Paper Number: 1876

Comparability and traceability in laboratory analysis of global geochemical baselines mapping samples

Yao Wensheng[1,2,3], Zhang Qin [1,2,3] , WANG Xueqiu [1,2,3]

[1]Institute of Geophysical and Geochemical Exploration (IGGE), CAGS, langfang, China
[2]International Centre on Global-scale Geochemistry, UNESCO, Langfang, China
[3]Key Laboratory of Geochemical Exploration, Ministry of Land and Resources, Langfang, China

---

Comparability is now recognised as a prerequisite of analytical measurement made on geochemical mapping samples. Data with a consistent bias might be acceptable in local or regional mapping programme, because the eventual outcomes of the anomalies could be delineated and the geochemical patterns can be determined base on those data. For global geochemical baselines mapping, such an attitude is no longer acceptable.

The global geochemical baselines mapping is to systematically document the concentration and spatial distribution of chemical elements and compounds on the Earth surface which can be applied to quantify the future human-induced or natural changes in the chemistry of the present Earth and the past chemical evolution induced by geological processes. The data are required for long-term reference purposes for changes, thus comparability and traceability in laboratory analyses of global-scale mapping samples have to be considered.

The developments of geoanalytical techniques for global-scale geochemical mapping samples are reviewed for the mapping programs completed in the past fifteen years or ongoing projects such as in China, Europe, North America, Australia. The comparison of analysis data obtained by Chinese and European Laboratories for top-soil and sub-soil of the FOREGS geochemical mapping samples are described. The results of two datasets of the IGGE's analysis data for composited samples and the FOREGS average data of samples in each GNT cell are agreed extremely well for about 23 elements. There are slight differences between-laboratory biases shown as proportional errors between the datasets for 21 elements. The study demonstrates that comparable analytical data of certain elements can be achieved by different first-class laboratories, such as some European and Chinese laboratories. However, the obvious biases exist between two datasets for more than 10 elements. The comparison of the biases between two laboratories as well as between top-soil and sub-soil datasets implied that the run bias had been all well controlled. The lab bias and the method bias had also been well restrained for about 21 elements. The analytical methods for other elements are need to give recommendation for the appropriate references methods. Cooperation between laboratories is also needed to re-evaluate or develop the certified materials with 76 elements values which could supply for a long term. The set of the common recognized certified reference materials should be used in the future global-scale geochemical mapping projects to evaluate the lab bias and the method bias, and finely to meet its comparability and traceability requirements.