

Comparison of Degassing Methods for Seismo-Geochemical Monitoring

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Flux change of gas emitted from a fault zone is a candidate of a good indicator of state of both an active fault and a hypocentral region to which the fault extends. In order to quantify the gas flux from deep crust, a gas chromatography and a quadrupole mass spectrometer are available for the purpose. (e.g Sugisaki(1978), Takahata(1997)) In either case, it is essential to realize a high-efficient and stable extraction method from groundwater including hot spring water. This study will discuss about the best method for continuous monitoring of gas flux based on comparing both gas permeable membrane method and depressurization method from viewpoints of extraction efficiency and fractionation effect.

First method, gas permeable membrane method is realized by using a gas extraction module in which 3000 hollow fibers made by gas permeable membrane are put. Water flows outside of fibers. Dissolved gas in water can go through a membrane and come inside a hollow fiber. Second method depressurization method is achieved by a hand-made instrument which consists of an extraction block and a vacuum pump. Inside of the extraction block is depressurized down to about 10 Pa by the pump, thus the instrument can degas effectively. However it is hard to keep up continuous extraction. In other words, it is quasi-continuous extraction.

Sample is tap water bubbled by atmospheric air. Total volume and composition of extracted gas and composition of atmospheric air are measured by a quadrupole mass spectrometer. The temperature of sample water is controlled by a thermostat at from 10 to 60 degree every 5 degree. We will show that depressurization method is able to extract dissolved gas from water effectively and stably according to comparison of data.