

Mantle Helium Released from a Fore-arc Region of the SW Japan Arc

Turhan Dogan[1]; Hirochika Sumino[2]; Keisuke Nagao[2]; Kenji Notsu[3]

[1] Lab. for Earthq. Chem., Grad. Sch. of Sci., The Uni. of Tokyo ; [2] Lab. Earthquake Chem., Univ. Tokyo; [3] Lab. Earthquake Chem., Univ. Tokyo

Helium with high $^3\text{He}/^4\text{He}$ ratios is released from Earth's mantle to the surface where magmatic activity occurs. However, helium rising from mantle was also reported in a calm seismicity area without volcanic activity, such as Oberpfalz, Germany, and in active regions of Greece, Turkey on a continental region. In addition, mantle helium is released from a forearc region of the SW Japan arc, where the Philippine Sea plate is subducting. There, detailed noble gas studies revealed geographical distribution pattern of the $^3\text{He}/^4\text{He}$ ratio in Kii Peninsula, district of the eastern sector, but noble gas isotope data throughout Shikoku Island of the western sector was not accomplished. Therefore, we have carried out mantle helium survey throughout Shikoku Island, where the Median Tectonic Line (MTL) active fault system is running in the east-west direction.

The noble gas results of present study from 31 spring water samples throughout Shikoku, compiled with unpublished data of helium isotopic ratio from 15 spring water by Nagao and some data published in literature by Sano and Wakita (1985), Matsumoto et al. (2003) have revealed the $^3\text{He}/^4\text{He}$ range from 3.57RA in Ishizuchiyama to 0.09RA in Hondani in this whole region.

The results show that high $^3\text{He}/^4\text{He}$ ratios are observed mainly in three areas. The first area along MTL with approximately 20km its north and south zone showed $^3\text{He}/^4\text{He}$ to be highest 3.57RA in Ishizuchiyama and higher than 1RA in 11 other sites. The second area that represented high $^3\text{He}/^4\text{He}$ is Engyoji and Wakamiya area, facing Tosa Bay, with 1.48RA and 1.66RA respectively. Finally, mantle helium is observed at five sites in the west part of the island where the highest value is 2.90RA in Takatsuki and lowest one is 1.43RA in Hosenbo. Geographical distribution of mantle helium release is related to the tectonic structures of this region.