Magnetic minerals in fluid mud from active mud volcanoes, southwestern Taiwan

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Active mud volcanoes are widely distributed in southwestern Taiwan. The mud volcanoes erupt along the Gutingkeng anticline and Chishan Fault in the foothill belt, and coastal plain about 30 km in the southeast of Tainan city. In Plio-Pleistocene marine strata around the Gutingkeng anticline, widespread occurrence of ferrimagnetic greigite (Fe3S4) and pyrrhotite (Fe7S8), which sometimes coexist with detrital magnetite, have been reported (Horng et al., 1992a,b; Horng et al., 1998). Jiang et al. (2001) suggested that the neo-formation of greigite is associated with diagenetic oxidation and dissolution of pyrite, which may be occurred by hydrocarbon-bearing fluids and gas from mud volcano. Recent geochemical study suggested that greigite and pyrrhotite of these strata are preserved in environments that are poor in organic carbon and rich in reactive iron (Kao et al., 2004).

We collected magnetic minerals from the fluid mud of several volcanoes with a magnetic finger separator. To identify these magnetic minerals, rock magnetic experiments were carried out by using a vibrating sample magnetometer and an X-ray diffractometer. Only greigite was detected from the mud volcano at Hsiaokunshui along the Gutingkeng anticline. Magnetite and iron sulfide or maghemite were detected from the mud volcano at Wushanding along the Chishan Fault. These magnetic minerals may come from surrounding strata or neo-formation in the fluid mud. In either case, the fluid mud seems to be a good condition for meta-stable greigite and pyrrhotite.

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