

Characterisation of Fracture Permeability in Mid-taiwan Mountainous Region: Experience from the Case Study of the Jhuoshuei River Basin

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Flow in fractured mountainous-foothill aquifers is of the increasing concern in Taiwan. In this paper, the preliminary results of an investigation project, which was fully funded by the Central Geological Survey, Taiwan, on the hydrogeologic characterisation of mountainous aquifers at the upper- and mid- stream of the Jhuoshuei River (Central Taiwan), were reported. The specific focus was on the hydraulic conductivity of fracture zones, whereby a theoretical and empirical based guideline for quick identification of conductible fractures was provided. A total of 29 vertical exploratory boreholes were drilled in the study area with depths of at least 100m. The lithostratigraphic characteristics of the host rock were recognized by core inspection, geophysical logging, and borehole imaging, subsequently, the key hydraulic properties of 209 designated segments were evaluated by various hydraulic tests. Within a local scale, the estimation of hydraulic conductivity for both fractured and non-fractured media (matrix) was attempted to be correlated not only with depth, lithology, porosity, but also with fracture properties like aperture width, orientation, frequency, and angle. Thereby the potential yield and hydraulic diffusivity of different hydraulic units in the study area were able to be quantified and classified. The availability of such data bank would contribute as a first step toward the understanding of a highly heterogeneous subsurface environment, and provides the evidence-based parameters for numerical modelling at the later stage.

Keywords: hydraulic conductivity; fracture zone; geophysical logging; borehole imaging; packer tests; Jhuoshuei River