

AHW023-14

Room:102

Time:May 25 12:30-12:45

Age dating of spring and groundwater and its modeling in Mt. Tsukuba, central Japan

Maki Tsujimura^{1*}, Takahiro Matsumoto¹, Koichi Ikeda¹, Kazuyoshi Asai²

¹Life Environ. Sci., Univ. Tsukuba, ²Geo Science Laboratory

To estimate the spring and groundwater residence time and to understand the surrounding groundwater flow system, the multi-tracer approaches using CFCs and stable isotope, and numerical modeling were applied to Mt. Tsukuba. From September 2009 to June 2010, field survey was conducted every 3 months, for spring and groundwater. Residence time and recharge elevation were respectively estimated from dissolved CFCs concentration and oxygen stable isotope. Using Visual MODFLOW, distribution of groundwater potential was estimated and particle tracing method computed the flow line and residence time. These values were compared with the estimated results derived from tracers. Parameters such as hydraulic conductivity were calibrated by trial and error, thus we tried to make clear the groundwater flow system.

Water chemistry was almost constant during one year: it means that there is no seasonal change of flow path and residence time. Modeling results show that groundwater level is up to 500 m and altitude where topography intersects the water table is between 300 m and 400 m. The springs located at an altitude more than 300 m show a residence time ranging from 1 to 10 years, whereas springs and groundwater located at the altitude less than 300 m show an estimated residence time, ranging from 20 to 40 years. In the gabbro catchment at the upper part of the mountain, groundwater is characterized by an almost vertical flow type. However, in granite catchment at the lower part of the mountain, groundwater is characterized by a horizontal flow type; that may explain its longer residence time. In the foot of the hillslope, an upward flow is dominant.

Keywords: Mt. Tsukuba, groundwater flow system, residence time, CFCs, numerical model