

Derivation of travel time of limestone cave drip water using tritium/helium-3 dating method

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A method of deriving the travel time of drip water based on the tritium/helium-3 ($^3\text{H}/^3\text{He}$) dating method was demonstrated in limestone caves in Indonesia. The examined drip waters from two caves, which were taken using different methods, included 5.37×10^{-15} ccSTP/g and 3.36×10^{-15} ccSTP/g of tritiogenic ^3He . From the derived tritiogenic ^3He contents and the measured tritium concentrations of the drip water samples (2.02 TU and 1.19 TU), the $^3\text{H}/^3\text{He}$ ages (travel times) of the drip waters from the two caves were estimated as 12.9 years and 13.5 years. The latter age is probably underestimated because re-equilibration of He between drip water and cave air is expected to occur during sampling. For reliable derivation of $^3\text{H}/^3\text{He}$ age, it is advisable to take a drip water sample that is kept isolated from the cave air.