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## Distribution of benthic foraminifera upstream of the Elbe Estuary (Northern Europe): ecological interactions

**Fabio Francescangeli**, Yvonne Milker, Eric Armynot du Châtelet, and Gerhard Schmiedl

University of Hamburg, Institute for Geology, Centre for Earth System Research and Sustainability, Hamburg, Germany, (fabio.francescangeli85@gmail.com)

Estuaries are transitional ecotones influenced by both marine and terrestrial (fresh) waters. For the past 200 years, estuarine environments experienced intense and rapid environmental degradations due to anthropogenic action (e.g., urban sewage, industry, aquaculture, and agricultural runoff). The distribution of benthic foraminifera in estuarine areas is the result of complex interactions between a large number of biotic and abiotic parameters. The natural stress (such as variation in salinity, sediment size, organic load) may be associated to anthropogenic stresses, enhancing the high natural variability of these areas. The objectives of the present work are to describe the specific composition of benthic foraminifera and to investigate their ecological interactions upstream of the Elbe Estuary (Germany). In this important estuarine area, there is a lack of a comprehensive investigation in terms of benthic foraminifera. So far, the ecology of living benthic foraminifera has not been studied in greater detail and it is largely unknown which species occur in this transitional area. For this purpose, a surface sampling was carried out from 24 stations along the salinity gradient of the Elbe Estuary. Living and dead foraminiferal assemblages were analyzed and the relative correlation with environmental parameters (such as salinity, pH, temperature, sediment size, organic matter) was investigated. Living assemblages are characterized by very low densities and largely dominated by "Ammonia" group. Dead assemblages are more diverse and dominated by estuarine taxa (*Ammonia aomoriensis*, *Haynesina germanica*, and *Criboelphidium selseyense*). Upstream of the estuarine area, the low salinity prevents the development of living benthic foraminifera while downstream, sediment grain size seems to be a major key-factor, influencing foraminiferal distributions. This work sheds new light on benthic foraminiferal ecology and biodiversity of this important estuarine area of Northern Europe.