

The Origin and Hydrogeochemical Properties for Salinization of a Shallow Coastal Groundwater in Reclaimed Area, KOREA

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Keyword: seawater intrusion, reclaimed area, isotope, salinity, reduction

Abstract

The need for more agricultural or residential areas has been reclaimed from coastal area in Korea since about 1200 AD. Owing to reclamation, groundwaters of these areas are expected to be shown hydrogeochemical properties different from those directly affected by seawater intrusion. Therefore, the purpose of this study is: (1) to characterize hydrogeochemical changes in reclaimed area, (2) to elucidate the relationship between these changes using appropriate geostatistical methods. Chemical and isotope analyses show that the groundwater compositions of the reclaimed areas are different from those of other areas in the spatial distributions of element concentrations. Especially, the δD and $\delta^{18}O$ of fresh groundwaters are close to the meteoric water line, but samples enriched in chloride are in ^{18}O -enriched with respect to the meteoric water line. The tritium values of groundwater samples with high salinity are higher than those of other area. These above results indicate the areas affected by directly seawater intrusion. Meanwhile, $\delta^{13}C$ values of saline groundwater are generally similar to those of freshwater, and those are depleted in ^{13}C with respect to seawater. These depleted ^{13}C values mean that a significant amount of the dissolved inorganic carbon (DIC) could be decomposed by microbial activities. The variation of ferric and ferrous ion and iodide concentrations observed in saline groundwater can be explained by this reduction phenomenon. Also, principal component analysis using geochemical data could reveal area affected by saltwater and by reduction.

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