Goldschmidt 2022 Abstract
https://doi.org/10.46427/gold2022.9566

New geochemical data set of 53 elements in stream sediments classified by the dominant lithology in a drainage basin –GSJ Medal Lecture–

ATSUYUKI OHTA, NOBORU IMAI, TAKASHI OKAI, MITSUO MANAKA, RAN KUBOTA, ATSUNORI NAKAMURA AND YOSHIKO TACHIBANA

Geological Survey of Japan, AIST

Presenting Author: a.ohta@aist.go.jp

Geological Survey of Japan, AIST has created nationwide geochemical maps of 53 elements using 3024 fine stream sediment samples and 4905 marine sediment samples. The maps are designed for environmental assessment and for the investigation of migration of materials from the land to the sea. All data are available on the online database (https://gbank.gsj.jp/geochemmap/). Recently, Japanese geochemical maps have found a wide application, such as provenance study of agricultural production, migration analyses in archaeology, forensic investigation, and the estimation of geoneutrino fluxes. For these requirements, it is important to know the chemical composition of surficial deposits and bedrock. Stream sediments dominantly comprise the weathering products of rocks in the catchment area upstream from the sampling site. To pair the geochemical mapping data with geological map would be highly informative to above purposes.

Thus, we have reported the newly-compiled dominant lithology in watersheds where stream sediment samples were collected for geochemical mapping based on a hydrologic model [1]. The drainage basin for each sampling location was obtained using GIS software and 50m-DEM data. The areal distribution of each lithology in the geologic map was calculated for each watershed: the exposed area for each lithology was estimated. We presume that when a specific rock type crops out over more than half of the drainage basin area, it is representative of surface rock types in the watershed and is the dominant control on elemental abundances in stream sediments. The validity of this assumption was confirmed with ANOVA analysis. Although the coexisting lithology and differences in the mineralogical composition of source rocks affect the chemical composition of stream sediments, these effects are smaller than the effect of heterogeneity of the sample media in the riverbed.

Finally, median values of 53 elemental concentrations of stream sediments classified according to the parent lithology have been calculated. Elemental abundance patterns of stream sediments classified by the dominant lithology are consistent with those of the parent rocks. The chemical compositions of stream sediments and information regarding their parent lithology are imperative for provenance studies.

[1] Ohta et al. (2021) *Geochem. J.* **55**, 59–88. 10.2343/geochemj.2.0618.