

Systematic Phased Geochemical Mapping Surveys for Mineral Exploration

ALECOS DEMETRIADES

International Union of Geological Sciences

Systematic phased geochemical mapping surveys for mineral exploration are conducted in five main stages: desk study, reconnaissance, follow-up, detailed, and ultra-detailed [1,2]; recently, a sixth stage, a global- or continental-scale geochemical survey, has been added. A key component of phased geochemical mapping is the orientation survey, which is usually carried out before the reconnaissance and detailed stages with the objective of finding a reliable and cost-effective methodology to clearly distinguish between the anomalous element values related to mineralisation from those of the background. Geochemical mapping for mineral exploration purposes should be carried out systematically by well-trained applied geochemists. Sampling and sample preparation are the most critical components in geochemical mapping and should be performed with the utmost care. To ensure the successful completion of a geochemical project, an effective quality assurance and quality control procedure should be installed during these two stages and carried forward in the laboratory analysis of collected samples. The recently published Manual of Standard Methods of the IUGS Commission on Global Geochemical Baselines provides the necessary methodologies [3], which can be adapted to any mapping scale. The cited publications provide teachers, early-career researchers and applied geochemistry professionals with important tools to plan their surveys at all mineral exploration stages effectively.

References:

- [1] Demetriades, A., 2014. Basic considerations: Sampling, the key for a successful applied geochemical survey for mineral exploration and environmental purposes. Chapter 15.1 In: W.F. McDonough (volume Editor), Analytical geochemistry/Inorganic instrument analysis. In: H.D. Holland and K.K. Turekian (Executive Editors), Treatise on Geochemistry, 2nd Edition, Elsevier, Oxford, 15, 1-31; <https://doi.org/10.1016/B978-0-08-095975-7.01401-7>.
- [2] Demetriades, A., 2025. Applied Geochemistry - The How and Why. Chapter 8.1 In: A. Shahar (volume Editor), How we Know. In: A. Anbar and D. Weis (Editors-in-Chief), Treatise on Geochemistry, 3rd Edition, Elsevier, 8, 1-72; <https://doi.org/10.1016/B978-0-323-99762-1.00004-8>.
- [3] Demetriades, A., Johnson, C.C., Smith, D.B., Ladenberger, A., Adanez-Sanjuan, P., Argyraki, A., Stouraiti, C., Caritat, P. de, Knights, K.V., Prieto-Rincon, G. and Simubali, G.N. (Editors), 2022. International Union of Geological Sciences Manual of Standard Methods for Establishing the Global Geochemical Reference Network. IUGS Commission on Global Geochemical Baselines, Athens, Hellenic Republic, Special Publication, 2, 515 pp.; <https://doi.org/10.5281/zenodo.7307696>.

