Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

SCG64-P01 Room:Convention Hall Time:May 21 18:15-19:30

Variation of concentration of dissolved gas in groundwater observed at Atotsugawa station

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A fault zone can be regarded as paths of crustal fluids. Quantification of chemical properties of the fluids penetrating the fault zone and their variation with time are important subjects to understand the relationship between fault zone activity (earthquake) and geochemistry. For the data from continuous monitoring of the fluids in the fault zone, local variations by difference in geological structures, the seasonal variation and secular change are should also be taken into account.

A new machine for continuous monitoring of dissolved gas using a quadrupole mass spectrometer (GROWDAS:GROund Water Data Analyzing System) is established and started measurement at Atotsugawa in Gifu Prefecture. In recent 10 months, we captured specific signature of chemical variation with time. We examined the factors that cause changes in the concentration of dissolved gas by comparing a variety of factors (temperature, pressure, precipitation, crustal movement). In this presentation, we discuss fundamental processes of change in chemical variations with time in the fault zone.

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Towards real-time fault monitoring: A real-time gas composition data delivery by GROWDAS

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Understanding fault activity is important to estimate earthquake generation process and for disaster prevention, however, there is no certain index for the fault activity based on geochemical observation. The goal of the GROundWater Data Analysing System (GROWDAS) Project is to understand the fault activity by continuous observation of dissolved gas composition in ground water within a fault. To observe gas composition continuously and automatically, a new gas analyzer GROWDAS was developed. Currently, the GROWDAS provides relative concentration of gases within the Atotsugawa fault. We aim to reveal the relationship between fluctuations of gas concentration and change in the fault condition using the data, and establish a model for the evaluation of the fault activity. We believe the data are important not only for researchers but also for the public to predict the fault activity, and therefore, we are trying to open all the data.

The GROWDAS is mainly composed of five systems, which are Purification-system, Analysis-system, Exhaust-system, Control-system and Power control-system. Analysis-system consists of the Heating and Cooling subsystems. We currently measure relative concentrations of ^{4}He, CH_3^+, H_2O, N_2, O_2, ^{36}Ar, ^{40}Ar and CO_2gases, which are analyzed with the following procedure.

1. Get gases from pumping groundwater by degassing in Purification-system, which are dried by Cooling-system and conducted to Analysis-system. The degassed water is disembogued to outside of GROWDAS.
2. The purified and dried gas is analyzed in Analysis-system. The gas is then conducted to Exhaust-system after analysis. An external PC is linked for recording and monitoring the data.

All above procedure is done automatically by Control-system and the data is sent to the data server installed at the University of Tokyo. The data of daily average (Day data) is uploaded to the web server and displayed in a chart for recent 30 days. This quasi-real-time data delivery is opened to public (http://growdas.com). We plan to provide a new download system, with which anyone can access and download the original and processed data and the charts in selected period.

Keywords: fault, grownd water, continuous observation, gas, Mass Spectrometry