

Origin of atmospheric gaseous mercury using the Hg/CO ratio in pollution plume observed at Mt. Fuji Weather Station

NAGAFUCHI, Osamu^{1*} ; YOKOTA, Kuriko² ; KATO, Syungo³ ; OSAKA, Ken'ichi¹ ; NAKAZAWA, Koyomi¹ ; KOGA, Masaru¹ ; HISHIDA, Naoko¹ ; NISHIDA, Yuki¹

¹the University of Shiga Prefecture, ²Toyohashi university of technology, ³Tokyo Metropolitan University

Mercury (Hg) is a global pollutant, which is dispersed worldwide mainly in gaseous elemental form via long-range atmospheric transport. Due to the increasing fossil fuel consumptions and industrial emissions, Asia now contributes more than 50% of the global anthropogenic Hg emission with China being the largest atmospheric Hg emitter. Previous studies have demonstrated that the trans-Pacific Asian Hg export could impact North America. Therefore, we would like to study its transport mechanism in the free troposphere by monitoring atmospheric Hg concentrations at high elevation site in Japan. The sampling site is at the summit of Mt. Fuji Weather Station, which is 3,777 m above sea level.

Gaseous mercury and particulate mercury in the atmosphere were separately collected by using a mercury sampler developed by Kagaya et. al., (2007). A quartz filter (Palflex2000, Tokyo Dylec) was attached at the tip of a mercury absorbing tube in which amalgamated gold was impregnated, and the air was aspirated by an air pump through the filter and the mercury absorbing tube at a rate of 0.5L/min. Particulate mercury was filtered by the quartz filter and gaseous mercury was absorbed by the amalgamated gold in the tube. Both particulate and gaseous mercury were analyzed by an atomic absorbance spectrophotometer (Nippon Instruments, MA-2000) after vaporization by heating.

The mercury sampler was set in a place 5m or more away from the building at summit of Mt. Fuji (N35.21'.38", E138.43'39"). The sampling was performed from 11 to 18 August, 2008. The filter and the absorbing tube were changed with 12-24 hour-intervals.

Atmospheric mercury concentrations observed at summit of Mt. Fuji and Japan. High concentrations of both gaseous and particulate mercuries were observed at the summit of Mt. Fuji. Swartzendruber et al. reported the gaseous and particulate mercury concentrations in the free troposphere at the Mt. Bachelor as 1.54 and 0.0043 ng/m³, respectively. Hans R. Friedli et al reported that gaseous elemental mercury were found in industrial plumes exiting China, Korea, and Japan ~6.3ng/ m³, ~3ng/ m³ and ~3ng/ m³, respectively. The higher atmospheric mercury concentrations at the summit of Mt. Fuji may imply that there is a specific pollution source in the East Asia. Because from the result of the back trajectory calculation, the air mass came from the China during this observation periods.