Construction of hydrogeological map in mountain area: Dajia River, Central Taiwan

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Taiwan is a mountainous island and two-thirds of the area occupied by mountains. To be an alternative water source for emergent use in drought, the groundwater in the mountain area should be widely investigated. However, the hydrogeological unit in mountain area is mainly composed of fractured hard rock. Both of conductance and storativity are difficult to be estimated. In addition, the hydrogeological system is complicated by geological structures, such as fold and fault. The investigation is very costly and the government has been proceeding systematically for years in Taiwan. The current work is a part of the plan. In this study, the spatial distribution of low permeable formation and geological structure were firstly determined for subdividing Dajia River in Central Taiwan into four groundwater watersheds. To focus on the one located at the central area, the hydrological and climatic information were subsequently collected for establishing the seasonal hydrological cycle in the watershed. In addition, spectrum analyses including Fast Fourier transform and cross correlation were applied to the stream flow data for evaluating the baseflow. The hydrogeological properties were estimated with pumping tests on six 100-meter-deep wells. The hydrochemistry of river water, seepage, springs and groundwater can also demonstrate the water-rock interaction, which implies the groundwater flow path and residence time. However, the temporal and spatial distribution of groundwater water level is one of the most important information, which can evaluate the groundwater flow across the hydrogeological divide. The satellite imagery and field survey are utilized to establish a database of groundwater water level in the study area and machine learning will be helpful to construct a model among the data of topography, climatology, hydrology and hydrogeology.