Geophysical Research Abstracts
Vol. 20, EGU2018-11894, 2018
EGU General Assembly 2018

Origin, recharge age, geochemistry of carbonated hot springs in the Jeju island, South Korea

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In this study, geochemical composition, CFCs(Chlorofluorocarbons), δ18O, δD, δ13C isotopes and noble gas isotopes (He, Ne) were analyzed to determine their recharge age, source of CO_2 gas and noble gases of carbonated hot spring water and cold groundwater samples collected in the Jeju island, South Korea.
The pH of the carbonated hot waters ranges from 6.21 to 6.84, and their electricities show higher values(1,928$\sim$4,720μS/cm) than that cold groundwater and water temperature ranges from 28.2 to 33.4 celsius degree. Their chemical composition is classified as Mg(Ca, Na)-HCO_3 and Na(Ca, Mg)-HCO_3 types. As a result of the calculation of hot spring water and cold groundwater recharge age using CFCs concentrations as an environmental tracer, their ages were estimated to be about 47.5$\sim$57.2 years and about 30.3$\sim$49.5 years, respectively. The δ13C data of carbonated hot waters ranges from -1.77 to –7.27‰ and is plotted on the deep-seated zone or the mixing zone of the deep-seated and inorganic origin. Noble gas isotopic ratio (3He/4He, 4He/20Ne) indicates that helium gas of carbonated hot waters comes from deep-seated magma origin.

Key words : hydrochemistry, CFCs, δ18O, δD, δ13C, noble gas isotope, recharge age