:C ratio suggests ecosystem disturbance
- the St. Petersburg tract is more closely influenced by urban areas, but in general, N:C ratios suggested similar ecological health when compared to Spring Hill which is not heavily influenced by urban areas
- thus, for the most part the N:C suggests that ecosystems in the St. Petersburg area are not heavily impacted by urban pollution. However, for the 25-75m section, meiofauna densities are consistently higher for the TB transect, suggesting increased food resources to sustain higher levels of abundance
- The drastic difference at 75m indicates that disturbance of some kind is heavily influencing ecosystem health in that particular area

Further Studies:

-N:C ratio is not the only indicator of ecological health, and further data needs to be collected and compiled with this data to truly assess ecosystem health (ex. Measuring oxygen levels, levels of organic material, etc.)
- It would be interesting to see how more samples in similar areas would relate to these results, specifically focusing on 75m

Acknowledgements

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References

Giere, Olav. *Meiobenthology the Microscopic Motile Fauna of Aquatic Sediments ; with 20 Tables Ans 41 Information Boxes*. Springer, 2009.