



Special issue “Spatial assessment of soil and plant contamination”

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This special issue is the continuation of others that for more than a decade have been published by different prestigious journals and that have collected the contributions of a number of sessions held in the SSS7 (Soil System Sciences, Soil Pollution and Reclamation) section of the EGU (European Geosciences Union). In recent years, EGAH has been the journal that has given us the possibility to continue with this mission, being this issue the last contribution corresponding to the session SSS7.5, “Spatial assessment of soil and plants contamination on different scales and approaches to evaluation of contamination level with due regard to natural geochemical background for improvement of remediation of the affected areas,” which was held in Vienna, EGU General

Assembly 2021. A total of 31 papers were presented in the online meeting. (Monday, April 26, 2021).

In all the above-mentioned editing works, Prof. Dr. Jaime Bech has acted as a tireless leader, providing his expertise and scientific quality as demonstrated by the success and dissemination achieved by the different contributions. Among the collaborators of these special issues, we must highlight Prof. Dr. Elena Korobova, who has left us forever, this being her last editing work.

From the beginning to the closing of this special issue, a number of events have occurred that may have affected its normal development, such as delays in communications and revisions, due to the adaptation to the new editorial platform system, which has been overcome thanks to the patience of the EGAH staff and the authors.

The objectives set have been more than met, having selected a total of 45 papers covering different topics focused on the development of strategic methodologies for the study of pollution, health and ecosystem risk assessment, remediation technologies, etc.

It is a recognized fact that soil health is directly related to the health of the ecosystem in its broadest sense, so that the constant increase in anthropogenic activity accompanied by emissions of elements and chemical compounds in quantities that exceed natural background levels causes contamination of staple foods and animal origin.

This article “Carvajal, M., Jeldres, P., Vergara, A. et al. Bioremoval of copper by filamentous fungi isolated from contaminated soils of Puchuncaví-Ventanas Central Chile. *Environ Geochem Health* 45, 4275–4293 (2023). <https://doi.org/10.1007/s10653-023-01493-z>” is part of the special issue “Spatial Assessment of soil and plant contamination” but inadvertently published in the regular issue Vol. 45(7).

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For all these reasons, it is important to assess the variation and spatial distribution of natural macro- and microelement associations as a key to understanding the dynamics of anthropogenic substances in order to provide safe remediation of contaminated soils. However, the diversity of contamination sources and their location in different climatic, physiographic and geochemical conditions require the development of differentiated approaches to assess and prevent the risk of adverse health and environmental effects. The development of technologies for the rehabilitation of soil properties, including soil fertility, is also a challenge. The problem of soil monitoring and remediation is becoming increasingly topical due to the expansion of the population into contaminated areas (mining industry) and the impacts caused by others activities (agricultural areas). Studies on the specific forms of occurrence, migration and accumulation of rare earths and potentially hazardous elements in soils from different natural and anthropogenic transformed substrates are also of high interest.

This special issue includes papers on potentially harmful elements (PHEs), persistent organic pollutants (POPs), radionuclides, emerging contaminants, etc., proposals for remediation together with review articles, providing results that will facilitate decision making in management plans for sites affected by contamination.

Crop soils can be affected by diffuse contamination (Huang et al, 2022; Lam et al, 2022; Rahimi et al, 2023; Sondhia et al, 2023), with irrigation water being one of the main factors to be evaluated in the case of wastewater, highlighting the importance of purifying this water for food safety (Aslam et al, 2023; Shah et al, 2022).

For groundwater, such as As-containing aquifers, problems also arise and monitoring plans (Khan et al, 2023; Sheera et al, 2023) and contaminant removal models are required (Huang et al., 2023; Murtaza et al, 2023a, 2023b; Nagra et al, 2022).

The characterization of potentially contaminated sites and hazard identification are two basic steps in the risk assessment procedure, differentiating sources (Melendez-Pastor et al, 2023; Verma et al, 2023), risk levels (Xu et al., 2023) and applying alternative methodologies (Kostantinov et al., 2023; Wang et al, 2023). In mining environments, spatial distribution takes on greater importance as it allows differentiation of geogenic zones, dispersion routes and risk

zones (Cuevas et al, 2023; Dziuba et al, 2023; Roca-Perez et al, 2023; Tume et al, 2023; Zúñiga-Vázquez et al., 2023).

Some pollutants present particularities that imply a special alert, such as radionuclides (Chandra et al., 2023; Dolgushin et al, 2022) and POPs (Dudnikova et al., 2022; Pathan et al., 2023; Tarigholizadeh et al., 2022).

Among the alternatives for soil remediation, those that use microorganisms to restore soil health and as bioindicators (Minkina et al., 2022; Upadhyay et al, 2022; Kumari 2022; Conesa et al, 2022; Pulikova et al, 2022; Devi et al, 2023; Carvajal et al, 2023), the use of biochar and nanoparticles (Jam et al, 2023; Kumari et al, 2022a, 2022b; Rajput et al, 2022), biosolids (Jordan et al., 2022), the use of vegetation (Dhaliwal et al., 2022; Hashemi et al, 2023; Lam et al, 2022, 2023; Ma et al, 2022; Veselinovic et al., 2023) and technosols (Barba-Brioso et al., 2023) stand out.

As the reader may appreciate, this special issue groups a set of multidisciplinary articles, focused on the quality and health of the soil that acts as a receptor and transmitter of contaminants. The risk assessment in the affected environments is the most important part and the one in which all the studies converge, since the recovery measures to be used will depend on the results provided.

An important parameter for a correct management is to know the spatial distribution of the contamination since it will affect qualitatively and quantitatively the objectives of the recovery plans of the affected areas. In arid and semiarid areas, the effects of climate change accelerate the processes of soil degradation and desertification, and the contribution of organic matter is an effective measure to save water and prevent soil erosion. The quality of irrigation water and the treatments of organic amendments used are parameters of great importance for soil health, influencing crop yields and food security.

Critical areas of the biosphere (including mining areas, wetlands, karst areas, etc.) are represented in the articles of this special issue, highlighting those articles dealing with pollutants with carcinogenic and mutagenic effects due to their persistence and difficult stabilization.

Finally, another important aspect to highlight is the varied origin of the authors who, with their contributions, give the leading required by the soil as

responsible for our current and future health (Kalinitchenko et al., 2023).

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Declarations

Conflict of interest The authors have not disclosed any competing interests.

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