

Hydrological and chemical cross-hole communication test in Taiwan Chelungpu-fault Drilling Project

Masaki Murakami, Hidemi Tanaka, Ting-Chun Kuo, Chang-Wei Tsao, Suavek Giletycz,
Wei-Ming Chen, Chien-Ying Wang, Chia-Shyun Chen, Chow-Son Chen, Tsan-Yao
Yang and Kuo-Fong Ma

University of Tokyo, National Central University, National Taiwan University

Abstract

Fluid Injection Test (FIT) between two boreholes was performed on from November 2006 to March 2007 to estimate permeability and to understand hydrological and chemical properties along Chelungpu fault.

1st FIT on November 2006, tap water was used for injected water, which was characterized by high Oxidation Reduction Potential (ORP; 250 mV) and high Dissolved Oxygen (DO; 5.6 mg/L). Because well water was characterized by low ORP (-350 - -150) and low DO (<0.5 mg/L), the arrival of injected water can be found by rise of these values. In fact, the values of ORP and DO increased to -50 mV of ORP and 2 mg/L of DO 6 days after a one-day slug test. This suggests that the pass at depth communicates with two boreholes. 1st FIT was performed for approximately 100 hours from 22:00 on 7th to 8:30 on 12th November. As a result, the values of ORP and DO increased on 13th November, which is 6 days after starting 1st FIT as well as in the previous slug test. Turbidity increased on 15th November, and then water flooded at the observer on 17th November. This suggests that the permeability is 10^{-16} m² assuming that the width of a permeable zone is 1 m by the preliminary estimation of the permeability based on the model of Kitagawa et al. (2002).

We present results of gas measurement with chemical monitoring during FIT. In addition, we will report the results of chemical monitoring in 2nd and 3rd FIT on January and March 2007.

Reference

Kitagawa, Y., K. Fujimori, and N. Koizumi 2002: Temporal change in permeability of the rock estimated from repeated water injection experiments near the Nojima fault in Awaji Island, Japan, *Geophys. Res. Lett.*, 29.