

Using water isotopes to assess relative importance of meteoric water and mountainous groundwater to alluvial plain groundwater, northeastern Taiwan

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Evaluation of groundwater recharge sources is a vital topic in hydrology and water resource management. Stable isotopes have been highly useful in identifying original groundwater recharge sources because such isotopes exhibit unique signatures from source to source. In this study, water isotopes were used to conduct a semi-quantitative calculation of the contributions of various groundwater sources by end-member mixing analyses (EMMA). The EMMA calculation was conducted on the precipitation, stream water, and groundwater in the I-Lan County, northeastern Taiwan. Results indicate that monsoonal and geographical circumstances constrained the contribution of precipitation to stream water and groundwater. In the northern plain, contributions of summer monsoon to stream water and groundwater are 60% and 55%, respectively; by comparison, contributions of summer monsoon to stream water and groundwater are respectively 41% and 47% in the southern plain. Moreover, the EMMA results also indicate that fractional contributions of precipitation, stream water, and mountainous groundwater to plain groundwater are approximately 28, 55, and 17%, respectively. Additionally, some coastal groundwaters were evaluated containing about 50% seawater. In summary, meteoric water is the main source of the plain groundwater, and the contribution fraction from mountainous groundwater is less than that of previous study.