Groundwater dating conducted in and around the Mizunami Underground Research Laboratory

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Groundwater dating was conducted in and around the Mizunami Underground Research Laboratory (MIU). MIU is located at discharge area in local groundwater flow regime, where groundwater age have not been estimated due to low DIC for ^{14}C and external He flux for ^{4}He. The groundwater samples were collected from borehole drilled in the galleries in the MIU. ^{14}C concentration can be evaluated accurately by changing pre-treatment method from precipitation method to gas stripping method. Helium was accumulated by not only in situ production but also external flux. Helium age can be evaluated by excluding the contribution of external flux using different ratio of external flux contribution data. ^{14}C age and ^{4}He age were estimated about 20,000 years around the MIU. The estimation of the recharge temperature by noble gas is also conducted. The estimated recharge temperature is around 6 ℃. This temperature is about 9 ℃ cooler than present annual average temperature, which agree with estimation of modern analog method conducted around the MIU. Therefore, groundwater around MIU recharged in glacial period. It is consistent with ^{14}C age and ^{4}He age. The groundwater age around MIU can be determined consistently by multiple groundwater dating methods, which are ^{14}C, ^{4}He and noble gas temperature.

Keywords: groundwater age, carbon 14, Helium 4, noble gas temperature

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