

## **Spatio-temporal change of groundwater chemistry in Pyosun Watershed, Jeju Volcanic Island, South Korea**

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To elucidate the spatio-temporal change of groundwater quality in a basaltic aquifer, a total of 368 groundwater samples were collected for one year between November 2010 and November 2011 from 32 pre-existing wells in the Pyosun Watershed of Jeju Volcanic Island, South Korea. The Principal Component Analysis (PCA) show that two principal components (PCs) account for 70.69% of the total variance of dataset. These are: 1) PC1 with high factor loadings for electrical conductivity (EC), Ca<sup>2+</sup>, Mg<sup>2+</sup>, Na<sup>+</sup>, Cl<sup>-</sup>, and NO<sub>3</sub><sup>-</sup>, which indicates the process of agricultural pollution, and 2) PC2 with high factor loadings for pH, HCO<sub>3</sub><sup>-</sup> and K<sup>+</sup>, which indicates a natural process (i.e., water-rock interactions). Groundwater samples whose chemistry is largely controlled by PC1 characteristically occur at the areas of low altitudes (< 200 m) where agricultural and residential areas are prevailing, while groundwater of PC2 largely occurs at high altitudes where forests and grasslands occur. Therefore, groundwater quality in the watershed shows a clear land use (and topography) control. Based on the land use control of groundwater quality, a few representative groundwater wells were selected for cost-efficient monitoring of the long-term variation of groundwater quality. The results of this study can be helpful for sustainable management of groundwater quality in the study watershed.