[EE] Evening Poster | S (Solid Earth Sciences) | S-GC Geochemistry

[S-GC45]Volatile Cycles in the Deep Earth - from Subduction Zone to Hot Spot

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Volatile geodynamics and chemical differentiation in the mantle and crust by drastically changing mineral stability and rheological behavior. Fractionation-processes such as partial melting, hydration, and dehydration are all controlled by volatiles in the rocks. A significant portion of the volatiles in the Earth has been thought to be present in the atmosphere and oceans as a consequence of extensive degassing during accretion and subsequent mantle degassing. On the other hand, it has been recently recognized that substantial amounts of volatiles are recycled back into the mantle at subduction zones, where intensive devolatilization of descended materials during arc magma generation was once thought to act as an effective "subduction barrier". However, fundamental questions still remain, such as: how are volatiles species distributed throughout the early and present Earth? What are the mechanisms for, and rate at which, volatiles are fluxed between the atmosphere, crust, and mantle? And what role have volatiles played in driving the evolution of the Earth? The possible role of the core in storing primordial volatiles is also poorly constrained. We therefore welcome contributions from experimental, observational, and modeling studies that help shed light on the deep cycles of volatiles, such as hydrogen, carbon, nitrogen, noble gases, halogens and sulfur. We particularly encourage studies linking the behavior of multiple volatile elements and their isotopic compositions. Studies investigating the linkage between volatile and solid geochemical tracers, the phase equilibria of volatile-bearing mantle assemblages, and the effect of volatiles on the physical properties of the mantle are also welcome.

[SGC45-P02]Origin of Helium and CO_2 Gas from Natural Carbonated Waters in the North-Eastern Area of South Korea.

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Many carbonated springs are found in Mesozoic granitoids and surrounding rocks in South Korea. Their presence is mainly restricted to the Kangwon and Kyungpook provinces. Discharge of many carbonated waters is mainly related to the geologic structures, i.e., the geologic boundaries, fault and dykes that could be a pathway for the rising of deep-seated CO_2 gas.

The composition of carbonated waters can be classified into three chemical types; Ca-HCO_3 water, Ca(Na)-HCO_3 water, and Na-HCO_3 water. Most of the carbonated waters are characterized a high CO_2 concentration (P_{CO2} 0.12 atm to 5.21 atm), a slightly acid pH (5.19 to 6.47), and high ion concentration.

Oxygen and hydrogen isotope data indicates that the carbonated waters are of meteoric origin. δ^{13}C data of –6.6 to –0.3‰ suggest that the CO_2 gas in carbonated waters is mainly derived from a deep-seated source, but is partly mixed with CO_2 derived from carbonate rocks. The ^{3}He/^{4}He ratios of carbonated waters range from 1.51×10^{-6} to 8.38×10^{-6}. The data are mainly plotted along the air-mantle mixing line on the ^{3}He/^{4}He versus ^{4}He/^{20}Ne diagram. These data strongly supported the deep-seated origin of CO_2 gas by δ^{13}C data.