



Spatial and temporal variability of the benthic foraminiferal assemblage in a low salinity environment (Stavns Fjord, Denmark)

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Modern analogue faunal distribution is increasingly being used in fossil foraminiferal studies to provide quantitative estimates of ancient environmental conditions, requiring an accurate assessment of modern taphonomic assemblages. The aim of this work was to create a local foraminiferal database for sea-level reconstruction.

Over one year, we analysed living (stained) and dead benthic foraminiferal assemblages, including soft-walled monothalamous taxa, along a transect (six sites at intertidal to subtidal elevations) in Stavns Fjord, a brackish microtidal shallow-water lagoon, located in the southern Kattegat Sea (Denmark). For each station, key environmental parameters like salinity, temperature, pH and vegetation cover were recorded. Loss on ignition and grain size of the sediment substrate were determined in the lab.

Stavns Fjord has a diverse living foraminiferal assemblage with 39 species identified, of which 32 are soft-walled species. The soft-wall foraminifera constitute more than >60% of the total assemblage except in the most landward station where their abundance varied between 0-18%. Most of the species counted in these samples are previously unreported from the Kattegat area; all are undescribed at the species level and in most cases also at the generic level. The dead foraminiferal assemblage yielded very low diversity assemblage with 6 agglutinated species (dominated by *Jadammina macrescens* and *Trochammina inflata*) and two calcareous taxa (*Elphidium williamsoni* and *Ammonia* sp.).

The living agglutinated and calcareous species show a general distributional trend with *J. macrescens* dominating landward and the calcareous species (*E. williamsoni* and *Ammonia* sp.) dominating seaward. In the dead assemblage, the most landward station is still dominated by *J. macrescens* (abundance > 508 individual/10 cm²), whereas the other sites are barren or with less than 30 individual/10 cm². The landward edge of the transect shows the lowest interannual variability (128 to 152 individual/10 cm²) whereas a higher interannual variability is recorded on the sandflats further out in the lagoon.

Major taphonomic changes occurred during the transition from living to dead assemblage in the seaward station: all the soft-wall taxa disappeared, and calcareous species, as well as many agglutinated species were affected by intensive in situ dissolution. Nevertheless the taphonomical assemblages still gives a fairly reliable record of the ecology of the environments.

This study demonstrates that it is important to compare data on living and dead assemblages in order to determine the pathways to fossilization and to evaluate the amount of information loss through taphonomic change before quantifying paleoenvironmental variations.

Key words: benthic foraminifera, ecology, intertidal, low salinity environment, sea-level.