Goldschmidt 2024 Abstract
https://doi.org/10.46247/gold2024.24176

Mercury emission related to subducting Philippine Sea Plate in Southwest Japan

HARUE MASUDA[1] AND SHINJI NAKAYA[2]

[1]Osaka Metropolitan University
[2]Shinshu University
Presenting Author: harue@omu.ac.jp

Mercury is one of the most mobile elements in geosphere, which mostly emits on the Earth's surface via magmatic and its associating hydrothermal activities. However, Hg contaminated groundwaters occasionally appear in the Southwest Japan, where Philippine Sea Plate is subducting from the Nankai Trough but not associating with magmatic activity. Those occurrences are overlapped with the areas of low frequency earthquakes (LFE). In this area, it has been explained that dehydration depths of the oceanic crust are too shallow to cause magmatism, and that the dehydrated fluids are upwelling directly to the surface. We hypothesized that the Hg emits in association with the dehydrated fluids, and the Hg concentration of 606 soil samples is mapped to document the possible Hg emission related to unique tectonic activity of this area. The median and average concentrations of the Hg were 146 and 236 ppb. About 8 % of the samples, especially taken from near hot spring areas, contained ≥500 ppb Hg with the maximum >4000 ppb. In addition to such occurrences, high concentrations of Hg appear along and near the active faults, especially Median Tectonic Line (MTL) and its derivative faults. Moreover, the median Hg concentrations are higher in the soils taken from the south of MTL (150 ppb) than those in the north (85 ppb). Epicenters of low frequency tremor (LFT), which is explained to be caused by slow-slip faults, zonally distribute in the south of MTL in the studied area. Dehydrated fluid is believed to migrate at the same timing of the LFE and LFT. High Hg concentrations ≥500 ppb also appear near the Hg and sulfide ore deposits, which occurred related to the Miocene volcanic activities, suggesting some part of Hg derived from host rocks of the soils. However, the coincidental occurrences of Hg related to LFT and LFE, present local hydrothermal activities and faults suggest that a certain fraction of the Hg would be emanated with dehydrated water from the subducting slab beneath the studied area through active and fossil faults at present.