frontiers | Frontiers in Ecology and Evolution

TYPE Editorial
PUBLISHED 18 July 2023
DOI 10.3389/fevo.2023.1250973

OPEN ACCESS

EDITED AND REVIEWED BY
Laura Parducci,
Sapienza University of Rome, Italy

*CORRESPONDENCE
Irene Tunno
irene.tunno@gmail.com

RECEIVED 30 June 2023
ACCEPTED 07 July 2023
PUBLISHED 18 July 2023

CITATION
Tunno I, Perrotti A, Burge DRL, McGlue MM and Csank A (2023) Editorial: Methods in paleoecology: 2021. *Front. Ecol. Evol.* 11:1250973. doi: 10.3389/fevo.2023.1250973

Editorial: Methods in paleoecology: 2021

Irene Tunno[1]*, Angelina Perrotti[2], David R. L. Burge[3], Michael M. McGlue[4] and Adam Csank[5]

[1]Research Institute on Terrestrial Ecosystems, National Research Council (CNR), Montelibretti, Italy, [2]Department of Geography, University of Wisconsin-Madison, Madison, WI, United States, [3]St. Croix Watershed Research Station, Science Museum of Minnesota, Saint Paul, MN, United States, [4]Department of Earth and Environmental Sciences, University of Kentucky, Lexington, KY, United States, [5]Department of Geography, University of Nevada, Reno, NV, United States

KEYWORDS

paleoecology, new methods, palynomorphs, fungal spores, sponge spicules, microscopy, diatoms, paleobotany

Editorial on the Research Topic
Methods in paleoecology: 2021

Paleoecology is a broad discipline that involves several fields with the aim of reconstructing past environments to understand the interaction between living organisms and their surroundings throughout time. Due to the impossibility of direct observations of communities, species interactions, and abiotic elements in the past, as well as their variance due to natural and human-induced effects, ecosystems must be reconstructed from evidence left in the geological record (Croft et al., 2018). These records are preserved in various natural archives in both marine and terrestrial settings. The complexity of nature, as well as the composition and availability of proxies in natural archives requires a multidisciplinary approach that has continuously improved since the discipline of paleoecology was founded. Hence, the application of new techniques and methods is fundamental in driving the evolution of this discipline.

This Research Topic compiles seven articles, providing an overview of new methodologies recently applied to the field of paleoecology.

Pound et al. present a paleoclimatic reconstruction during the Miocene in the UK based on fungal assemblage. In this paper 110 fungal fossil remains were recorded, including 38 newly described morphotypes, providing a new approach using fungal morphotypes as paleoclimate proxies.

Schachat proposes the application of two analytical methods (propensity score matching and specification curve analysis) in paleobotany to better understand long-term trends in fossil records.

Perrotti et al. present an analysis of the uncertainties about palynomorphs concentration value estimates coprophilous fungal spores in paleoecological studies.

Rasbold et al. provide systematic guidelines for extraction, preparation, and identification of sponge spicules from the Neotropics, contributing to the implementation of sponges in the reconstruction of ancient freshwater ecosystems.

Noble et al. characterize the algal community composition and structure in Lake Tahoe, providing a better understanding of nearshore environments in oligotrophic subalpine lakes.

Wang et al. investigate the influence of traditional pollen extraction treatments on ultraviolet absorbing compounds (UACs) in sub-fossil pollen and spores observed with FTIR micro-spectrometry. This study provides an overview of the effects of commonly used pollen extraction methods on new techniques applied to modern and fossil palynomorphs for paleoenvironmental reconstructions.

Blong et al. present a sequential biomolecular, macrofossil, and microfossil extraction method, piloted on an assemblage of coprolites from the western USA, contributing to the understanding of the taxonomy and the behavior of organisms in paleoecological environments.

The articles collected in this Research Topic provide insight into some of the most recent advances in methods being applied in paleoecology, underlining the heterogeneity of fields that allow the application of new tools, methods, and therefore a deeper understanding of paleoenvironments and their interactions with organisms. Proving novel techniques and applying methodology from other disciplines accelerates the field's ability to better reconstruct ecological change on the time scales similar to which evolution occurs. Ranging from microscopy, statistical analysis, geochemistry, and micro-spectrometry on multiproxy biomarkers, the authors enlighten the complexity and challenges of paleoecological studies and how new techniques and methods can be applied in this discipline.

Author contributions

IT wrote the initial daft of the manuscript and the all authors contributed to the article editing and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

References

Croft, D. A., Su, D. F., and Simpson, S. W. (2018) "Introduction to paleoecological reconstruction." In: *Methods in paleoecology. Vertebrate paleobiology and paleoanthropology*, Eds. D. Croft, D. Su and S. Simpson (Springer, Cham).