

Origin of saline waters distributed along the Median Tectonic Line in southwest Japan

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To identify of metamorphic dehydrated fluid as source fluid of hot spring water, we conducted chemical and isotopic analyses of water and accompanied gas samples collected from hot-spring wells along the Median Tectonic Line (MTL) in the forearc region of the southwestern part of Japan. As a result, we found hot spring waters having anomalous dD and d¹⁸O compositions as compared with modern seawater and shallow groundwater in Wakayama and Shikoku regions. Judging from data in relative B-Li-Cl composition and He isotopic systematics, the source fluid of the hot springs in Shikoku could be identified to be one of diagenetic fluids. On the other hand, the source fluid of the hot springs of Wakayama had different B-Li-Cl composition and higher 3He/4He ratio in comparison with diagenetic dehydrated fluids and then the fluid was thought to be originated from metamorphic dehydrated fluid as well as Oita plain. There was another striking contrast between the source fluid of Wakayama and Oita and that of Shikoku and Miyazaki; accompanied gases by the former were rich in CO₂, whereas those with the latter were rich in CH₄, and CO₂ in the accompanied gases of Wakayama and Oita is mostly derived from marine carbonate like volcanic gases in subduction zones. Moreover, the Li-B-Cl compositions of them showed transitive values between the relative composition of diagenetic fluids and those of volcanic thermal waters. Consequently, the source fluid of hot springs in Wakayama and Oita was likely to be dehydrated metamorphic fluids released from the subducting Philippine-Sea plate.

Keywords: hot spring water, dehydrated fluid from subducting plate, Median Tectonic Line