

A Study on the Recharge Characteristics of Groundwater in the Jeju Samdasoo Watershed Using Stable Water Isotope Data

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(a) Purpose of study or research hypothesis

In order to evaluate the recharge altitude, this study used monthly, seasonal and altitudinal changes data of oxygen and hydrogen isotope compositions of wet precipitation samples (n = 238) that were collected for the last four years from 7 altitudes (from 265 to 1,500 m above sea level) in the Jeju Samdasoo watershed at the southeastern part of Jeju island.

(b) Key issue(s) or problem(s) addressed.

For the management of clean groundwater, it is essential to identify the origin of groundwater. Therefore, this study examined the recharge characteristics of groundwater in southeastern Jeju island.

(c) Methodology or approach used

The precipitation weighted average value of the oxygen isotope composition of the precipitation at each precipitation sampling point was calculated and compared with the groundwater value to evaluate the recharge altitude of the Jeju Samdasoo groundwater in the study area.

(d) Results or conclusions derived from the project

The stable isotope compositions of groundwater were nearly constant throughout the year and did not show a distinct monthly or seasonal change, implying the well-mixing of infiltrated water during and after its recharge. An altitudinal effect of the oxygen isotope compositions of precipitation was also remarkable with the decrease of -0.19‰ ($R^2 = 0.91$) with the elevation increase by 100 m. Based on the observed altitudinal change, the minimum altitude of groundwater recharge was estimated as 1,200 m above the sea level in the Jeju Samdasoo watershed.

(e) Implications of the project relevant to congress themes

The recharge altitude derived in this study has an important meaning as the origin of the hydrological cycle of groundwater and the formation of water quality. This project is an essential study on evaluation of the recharge altitude using the most recently developed method, which corresponds to the purpose of this congress theme and is expected to contribute to this congress.

Keywords : Groundwater recharge, Jeju Samdasoo watershed, Recharge altitude, Oxygen and hydrogen isotopes of precipitation