



## **Precursory Variations of Gas Flux and Water Level from an Active Mud Volcano in SW Taiwan**

Tsanyao Frank Yang (1), Jens Heinicke (2), Tsung-Kwei Liu (1), Ching-Chou Fu (1), Vivek Walia (3), and Chin-Shoun Hou (4)

(1) National Taiwan University, Department of Geosciences, Taipei, Taiwan (tyyang@ntu.edu.tw), (2) Sachsische Akademie der Wissenschaften zu Leipzig Arbeitsstelle Freiberg, Germany, (3) National Center for Research on Earthquake Engineering, National Applied Research Laboratories, Taipei, Taiwan, (4) Central Geological Survey, MOEA, Taipei, Taiwan

Many hot springs and mud volcanoes are distributed along the tectonic sutures in SW Taiwan. Bubbling gases from hot springs in this area usually are CO<sub>2</sub>-dominated with minor CH<sub>4</sub> and N<sub>2</sub> contents. In contrast, mud volcanoes generally exhibit CH<sub>4</sub>-dominated gas composition with low helium isotopic ratios (<sup>3</sup>He/<sup>4</sup>He < 0.2 Ra; Ra is air ratio), which are typical crustal signature in origin. Chung-Lun (CL) mud pool, is located in the southwest Taiwan and cut by the active Chu-Kou Fault. The natural gas has been continuously emanating from the pool for decades. Its flux is considered to be sensitive to the local stress/earthquakes, and hence, it is named as 'earthquake pool' by local people. The main component of its bubbling gas is CO<sub>2</sub> (>75%) with minor CH<sub>4</sub> (<10%). The carbon isotopic data indicate the abiogenic source for both CO<sub>2</sub> (δ<sup>13</sup>C = -2.5 ‰) and CH<sub>4</sub> (δ<sup>13</sup>C = -38 ‰). Interestingly, gases collected from CL mud-pool show anomalous high helium isotopic ratios (<sup>3</sup>He/<sup>4</sup>He = 5.2~6.6 Ra). It implies that significant mantle-derived gas source may exist underneath CL area. A continuous monitoring system was setup to record the gas flow at CL mud pool, using a big funnel (1m x 1m) to cover the bubbling gas of the mud pool. Anomalous gas flux and water level variations of the mud pool have been observed before some large earthquakes (M<sub>L</sub> >6.0) occurred around central Taiwan in 2009. Therefore, its emanating flux is believed to be sensitive and controlled by the local stress and would be useful for earthquake surveillance.