

Introduction to the thematic issue: mineral deposits exploration and environmental geochemistry: case studies in Italy and in China



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Raw materials are fundamental to the economy, and hence to growth and jobs, and they are essential for maintaining and improving our quality of life. Securing reliable, sustainable and economic access to certain 'critical' raw materials is of growing concern around the globe. But it is as well a priority to acquire detailed information about the distribution of PTE and POP both at regional and local scales for environmental issues. The latter are of fundamental importance for environmental risk assessment and analysis that have a crucial role in the evaluation of human health risk, especially in mining and intensive urbanized areas. In addition, geochemical knowledge of the territory and mostly of top soils, where the main agricultural products grow, to become the foods for citizens, may be useful for land-use planning. Geochemical exploration methods are widely used to manage, visualize, analyse and interpret data for further identifying geochemical anomalies, for both the discovery of new ore bodies and for environmental purposes.

This Thematic Issue '*Mineral deposits exploration and environmental geochemistry: case studies in Italy and in China*' contains two papers in the field of mineral deposit exploration of critical materials in China and five papers in the environmental field in China and Italy.

Pan *et al.* describe fluid inclusion investigations of the Zijinshan high-sulphidation Cu-Au deposit in the west Fujian Province. The latter ore deposit is the largest active Au mine in China with total production of Au of over 300 tons to date. The good consistency of the mineralization distribution pattern and the fluid evolution trend implies that the southeastward extending ore bodies probably reflect the fluid pathway which is connected to the deeper porphyry mineralization and their magmatic source.

Feng *et al.* discuss the high As content (up to 190 µg/g) associated to the Hanshuiquan ore district of the Santanghu

Coalfield. By combining the results of low-temperature ashing (LTA) and X-ray diffraction (XRD) experiments, it was found that As occurs not mainly in arsenopyrites or As-bearing pyrites, but in the form of arsenate minerals, followed by pyrite via isomorphism.

Chi *et al.* describe investigations on fluid inclusions of the Yueyang Ag-Au-Cu deposit in the Zijinshan ore district. Based on their data, the authors classify the Yueyang deposit as an intermediate-sulphidation epithermal deposit, suggesting that mineral exploration in the adjacent area of the deposit would be very promising to find new ores.

Petric *et al.* discuss the spatial pattern of As in a geochemical investigation, environmentally oriented, in topsoils of the Campania region (Italy). The study shows that the highest As concentration is related to topsoils developed on NW-SE-trending carbonate massifs overlain by pyroclastic rocks where the highest fault density was also observed, and mostly in topsoils over volcanic rocks which played a control on its distribution pattern.

Rezza *et al.* discuss the spatial distribution of Mo, Sn and W in topsoils of the Campania Region (Italy). The authors use multi-fractal methods and RGB (Red, Green, Blue) composite maps of untransformed and centred log-ratio (clr) transformed datasets to recognise spatial patterns of the three investigated elements.

Nigro *et al.* discuss the use of B isotopes to identify B sources in groundwater in the eastern part of central Italy. The paper highlights that isotope analysis is a powerful tool for environmental groundwater planning.

Valera *et al.* discuss the Au distribution in Sardinia (Italy) using 33 000 stream sediment samples collected in the years from 1970 to 2000. The results show that the metamorphic-dominated areas display a number of Au assays exceeding 20 ppb. These anomalous values are clearly clustered and related with ore-bearing structures.