



Two-dimensional distribution of living benthic foraminifera in anoxic sediment layers of an estuarine mudflat (Loire estuary, France)

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Résumé en
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We present a new rapid and accurate protocol to simultaneously sample benthic living foraminifera in two dimensions in a centimetre-scale vertical grid and dissolved iron and phosphorus in two dimensions at high resolution (200 µm). Such an approach appears crucial for the study of foraminiferal ecology in highly dynamic and heterogeneous sedimentary systems, where dissolved iron shows a strong variability at the centimetre scale. On the studied intertidal mudflat of the Loire estuary, foraminiferal faunas are dominated by *Ammonia tepida*, which accounts for 92 % of the living (CellTracker Green(CTG)-labelled) assemblage. The vertical distribution shows a maximum density in the oxygenated 0-0.4 cm surface layer. A sharp decrease is observed in the next 2 cm, followed by a second, well-defined maximum in the suboxic sediment layer (3-8 cm depth). The presented method yields new information concerning the 2-D distribution of living *A. tepida* in suboxic layers. First, the identification of recent burrows by visual observation of the sediment cross section and the burrowing activity as deduced from the dissolved iron spatial distribution show no direct relation to the distribution of *A. tepida* at the centimetre scale. This lack of relation appears contradictory to previous studies (Aller and Aller, 1986; Berkeley et al., 2007). Next, the heterogeneity of *A. tepida* in the 3-8 cm depth layer was quantified by means of Moran's index to identify the scale of parameters controlling the *A. tepida* distribution. The results reveal horizontal patches with a characteristic length of 1-2 cm. These patches correspond to areas enriched in dissolved iron likely generated by anaerobic degradation of labile organic matter. These results suggest that the routine application of our new sampling strategy could yield important new insights about foraminiferal life strategies, improving our understanding of the role of these organisms in coastal marine ecosystems.

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