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Utilisation des foraminifères benthiques comme indicateurs de paléo-niveaux marins ? Étude du cas de l'anse de l'Aiguillon

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Résumé

Soixante-quatorze échantillons de sédiment ont été prélevés dans l'anse de l'Aiguillon (Charente-Maritime et Vendée, France) pour l'étude des peuplements de foraminifères benthiques. La répartition des sept espèces les plus fréquentes est analysée en vue de leur utilisation pour des reconstitutions de paléo-niveaux marins. La répartition verticale et la durée d'émersion ont une influence significative sur la distribution de quatre espèces sur la rive est (Charente) : *Haynesina germanica* (la plus haute sur l'estran), *Brizalina variabilis*, *Stainforthia fusiformis* et *Hopkinsina Atlantica* et seulement sur une espèce, *Ammonia tepida*, sur la rive nord-ouest (Vendée). Cette étude apporte des informations complémentaires sur des espèces abondantes dans le domaine intertidal, utilisables pour la reconstitution des paléo-niveaux marins, mais suggère qu'elles doivent être utilisées avec précaution, en raison de l'influence des conditions locales sur leur répartition verticale. ***Pour citer cet article : É. Armynot du Châtelet et al., C. R. Palevol 4 (2005)***.

Abstract

The use of benthic foraminifera as sea-level indicators? Case study of the Aiguillon cove. Seventy-four sediment samples were collected within the Aiguillon cove (Charente-Maritime and Vendée, France) in order to investigate the ecology of benthic foraminifera in relation to their vertical elevation. The distribution of the seven dominant species was studied with a view to a further use in sea-level reconstruction. Vertical elevation and the associated duration of subaerial exposure significantly influence the distribution of four species along the eastern shore of the cove (Charente): *Haynesina germanica* (in the higher position), *Brizalina variabilis*, *Stainforthia fusiformis*, and *Hopkinsina Atlantica* and of one species, *Ammonia tepida* along the northern and western shores (Vendée). This study provides more information on the vertical elevation of dominant intertidal

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species, which may be used for reconstructing former sea levels. It suggests that their position may change, depending on local conditions, which requires great caution in using them as indicators of former sea levels. ***To cite this article: É. Armynot du Châtelet et al., C. R. Palevol 4 (2005)***.

Mots clés : Foraminifères benthiques ; Position topographique ; Durée d'émersion ; Estran ; Reconstitutions du niveau marin

Keywords: Benthic foraminifera; Vertical elevation; Subaerial exposure; Tidal zone; Sea-level reconstruction

Abridged English version

Introduction

Benthic foraminifera are present worldwide in marine and paralic waters [e.g.,15,17,51,55,56,71] and are frequently used as Holocene proxies furnishing precise information on palaeoenvironment [e.g., 10,21, 52,53]. Many studies carried out on benthic foraminifera have shown a vertical distribution of the main species allowing us to use them as sea-level indicators, on the schorre [e.g., 64,67,68] or on the slikke [e.g., [43,44]. Nevertheless, it had been shown that vertical succession may vary, depending on local characteristics [14,19,33], and reconstitutions based on foraminifera observation may not be considered to have a universal value [14].

This work will increase the knowledge about foraminifera environments on the slikke related to the topography. Hence, quantitative observations of the dominant species in the Aiguillon cove (Charente-Maritime – Vendée, France) will be exposed and discussed with the view of a possible use as sea-level indicators.

Material and methods

A systematic sampling of seventy-four sites had been carried out. These sites were set out every 750 m. Two zones are sampled every 250 m (Fig. 1b). Most of samples are located on the slikke.

Because of the asymmetric hydrodynamic [77,78], the Charente-Maritime side to the east and the Vendée side to the north and the northwest were studied separately. Each sample was made of 50 cm^3 of sediment stored within an ethanol–Rose Bengal solution [79]. Each sample was washed through 315-µm and 50-µm mesh sieves. The tests were isolated by flotation on trichloroethylene from the intermediate fraction (50–315 µm). Relative and absolute abundance were selected as descriptive parameters of foraminiferal assemblages.

Correlation between the relative and absolute abundances of each species and its vertical position, which determine the time of subaerial exposure, had been tested in each of the side of the Aiguillon cove by means of a variance analysis [11]. Correlations between the abundance of the seven selected species (present at more than 25% of the sites [6]) and the vertical distribution in each zone are represented by means of box-and-whisker plots.

Results

Thirty-one living species (Rose Bengal stained) have been observed in the Aiguillon cove. Only seven are present in more than 25% of samples. They are listed by order of decreasing abundance: *Haynesina germanica*, *Ammonia tepida*, *Cribroelphidium excavatum*, *Brizalina variabilis*, *Cribroelphidium gunteri*, *Hopkinsina atlantica* and *Stainforthia fusiformis* (Fig. 2). All those species have a carbonaceous test.

Haynesina germanica is the species that bears the longest emersion (Fig. 4a and b): ca. 7.5 h on the eastern shore and ca. 6.5–7 h on the northwestern shore (respectively 56% et 50% of the time). Its average topographic position is between 4.4 and 4.8 m. *Ammonia tepida* is the second important species. It dominates the assemblages in the central area of the Aiguillon cove. It bears emersion length shorter than *Haynesina germanica*, associated with a lowest topographic position, ca. 4 to 5.5 h, on the eastern shore (32 to 44% of the time) (Fig. 4a) and ca. 6.5 h on the north-western shore (56% of the time) (Fig. 4b). *Cribroelphidium excavatum* is observed in the central part of the cove, but at a lower altitude than *A. tepida* (Fig. 3). *Brizalina variabilis* is observed on the eastern shore, at a lower posi-