Preliminary report on isotopic and geochemical analyses of drip water samples from Buniayu limestone caves, in Indonesia

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We carried out isotopic and geochemical analyses of drip waters collected from Buniayu limestone caves in Sukabumi, West Java, Indonesia. Aims of the analyses are understanding of formation process of the cave drip water and chemical reactions related to the formation of speleothem, and also estimating infiltration ages of the drip waters (= traveling times of percolating rainwater from the ground surface to the cave ceiling). In this presentation, we will show preliminary results of data analyses of major chemical compositions, stable water isotope ratios, stable carbon isotope ratios of dissolved inorganic carbon (DIC), and dissolved rare-gas isotope ratios ($^{3}He/^{4}He$ and $^{4}He/^{20}Ne$) for the tritium(^{3}H)-^{3}He method.

The drip waters are shown to be mostly originated from local meteoric water (rain) by their stable water isotope compositions. Calcium ion and HCO_3^-, which occupy the greater part of the dissolved constituents in the drip waters, are in chemically equivalent (Ca^{2+} : HCO_3^- = 1 : 2). This relation shows that Ca^{2+} and HCO_3^- of the drip waters are derived from the chemical reaction between the limestone bedrock and the infiltrating rain water absorbing a CO_2. The delta ^{13}C values of DIC of the drip waters are not between the delta ^{13}C of DIC equilibrated with atmospheric CO_2 and that of the limestone, but are nearly in the middle of delta ^{13}C values of DIC equilibrated with soil-CO_2 and the limestone, therefore the CO_2 absorbed in the infiltrating rain water is expressed to be CO_2 originated in the soil layer over the limestone bedrock. $^{4}He/^{20}Ne$ ratios of dissolved gases in the drip waters clearly indicate that there is no influence of volcanic gas to the dissolved He in the drip waters. $^{3}He/^{4}He$ ratios of the dissolved gases in the drip waters are all somewhat higher than that of atmospheric He, so the excess ^{3}He are thought to be the decay product of ^{3}H.