Regional geochemical mapping using composite sample of stream sediment in NE part of South Korea

SEUNG –JUN YOUM[1]*, JOO SUNG AHN[1], YONG-CHAN CHO[1] AND SEONG-CHEON SHIN[1]

[1]KOREA INSTITUTE OF GEOSCIENCE AND MINERAL RESOURCES, DAEJEON 305-350, REPUBLIC OF KOREA

(*correspondence: sjyoum@kigam.re.kr)

Now, Kigam is compiling the high-density (1 sample/3.6 km^2) geochemical maps of 16 elements (As, Bi, Cd, Cu, Ga, Ge, In, Mo, Pb, Sb, Sn, Ta, Tl, U, W and Zn) in the NE part of South Korea (ca. 14,000 km^2), using 3,890 stream sediments (<150 micormeter) from sample archives (ca. 23,500 stream sediments) of the National Baseline Mapping (NBM) for Geochemical Hazard Assessment Project (1996-2003) with the aim of providing the geochemical information on domestic mineral resources. Although this high-density sampling would give more geochemical infomation, it would be prohibitively expensive. Therefore, we intend to assess the use of the composite sampling method in study area for reducing analysis cost without significant loss of geochemical information, and apply it to national-scale geochemical mapping.

The study area is divided into grid cells of 5' x 5' (minutes), and all samples (avg. 19) in each cell were physically combined into a single sample, and thus total 204 composite samples (1 sample/70 km^2) from 3,890 original samples (1 sample/3.6 km^2) were prepared for analysis. Chemical analysis and geochemical mapping of composite samples were exactly same as original samples: ICP-MS (HF-HNO_3-HCl-$HClO_4$) and Inverse Distance Weighted method. The differences between two datasets are not large in median and mean values, but the maximum values of the original dataset are greater than those of composited datasets. Spatial distribution patterns of the datasets of composite samples are broadly similar to those of original samples, but local anomalies are lost (smoothing effect). However, highest anomaly of elements (such as W and Pb) is observed in the well-known W-Pb-Zn districts in study area. In conclusion, the composite sampling method may be cost-effective to establish geochemical baseline and to identify the elemental distribution patterns in regional-scale, and thus could be used in national-scale multi-element geochemical mapping, even though the information of local anomalies is lost.