Data Article

Relative abundances of benthic foraminifera in response to total organic carbon in sediments: Data from European intertidal areas and transitional waters

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We gathered total organic carbon (%) and relative abundances of benthic foraminifera in intertidal areas and transitional waters from the English Channel/European Atlantic Coast (587 samples) and the Mediterranean Sea (301 samples) regions from published and unpublished datasets. This database allowed to calculate total organic carbon optimum and tolerance range of benthic foraminifera in order to assign them to ecological groups of sensitivity. Optima and tolerance range were obtained by mean of the weighted-averaging method. The data are related to the research article titled “Indicative value of benthic foraminifera for biomonitoring: assignement to ecological groups of sensitivity to total organic carbon of species from European intertidal areas and transitional waters” [1].

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Value of the Data

- The data of relative abundances of living benthic foraminifera in European intertidal areas and transitional waters allows assessing the response of the species to total organic carbon contained in the sediment over a large geographical scale.
- The assignment of benthic foraminiferal species to ecological groups of sensitivity to total organic carbon have further implication for environmental monitoring.
- In the present study database, foraminiferal species names and data format were standardized to species concept from the World Register of Marine Species and to relative abundances, respectively.
- These data might be re-used to further assess and improve our understanding of the biogeographical distribution patterns of benthic foraminifera in European intertidal areas and transitional waters over a large latitudinal range.

1. Data Description

The present study database (available in Mendeley: http://dx.doi.org/10.17632/stjfr9xvxg.1), composed of primary and secondary data, summarizes the total organic carbon content in sediment (%) and the relative abundances (%) of benthic foraminiferal species in European intertidal areas and transitional waters (French coast of the English Channel, European Atlantic Coast and the Mediterranean Sea) extracted from 35 primary peer-reviewed articles and seven unpublished grey literature that met the inclusion criteria for the related meta-analysis [1] (see meta-data in Table 1). In the English Channel/European Atlantic Coast, selected study sites included eight classical estuaries, four coastal freshwater/brackish water plumes, two artificial water bodies and two Rias (Fig. 1; see definition of each body type in Table 1 in [1] according to [9,10]). In the Mediterranean Sea, one delta, six lentic non-tidal lagoons, four lentic tidal lagoons, one artificial water body, seven semi-enclosed bays and one classical estuary were considered (Fig. 1).

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Secondary data - When available, relative abundances data were downloaded from online sources where the study was published. When only raw counts or abundances were published, foraminiferal data were transformed to relative abundances.

We standardized species names according to the World Registry of Marine Species (WoRMS). All data processing and analysis was done in the open-source software R.

Data source location

Secondary data sources: The full list of data sources is available at https://data.mendeley.com/datasets/stjfr9xvxg/1

Data accessibility

The database is available on Mendeley: Bouchet, Vincent; Frontalini, Fabrizio; Francescangeli, Fabio; Sauriau, Pierre-Guy; Geslin, Emmanuelle; Martins, Virginia; Almogi-Labin, Ahuva; Avnaim-Katav, Simona; Di Bella, Letizia; Cearreta, Alejandro; Coccioni, Rodolfo; Costelloe, Ashleigh; Dimiza, Margarita; Ferraro, Luciana; Haynert, Kristin; Martinez-Colon, Michael; Melis, Romana; Schweizer, Magali; Triantaphyllou, Maria; Tsujimoto, Akira; Wilson, Brent; Armnont du Châtelet, Eric (2021). “Living foraminifera relative abundances and total organic carbon in European Atlantic intertidal and transitional areas”, Mendeley Data, V1, http://dx.doi.org/10.17632/stjfr9xvxg.1

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Related research article

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This database was built to assign benthic foraminiferal species to ecological groups of sensitivity to total organic carbon (see [1] for more details). Because of the particular characteristics of foraminiferal habitats and communities, we decided to present the database split in two: one for the English Channel/European Atlantic and one for the Mediterranean region. The overall aim of this paper is to provide foraminiferal ecologists with a ready-to-use database detailing foraminiferal species relative abundances and total organic content (%) in the studied sampling sites to be used for ecological, biogeographical and environmental monitoring purposes.

Table 1
Meta-data of the different selected studies. Full details of primary and secondary data sources are available at [https://data.mendeley.com/datasets/stjfr95xvxx/1](https://data.mendeley.com/datasets/stjfr95xvxx/1).
| Region       | Country | Local study area | Related Ecological study | Related Local Organisms study | Sample code description | Total conditions | Year of sampling | Time of the year | Future size fractions | TNC method | Data available with original publications | Sediment type | Sampling device |
|--------------|---------|-----------------|--------------------------|-----------------------------|-------------------------|------------------|-----------------|-----------------|---------------------|------------|--------------------------------------|---------------|----------------|
Fig. 1. Map showing the geographical distribution of the 42 studies according to the water body type (see definition of each body type in Table 1 in [1] according to [9] and [10]) used to assign the species from the English Channel/European Atlantic coast and the Mediterranean Sea intertidal and TWs. Numbers are the same as in Table 1.
Fig. 2. Caterpillar plot showing the optimum (green dots) and tolerance range (bars) to TOC of benthic foraminiferal species in the English Channel/European Atlantic intertidal areas and transitional waters.
Fig. 3. Caterpillar plot showing the optimum (green dots) and tolerance range (bars) to TOC of benthic foraminiferal species in the Mediterranean Sea intertidal areas and transitional waters.
2. Experimental Design, Materials and Methods

Data acquisition: Data of benthic foraminifera relative abundances and related TOC contents (%) in the sediment are mainly from published literature, obtained from data tables in the publication or provided by the authors if not published (database available in Mendeley: http://dx.doi.org/10.17632/stjfr9xvxs.1). To select the relevant studies, the following criteria scheme was followed: only studies on living foraminifera (not dead neither total assemblages), only samples with >50 living specimens and contemporaneous TOC and foraminifera sampling. In total, it was possible to include in the data 587 samples from the English Channel/European Atlantic Coast and 301 from the Mediterranean Sea.

Data computation: When raw counts or abundances were provided, we standardised it to relative abundances. The optimos.prime R package [4] was used to calculate the weighted averaging optimum and tolerance level [2,3] of each species to TOC (Figs. 2 and 3).

In order to illustrate the typical response of species from each ecological group along the TOC gradient, a locally weighted scatterplot smooth line (LOESS) was fitted through each scatter plot (see Fig. 5–6 in [1]). Marginal plots were added to each scatter plot to show the frequency of distribution of occurrences along the TOC gradient. The median of the distribution of the occurrences was also computed. The R code (supplementary materials) includes the following packages: ggrepur, ggExtra, cowplot, mgcv.

CRediT Author Statement

Vincent M.P. Bouchet: Conceptualization, Supervision, Investigation, Data curation, Formal analysis, Visualization, Writing – original draft; Fabrizio Frontalini: Investigation, Writing – Review & Editing; Fabio Francescangeli: Visualization – Writing – Review & Editing; Pierre-Guy Sauriau: Formal analysis, Writing – Review & Editing; Emmanuelle Geslin: Supervision, Writing – Review & Editing; Virginia Martins: Investigation, Writing – Review & Editing; Ahuva Almog-Labin: Writing – Review & Editing; Simona Avnaim-Katav: Investigation, Writing – Review & Editing; Letizia Di Bella: Writing – Review & Editing; Alejandro Carreata: Investigation, Writing – Review & Editing; Rodolfo Coccioni: Writing – Review & Editing; Ashleigh Costelloe: Writing – Review & Editing; Margarita D. Dimiza: Writing – Review & Editing; Luciana Ferraro: Investigation, Writing – Review & Editing; Kristin Haynaert: Writing – Review & Editing; Michael Martínez-Colón: Writing – Review & Editing; Romana Melis: Investigation, Writing – Review & Editing; Magali Schweizer: Writing – Review & Editing; Maria V. Triantaphyllou: Investigation, Writing – Review & Editing; Akira Tsujimoto: Writing – Review & Editing; Brent Wilson: Writing – Review & Editing; Eric Armynot du Châtelet: Supervision, Investigation, Writing – Review & Editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships which have or could be perceived to have influenced the work reported in this article.

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Supplementary Materials

Supplementary material associated with this article can be found in the online version at doi: 10.1016/j.dib.2021.106920.

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