



Assessment of hydrogeochemistry and spatial distribution of mineral waters from various water sources

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The purpose of this study was to analyze the dissolved components of various water sources in Korea and to construct a database for them. We investigated the type of water source in hot springs, mineral spring water, spring water, groundwater, and community spring. The number of drinking water products sold on the market domestic and imported bottled water, deep sea water, and functional water were also included in the study. The basic information and water quality including major elements(15), trace elements(48), and dissolved organic matter were investigated and analyzed to construct database for total 152 water sources. We compared the characteristics of the various water sources using the Piper diagram and Box-whisker plot to know the characteristics of various water sources. The map of distribution of water quality was also used to investigate the spatial correlation between bedrock geology and water quality. The highly mineralized waters with high Ca, Mg, and HCO_3 were observed at water in the eastern part of the Korean peninsula where carbonate rocks of limestone and dolomite with highly soluble minerals were distributed. On the other hand, the western part of the Korean peninsula is mainly composed of granitic and volcanic rocks with low mineral water. K and Si show similar characteristics to Ca and Mg, but the high concentrations observed in the southeastern area of Korea. They are likely to be derived from the weathering of feldspar, which is abundant in the volcanic rocks. Sulphate (SO_4) is expected to be highly correlated with the dissolution or oxidation of iron sulfide minerals in the area of volcanic rocks. Fluoride (F), chloride (Cl), and nitrate (NO_3) appear as contaminants due to natural or anthropogenic origin in the water sources. Fluorine is mainly found in spring water and spring water mainly due to the effects of mineralization and weathering of biotite in granitic rocks. Chlorine (Cl) and nitrate (NO_3) are high in the western part where spatially flat land develops, and it is highly likely to be an artificial pollution source according to agriculture and housing. V, Ge, and Se, which are known as functional components, are distributed widely in the north-south direction in the eastern region. Ge has high concentrations in Gangwon, Kyungnam and Chungbuk provinces, but Se is high in Gangwon and Kyungnam provinces. The major and trace elements of mineral and functional waters are characterized by relatively high concentrations of Ca, Mg, Se, and Ge compared to normal spring water. This shows that the elements with high mobility are linearly increasing according to the water evolution characteristics, but the elements with low mobility or being affected by the geochemical reaction are complicated.