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Preface

By R. F. Shen

A 35-year journey of *Pedosphere*: Promoting soil science across the world

This special issue is launched to celebrate the 35-year anniversary of *Pedosphere*. As stated in the inaugural paper of *Pedosphere* by the late Professor Qiguo Zhao, the founding Editor-in-Chief, its mission is: 'It is our hope that "PEDOSPHERE" will win the support of the soil scientists both at home and abroad and will be able to play an active role in strengthening the academic interflows between Chinese and foreign soil scientists and to contribute its part to the advance of soil science.' Looking back on the long journey of 35 years, *Pedosphere* has witnessed not only the rapid advances of soil science but also the remarkable globalization of academic research. To date, papers published in *Pedosphere* have been contributed by authors from over 100 countries/regions, and the journal has been listed as a top-tier Q1 (Top 3) journal with an impact factor of 7.3 in 2025. The success of *Pedosphere* comes as a result of tireless work and tremendous contributions from academic communities across the world including authors, readers, publishers, and the editorial team over several generations.

We are very happy that this special issue is in close conjunction with the 23rd World Congress of Soil Science (23rd WCSS), to be held in June 2026 in Nanjing, China. The editorial team of *Pedosphere* will organize a session at the 23rd WCSS (No. 501001), which is dedicated to all who have helped the journal and aims to show the importance of scientific journals in promoting soil science worldwide. Given the key roles of soils in addressing the major resource, environmental, health, and social problems that humanity is facing, this session will serve as a platform for critical discussion of professional journals on steering of soil science development, with topics including but not limited to: i) the concept of pedosphere, the launch of the journal *Pedosphere*, and the publication experience with *Pedosphere*; ii) the classic research on pedosphere as a hub connecting lithosphere, atmosphere, hydrosphere, and biosphere; iii) the future of pedosphere at the Anthropocene era; and iv) the role of high-quality journals in promoting soil science to bridge soil science with the public community and stakeholders and to address the challenges of soil-oriented planetary health while meeting the ever-increasing demand worldwide in the era of big data. It is noteworthy that the 23rd WCSS represents the first official conference in China of the International Union of Soil Science (IUSS) since its foundation in 1924, and we welcome your submission and participation in this event.

This special issue consists of 2 invited perspectives, 1 invited opinion, 5 reviews, and 16 research articles. In the 1st perspective, Shen *et al*. propose three core strategic directions for mitigating soil acidification with emphasis on global progress and local practice, i) formulating a national zoning plan for the prevention and control of cultivated soil acidification, ii) achieving breakthroughs in key core technologies for acidified soil management, and iii) implementing major action plans for large-scale technology promotion in the context of China's high-intensity land use and the demands for advancing agricultural science and technology, aiming to safeguard cultivated land quality and ensure national food security. In the 2nd perspective, Chen *et al*. reveal that synergistic interactions between small molecules (SMs) and carbon-engine microbes (CEMs) play key roles in soil organic carbon (SOC) accumulation because SM inputs activate carbon-stabilizing functions of CEMs by enhancing microbial carbon use efficiency, promoting mineral binding, and improving physical protection through aggregate formation. They conclude that precision SOC management requires optimized SM inputs, microbial community engineering, and artificial intelligence (AI)-integrated monitoring to maximize carbon sequestration and enhance ecosystem sustainability. Juilleret *et al*. advance a new nomenclature for lunar soils that highlights differences in pedogenic processes on the Moon, compared to those on Earth, in their opinion article. The five reviews summarize innovative techniques for sustainable soil management and agricultural productivity, focusing on the potential of root exudates as bioactive compounds, the synergistic use of biochar and phosphogypsum to improve soil health, the development of hydroxyapatite-based nanofertilizers for enhanced nutrient delivery, and integrated approaches to mitigate salt stress in rice cultivation. The 16 research articles address key concerns in soil science with global significance including food security, environmental health, biodiversity conservation, and climate change, covering a wide array of up-to-date topics in soil science: the enhancement of soil health and crop productivity through amendments like biochar, phosphogypsum, and organic fertilizers, the remediation of contaminated soils with novel materials such as metal-organic framework (MOF)-decorated fabrics and aluminum-modified biochar, soil and plant dynamics under salinity and climate warming, the complex interactions between plant roots, soil microbes, and soil organic matter, the mechanisms of greenhouse gas emissions and carbon sequestration, *etc*.

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