Geophysical Research Abstracts,
Vol. 11, EGU2009-8105, 2009
EGU General Assembly 2009

Chemical weathering fluxes in the groundwater flow system determined by trace elements and stable isotopes in southwestern Taiwan

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The significance of chemical weathering in the fluxes of elements is poorly known as the nature and kinematics of the weathering process are difficult to constrain. Studies of a rapidly eroding environment benefit us by providing a better chance to quantify the controls of chemical weathering and climate-sensitive feedbacks as the detritus constantly bring material to the global carbon cycle. The island of Taiwan is a young mountain belt formed by oblique collision between the Philippine Sea plate and the Eurasian plate since 5 Ma. Frequent thrust-faulting earthquakes and rapid uplift bear witness to its active mountain-building activities. The Pingtung Plain, one of the most important aquifers in southwestern Taiwan, is dominated by subtropical climate. The long-term annual rainfall is between 2,500 and 3,000 mm and the annual evaporation is 1,120 mm. The plain is geologically bounded by low hills of Quaternary sediments to the north and west, the Tertiary Central Range to the east, and the Taiwan Strait to the south. To gain a better understanding toward the geochemical behavior of the trace elements in groundwater and to examine the chemical fluxes, more than 50 water samples were collected from wells during October 2008 to December 2008. Temperature, pH, specific conductivity, major ions, trace elements and the environmental stable isotopes were determined. These isotopic and elemental compositions not only reveal unique features for the recharge and flow pattern of the groundwater but also help to assess the magnitude of chemical weathering in the source area.