

Geochemical characteristics of the stream sediments in the Shikoku region

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Geochemical characteristics of stream sediments from the Shikoku region, southwest Japan, are studied, as a part of full-land geochemical mapping project of Japan. In Shikoku, major rock units are arranged almost parallel to the length of the arc as follows: from north to south, Cretaceous granitic rocks with Cretaceous sediments (Ryoke Belt), high pressure type metamorphic rocks (Sanbagawa Belt), sedimentary rocks plus exotic blocks mainly of Jurassic accretionary complexes (Chichibu Belt), and sedimentary rocks of Cretaceous-Tertiary accretionary complexes (Shimanto Belt).

Chemical compositions of more than 170 stream sediments were determined by ICP-AES, ICP-MS and AAS. Geochemical mapping of the Shikoku region were carried out using a geographic information system.

The averaged chemical compositions of the stream sediments from the Shikoku region, are higher in Ni, Cr, Cu, Hg, Li, K₂O and lower in CaO than those of Japanese stream sediments. The higher Li and lower CaO contents are related to wide exposure of pelitic rocks in Shikoku.

The stream sediments are grouped according to geotectonic units of the upstream area. The stream sediments derived from areas of the Sanbagawa and Chichibu Belts have wide variation of iron concentrations as total-Fe₂O₃. On the contrary, the stream sediments from the Shimanto and Ryoke Belts have generally lower concentrations of total-Fe₂O₃ with a narrow range except for several samples. In the geochemical map, the areas with higher total-Fe₂O₃ contents are located dominantly within the Sanbagawa and Chichibu Belts, forming a zonal variation. Many other mafic elements show similar patterns. These distribution patterns indicate that various amounts of mafic materials possibly of oceanic origin were incorporated into the stream sediments from the Sanbagawa and Chichibu Belts whereas such components were minor in the Shimanto and Ryoke Belts.

The areas with especially high concentrations of Cr and Ni are located along the boundary of the Sanbagawa and Chichibu Belts, indicating the effect of the Mikabu greenstones, and are also located near the ultramafic rocks within these belts. The stream sediments with especially rich in Cu are associated with the major copper deposits. The stream sediments with fairly high Hg values are found from the Chichibu and Shimanto Belts, suggesting a relation to the accretionary complexes in the forearc region.