Goldschmidt 2024 Abstract
https://doi.org/10.46247/gold2024.23850

Sources of anthropogenic Pb in wet depositions collected in remote and urban areas in Japan

YUHEI YAMAMOTO[1], RYOICHI NAKADA[2], KAZUYA NAGAISHI[3], SHUN-ICHI TOKORO[4], YOICHI KIKUCHI[5], JUN NISHIMOTO[6] AND SHOJI IMAI[1]

[1]Graduate School of Technology, Industrial and Social Science, Tokushima University

[2]Kochi Institute for Core Sample Research, Institute for Extra-cutting-edge Science and Technology Avant-garde Research (X-star), Japan Agency for Marine-Earth Science and Technology (JAMSTEC)

[3]Marine Works Japan Ltd

[4]Graduate School of Science and Technology for Innovation, Tokushima University, 2

[5]Faculty of Education, Iwate University

[6]Faculty of Life and Environmental Science, Prefectural University of Hiroshima

Presenting Author: yamamoto.yuhei@tokushima-u.ac.jp

Pb isotope ratios of wet deposition (snow and rain) collected from remote and urban areas in Japan were precisely determined to identify sources of anthropogenic aerosols. Samples were collected from 1 urban area (Niihama City, Ehime Prefecture), 3 suburb areas, and 5 remote mountain areas. Remote areas were more than 30 km from Niihama, whereas suburb areas were less than 30 km from Niihama. Snow was collected using a Ziploc^{R} freezer bag (Asahi Kasei) as soon as possible (within 24 h) after each snowfall event without melting and compaction. Rain was collected in a low-density polyethylene (LDPE) bottle using PE funnel and a PFA tube. Melted snow and rain were filtered through a membrane filter (pore size 0.45 μm). Solid phase extraction was conducted using a column of NOBIAS chelate PA-1 (Hitachi High-Technology) and an auto solid phase extractor (SPE-100, Hiranuma) to remove Tl. After sample introduction, 3 M nitric acid was passed through the column and Pb was collected. The eluent was evaporated and redissolved in 2% nitric acid to make a concentration of 1 μg/L of Pb. A double-focusing MC-ICP-MS (NEPTUNE, Thermo Fisher Sci.) with a desolvating nebulizer (Aridus II^{TM}, Teledyne CETAC Technologies) was used for Pb isotope measurement. NIST SRM 981 Pb and SRM 997 Tl solutions were used as a Pb standard and a doping Tl standard for mass calibration.

Pb concentrations of rain were from 0.0020 to 0.408 μg/L, whereas those of snow were from 0.159 to 1.94 μg/L. The $^{206}Pb/^{204}Pb$, $^{207}Pb/^{206}Pb$ and $^{208}Pb/^{206}Pb$ values of rain were 17.9766 18.2028, 0.085801 0.86759 and 2.06412 2.12250, respectively. The $^{206}Pb/^{204}Pb$, $^{207}Pb/^{206}Pb$ and $^{208}Pb/^{206}Pb$ values of snow were 17.5897 18.1572, 0.85829 0.88399 and 2.09905 2.13902. The RSD of 206Pb/204Pb for rain was 0.009% at a concentration of 2 ng/L. According to the comparison of Pb isotope ratios for reference materials and atmospheric aerosols in China, Korea and Japan (Fig. 1), the sources of Pb of wet depositions in remote areas were mainly long-range transport from the continent, whereas those in urban areas were mainly fly ash from waste incineration.