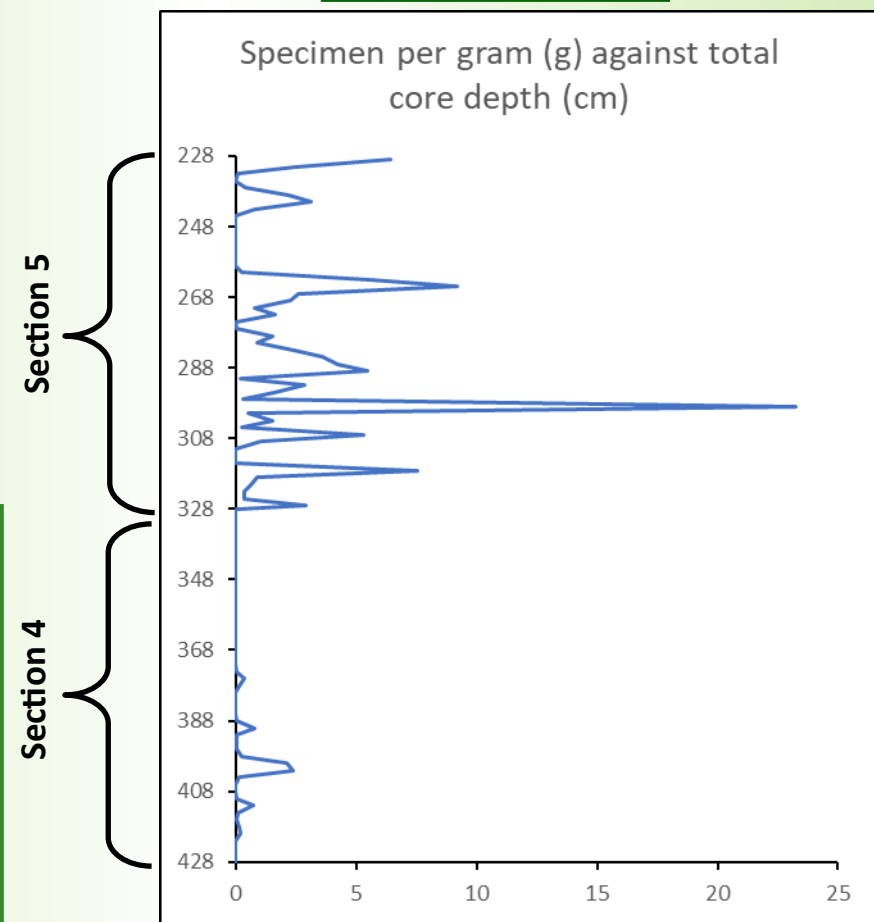


What impact has climate change had on the variability of the Baltic Sea ecosystem as evidenced by the presence or lack of marine plankton in Baltic Sea sediment cores?



The aim of this research was to establish whether, due to geographical changes caused by climate change, the North Sea entered the Baltic Sea between mainland Sweden and the Aaland Sill through looking at the amount of Marine plankton also known as Benthic Foraminifera (forams) present in Baltic Sea sediment cores taken from the site.

Results:



Discussion—Section 4

Its likely that section 4 formed under redox and hypoxic conditions resulting in a high turnover of forams due to the lack of oxygen available. This higher turnover resulted in smaller populations and smaller foram sizes per gram due to the prioritisation of survival over the development of the foram population. This means that the period when core section 4 formed was likely not when the North Sea waters were entering the Baltic Sea through the Aaland sill leaving the Baltic Sea in hypoxic conditions which did not support the forams enough for them to survive and flourish like they did in section 5.

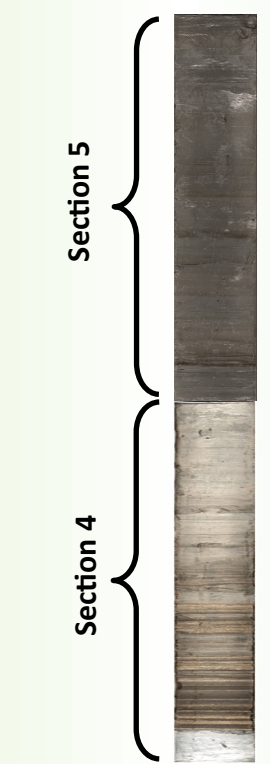
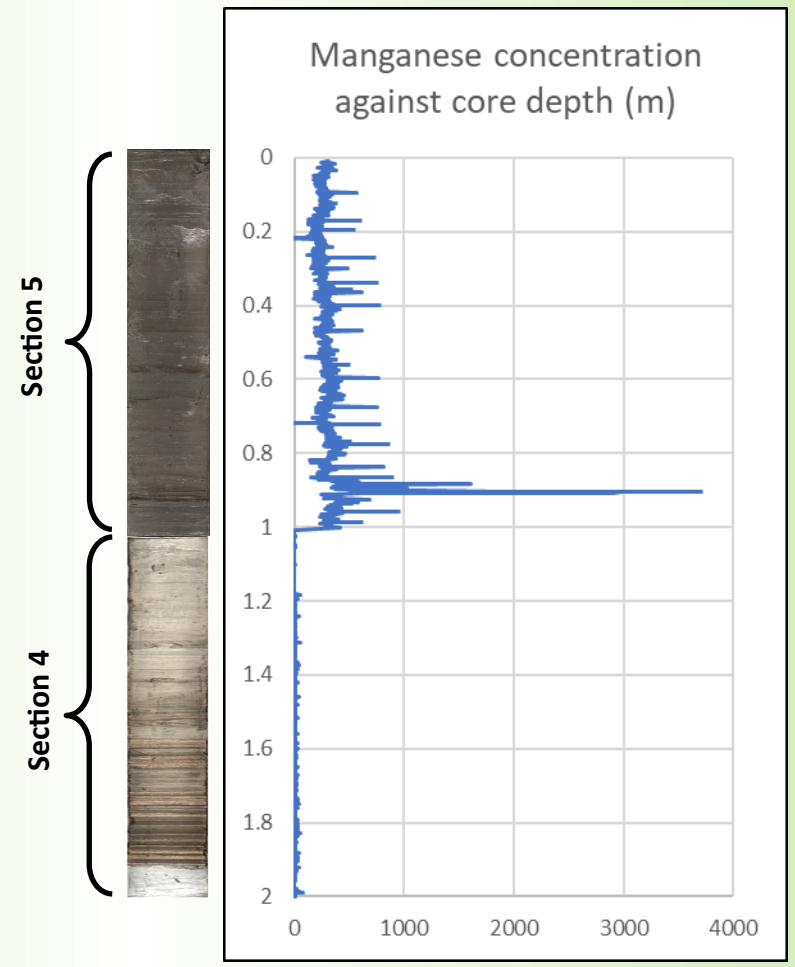
Discussion—Section 5

Section 5 formed under more oxygenated conditions which were able to support the development of larger abundances of foram per gram. Its likely the drastic change in forams per gram between section 4 and 5 was due to a major environmental change in the Baltic Sea such as the Limnea Sea stage (producing less saline conditions due to the introduction of North Sea water). The higher foram abundances suggest this period was when the North Sea entered the Baltic Sea through the Aaland Sill bringing more oxygenated waters which supported foram growth (as they were able to prioritise development over survival due to the oxygenated conditions) and larger abundances.

Conclusions from my research:

For a definitive conclusion, the remaining core sections 1-4 and 7-8 would also need to be sampled and their foram abundances counted to determine whether the location between the Aaland sill and mainland Sweden was the main entry point of the North Sea into the Baltic Sea,.

However, from the data collected from core sections 4 and 5, we can state that the forams are evidence of marine water from the North Sea because the North Sea provided more oxygenated water to the Baltic sea which supported the foram abundances we see in core section 4 and 5.



Leppäranta, M., and Myrberg, K., (2009), "Physical oceanography of the Baltic Sea". Berlin: Springer/Praxis Pub., pg.2.

Background of the Baltic Sea:

- The Baltic Sea (an old depression in the Fennoscandian bedrock) was initially formed after the Weichselian glacier melted, resulting in isostatic uplift at a rate of up to 9mm per year, in the north of the Fennoscandian bedrock (Lepparanta and Myberg 2009).
- Due to this process of isostatic uplift, the Baltic Sea underwent multiple alternating postglacial phases of brackish water and freshwater due to new channels forming and closing allowing North Sea water to enter and be closed off from the Baltic. These environmental changes can be seen through the presence and lack of marine plankton (Benthic Foraminifera).

Methods:

- Microscopy**—the sample (wet or dry) was placed into a small black tray for examination. Any forams were taken from the sample using a small paint brush and placed onto a microscope slide, labelled with the site code and depth (MSM99—416—418cm i.e.).
- Sampling**—the cores were sampled in 20g 2cm and 1cm sections.
- Sieving**—a 63 micron sieve was used to process the samples to remove sand and silt.

The Core:

The length of the entire core (all 8 sections) is 728cm with section 5 measuring between 228-328cm and section 4 measuring between 328-428cm. This research used core sections 5 and 4 which corresponded to the depth 228-428cm within the whole core.