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Preface

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This special issue of the Boletín de la Sociedad Geológica Mexicana contains a selection of papers presented at the 15th International Conference on Soil Micromorphology (ICSM 2016) in Mexico City. This conference was organized by the International Union of Soil Science (IUSS), Sociedad Mexicana de la Ciencia del Suelo, Instituto de Geología (Universidad Nacional Autónoma de México), Facultad de Geografía (Universidad Autónoma del Estado de México) and Colegio de Postgraduados. It took place at the Instituto de Geología (Universidad Nacional Autónoma de México) in Mexico City from 27th November to 5th December 2016.

The six papers of this special issue offer a short but significant overview of some recent advances in micropedology. While crossing a number of ancillary disciplines and techniques, the papers deal with different aspects of soil micromorphology, from pedogenesis in extreme environments (deserts, Antarctica), geoarchaeology and loess-paleosol sequences, to structural and porosity patterns of soils with anthropic influence. In all the papers, the spatial relation of components and the microsites they create are the basic information used to answer questions regarding indicators of incipient pedogenesis, soil–biota interactions, paleoenvironmental/climatic reconstructions, and to validate novel techniques of investigation at the microscale level.

Lebedeva *et al.* present a very interesting comparison of the micromorphology and composition of desert crusts in two distant climatic desert locations (Gobi, Mongolia and Mojave, USA). They arrive at surprisingly similar results that allow them to propose a crust formation process involving particular microbiological activity patterns, capillary rise along the desert pavement stones, and specific redox reactions.

Sedov *et al.* study the micromorphology of little-known ice-free soils of the Antarctic. Features indicating cryogenic fragmentation, chemical alteration of micas, incipient weathering in the mineral material, and a good preservation of organic components (moss and lichen tissues) allow

the authors to propose a synsedimentary pedogenesis in these extreme environments, where the deposition of mineral material occurs simultaneously with the growth of primitive plants.

Poch *et al.* use micromorphology to study subsurface irrigation systems in peach orchards in the Ebro valley (NE Iberia). The best system (addition of rice husk around the irrigation pipe) showed a higher porosity due to faunal activity, while the injection of pressurized air created vesicular porosity unable to conduct fluids.

Leonard *et al.* studied the geoarchaeology of Maya wetlands in the Yalahau region (Mexico), which combines micromorphology and dating methods. The composition (carbonates, organic matter, shells, pyrite, gypsum), porosity patterns, and core sequences (characterized by vertically juxtaposed units with micritic and gleyic redox features) lead to the conclusion that the area was used for agriculture during the Preclassic period, and for the exploitation of aquatic resources when flooding was more frequent at the end of the Late Postclassic.

Bronger and Smolíková carry out a complex exercise of paleosol correlation using well-known chronostratigraphies of several loess–paleosol sequences in Tadjikistan, China, and Central Europe (Carpathian Basin, Czechia, Lower Austria). Sequence truncation, accretion, decarbonation/recarbonation, rubification, and clay illuviation processes are discussed using traditional classification systems, and correlated with the respective paleoclimates.

Watteau *et al.* studying Technosol evolution after revegetation and introduction of mesofauna

(earthworms), propose a method of soil structure evaluation using an innovative automatic high-resolution image-acquisition device (Soilinsight®). They found that three aggregate descriptors—number, area, and shape—were the most significant indicators of soil aggregation evolution during early pedogenesis.

Similar to the 15th ICSM, this issue is also dedicated to honour the memory of Nicolas Fedoroff (1934-2013), Kubiěna Medal 2010, who carried out an outstanding and sustained contribution to soil micromorphology. As a child, during and after World War II, Nicolas assisted his aunt, Vera Malychev, a famous Russian Quaternary geologist, working on the loess sections around Paris. His education included both Earth Science and Soil Science and he remained convinced that the two disciplines should never have diverged. At the beginning of his career in the 1960's, Nicolas initiated pioneering research using micromorphology to understand soil forming processes and history of Quaternary paleosols. He was a co-founder in 1969 of the International Working Group of Soil Micromorphology, which provided an international standard for soil thin section description. This culminated in 1985 with the publication of the “Handbook for Soil Thin Section Description” of which Nicolas was one of many famous authors.

Nicolas was also co-author of chapters on soil micromorphology in soil science textbooks. Throughout his career he organized meetings, edited proceedings, and gave numerous invited lectures. Perhaps one of his most lasting contributions to soil micromorphology was his engagement and training of students. Nicolas and his students worked in the tropics, the arctic, prairies, woodlands, and on man-made soils. They also

published countless articles that demonstrate the broad applications of soil micromorphology: from pedology to paleopedology, from human impacts on soils to archaeology. They also contributed to the understanding soil processes scheme in all climates and parent materials.

We are sure his legacy (both human and scientific), commitment, and enthusiasm to generate new knowledge will continue to be an example for the whole scientific community, especially for the younger ones.

We warmly thank all the contributors to this special issue: the authors, who allowed a selection of papers dealing with variegated advances in soil micromorphology; the reviewers, who spent valuable time and efforts to help the authors improve their manuscripts; and finally, Antoni Camprubí, Editor-in-Chief, *Boletín de la Sociedad Geológica Mexicana*, who collaborated with us at all times for the handling of the manuscripts included in this volume. The scientific reviewers Donald Davidson, Sergio Favero Longo, Richard Heck, Danny Itkin, Emilia Le Pera, Juan Manuel Mejía, Rosa M. Poch, Fabio Scarciglia, Georges Stoops, Alexander Tsaskin, Amanda J. Williams, and those who chose to remain anonymous are wholeheartedly thanked for improving the quality of this issue with their insight.



Nicolas Fedoroff (1934-2013). Picture by Marie-Agnès Courty.