



## **$^3\text{H}$ - $^3\text{He}$ groundwater ages of the layered aquifer system in the agricultural fields of Jeju volcanic island, South Korea**

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In the Gosan area (the western parts of Jeju volcanic Island), due to the distribution of impermeable clay layers in the subsurface geology, two aquifer systems (shallow perched and deep regional aquifers) are locally observed. Severe nitrate contamination has been occurred in the two aquifers resulting from heavily performed agricultural activities in the study area. From the previous study, poorly grouted wells of regional groundwater wells were considered as a major pathway of the nitrate contamination in the regional aquifer by directly inflows of the nitrate-rich perched groundwater. For fully understanding the characteristics of the groundwater recharge in relations with the nitrate contamination in the layered aquifers, groundwater ages were estimated by using the  $^3\text{H}$ - $^3\text{He}$  age dating method in this study. The calculated  $^3\text{H}$ - $^3\text{He}$  ages for the perched groundwater showed younger ages as 4.4 ~ 11.3 years than that of the regional groundwater, which has ages of 22.1 ~ >60.0 years. The  $\text{NO}_3\text{-N}$  contaminant sources were derived from the recently recharged water based on the negative correlation between recharged dates and nitrate concentrations for groundwater. Moreover, the occurrence of old regional groundwater wells ( $^3\text{H} < 0.5$  TU, more than 60 years) with low  $\text{NO}_3\text{-N}$  concentrations ( $< 3.0$  mg/L) demonstrated that a separated regional aquifer system which was not affected by nitrate contaminants underlay the regional aquifer with the elevated  $\text{NO}_3\text{-N}$  concentrations.