

Editorial

GEO&BIO: broadening the lens by integrating Earth sciences and ecology with museum data

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abstract

This editorial outlines the renewed vision and scope of GEO&BIO, a journal dedicated to advancing interdisciplinary research at the interface of Earth sciences, ecology, and museum-based data. Building on its long-standing role as a repository of natural history knowledge, the journal now emphasises integrative approaches that connect geological frameworks, ecological processes, and natural history collections to better understand environmental change across temporal and spatial scales. We highlight the growing need for synthesis-driven research that bridges traditionally separate disciplines, demonstrating how geological settings underpin ecosystems while ecological dynamics, in turn, leave measurable signatures in the geological record. Particular attention is given to the expanding role of natural history museums as dynamic research infrastructures. Their collections are reframed as ‘time capsules’ that provide invaluable baselines for reconstructing past environments, tracking biodiversity change, and informing future projections. The editorial advocates for the integration of specimen-based data with geochemical, stratigraphic, and ecological datasets, supported by digitisation, standardisation, and open data practices. In parallel, GEO&BIO introduces updated editorial policies aimed at enhancing transparency, reproducibility, and international accessibility, while actively supporting early-career researchers. By encouraging rigorous documentation, data sharing, and methodological clarity, the journal seeks to facilitate cumulative and globally relevant research. Ultimately, GEO&BIO positions itself as a platform for fostering a holistic understanding of the Earth system, promoting collaboration across disciplines, and contributing to solutions for contemporary environmental challenges.

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GEO&BIO: розширення перспективи через інтеграцію наук про Землю та екології з музейними даними

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Резюме. У редакційній статті окреслено оновлене бачення та сферу діяльності журналу GEO&BIO, присвяченого розвитку міждисциплінарних досліджень на перетині наук про Землю, екології та музейних даних. Спираючись на багаторічну роль видання як сховища знань з природничої історії, журнал робить акцент на інтегративних підходах, що поєднують геологічні дослідження, екологічні процеси та природничі колекції для кращого розуміння змін довкілля у часовому та просторовому вимірах. Особливу увагу приділено зростаючій ролі природничих музеїв як динамічної дослідницької інфраструктури. Їхні колекції розглядаються як «капсули часу», що забезпечують безцінні базові дані для реконструкції минулих середовищ, відстеження змін біорізноманіття та формування прогнозів на майбутнє. У статті наголошується на необхідності інтеграції даних зі зразків із геохімічними, стратиграфічними та екологічними параметрами, підтриманими цифровізацією, стандартизацією та відкритими практиками обміну даними. Паралельно GEO&BIO запроваджує оновлені редакційні політики, спрямовані на підвищення прозорості, відтворюваності та міжнародної доступності, а також активну підтримку молодих дослідників. Заохочуючи ретельну документацію, обмін даними та методологічну чіткість, журнал прагне сприяти накопиченню знань і висвітленню досліджень глобального характеру. GEO&BIO позиціонує себе як платформу для розвитку цілісного розуміння Землі, стимулювання міждисциплінарної співпраці та пошуку рішень сучасних викликів.

Ключові слова: науки про Землю, екологія, міждисциплінарні дослідження, природничі музеї, колекції, глобальні зміни.

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For many years, *GEO&BIO* (formerly known as *Proceedings of the National Museum of Natural History*) has been a professional journal bringing together palaeontologists, geologists, biologists, and museum curators. Its pages have preserved the history of Ukrainian natural science, collections, the results of expeditions, the description of unique geological objects, and methodological approaches to safeguarding natural heritage. This experience is not merely an archive but a living foundation upon which we build the future.

Today's science undergoes profound transformations when combining data from various fields and sources and a systems approach are becoming essential. Researchers are expected to not only present facts but also integrate data from different sciences, develop forecasts, and propose solutions for challenges faced by society. That is why *GEO&BIO* has decided to refine its scope emphasizing two strategic directions—Earth Sciences and Ecology. Although geological and biological diversity has always been the central topic of the journal, the next chapter in the history of *GEO&BIO* will be defined by an increased focus on interdisciplinary studies bridging natural history collections with geological and ecological data to achieve a holistic understanding of past, present, and future natural processes and phenomena.

At first glance, geology and ecology appear to operate on contrasting timescales: geological processes range from short-lived events to transformations that unfold over millions of years, whereas ecological changes can occur within months, years, or decades. Yet modern research increasingly shows that these disciplines do not simply complement each other—they represent interconnected components of a single system (Connecting..., 2024). Geological structures shape relief, soils, hydrology, and the mineral composition of the environment, thereby setting the fundamental conditions for life. Ecological processes, in turn, develop within this physical framework, governing interactions

between organisms and their surroundings and leaving traces in the geological record that provide essential insights into past ecosystems.

A growing number of studies now integrate geochemistry with biological indicators, employ palaeontological data to model the dynamics of modern ecosystems, and use ecological observations to interpret ancient climatic signals and global environmental transformations (Kump, 2011). Such interdisciplinary approaches make it possible to unravel the complex interactions between the geosphere and the biosphere, evaluate the influence of anthropogenic factors, and understand the Earth as a dynamic system in continuous change (Kunkel *et al.*, 2026). *GEO&BIO* aims to serve as a respective and useful platform where these lines of evidence can be brought together, fostering a comprehensive and unified scientific outlook.

To help these perspectives meet in a tangible way, for the journal “integration” is not a slogan but a practical research strategy. We particularly welcome studies that connect specimen- or outcrop-level observations with environmental and geological context: for example, analyses that link species occurrences and community structure to lithology, soils, geomorphology, hydrology, or geochemical baselines; reconstructions that combine fossil assemblages with sedimentological and stratigraphic evidence to refine palaeoenvironmental interpretations; and approaches that use stable isotopes, trace elements, or other chemical proxies in biological and geological materials to track pollution, trophic change, or climatic variability through time. Equally important are works that couple field monitoring and historical collection records to test hypotheses about range shifts, phenology, habitat transformation, and ecosystem resilience.

In an era of global change, natural history museums acquire new significance. The collections they harbour are not merely historical specimens but unique ‘time capsules’ enabling us to trace changes in environments, morphology, and composition of organisms over decades and centuries (Sanders *et al.*, 2023). In many cases, natural history collections are the only source of data on ecosystems prior to intensive human impact. Modern technologies are transforming natural history museums into full-fledged scientific centres capable of generating data for global models of climate, biodiversity, and ecological risks (Lendemer *et al.*, 2020; National..., 2020). Collections are becoming an essential part of international research networks, and their value grows year by year (Johnson *et al.*, 2023). *GEO&BIO* aims to embark on this journey and partake in this transformation encouraging authors to submit their work that combines field research, laboratory methods, and collection materials. We aim for museum data to be accessible, interpreted, and integrated into a global context.

To make such work genuinely cumulative and comparable across studies, meaningful synthesis depends on how well museum resources are described, curated, and shared. A specimen becomes far more than a label and a taxonomic name when it is accompanied by precise locality information, stratigraphic and habitat context, dates, as well as collector and determination history. Digitisation, high-resolution imaging, and the publication of structured metadata allow collection objects to be linked to environmental layers, geochemical datasets, and ecological observations, turning dispersed holdings into interoperable evidence for regional and global analyses. By encouraging careful documentation and responsible data sharing, we aim to help authors transform museum “time capsules” into connected research infrastructure that supports both discovery-driven studies and applied decision-making.

The journal’s renewed focus is accompanied with an updated editorial policy. We strive to ensure not only high-quality publications but also compliance with contemporary international standards. This entails (i) clear methodological requirements; (ii) transparency and reproducibility; (iii) expansion of the English-language segment, enabling authors to reach an international audience and vice versa; and (iv) support for early-career researchers, including mentored peer review and opportunities to publish preliminary results.

Alongside these core principles, we will increasingly encourage authors to treat data and metadata as first-class research outputs. Where appropriate, we will ask for data availability statements and for primary datasets (including specimen catalog numbers and other persistent identifiers) to be archived in stable repositories, enabling verification and reuse. We also intend to promote consistent reporting of georeferencing and stratigraphic conventions, documentation of analytical workflows, and clear descriptions of sampling and curation procedures, so that results remain interpretable beyond the boundaries of individual projects and disciplines. These steps are designed not to raise barriers to publication, but to help authors present their work in a form that is durable, transparent, and ready for integration into broader syntheses.

We want *GEO&BIO* to become a journal trusted by both authors and readers—one that not only records scientific results but also fosters a culture of responsible, open, and high-quality science. We invite researchers from diverse fields—geologists, palaeontologists, ecologists, biogeographers, geochemists, conservation experts, museum professionals, and early-career scientists—to join our community. We aim to create an environment where every voice is heard, ideas are openly discussed, and results pass into a broader scientific dialogue.

We believe that interdisciplinarity is the key to seeing the planet holistically. *GEO&BIO* seeks to be the platform where this vision is formed, developed, and inspired.

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