Detection of Fallout in Smoke from Forest Fires along the Pacific Coast: A Study of Actinide and Fission Product Transport

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The release of anthropogenic radionuclides into the environment can occur as the result of medical isotope production, weapons testing, nuclear accidents, nuclear reactors, and nuclear reprocessing. Resuspension of radionuclides can occur during activities such as environmental remediation and/or natural disasters. Several studies have evaluated the resuspension of anthropogenic radionuclides from natural disasters such as forest fires in areas around Chernobyl [1-4]. During September 2020, forest fires broke out all along the west coast of North America and smoke from the burning fires was collected on air samples in Richland, WA. The samples were analyzed for $^{239,240,241,242}Pu$, ^{237}Np, ^{90}Sr, and ^{137}Cs by thermal ion mass spectrometry (TIMS), gross alpha beta (GAB), or gamma emission analysis (GEA). Filters that collected resuspended particles from the forest fires showed elevated levels of ^{242}Pu, ^{237}Np, ^{137}Cs, and ^{90}Sr relative to global background. Data collected showed the concentrations of these nuclides increased by an order of magnitude by comparison to filters without particulates from the forest fires. To try and locate the origin of the radionuclides in the smoke atmospheric modeling was conducted using the ^{137}Cs data from the GEA counts. Modeling data suggests forest fires from the western-central part of Oregon is the probable location of the resuspended radionuclides collected on the air filter samples. This data can be used to help understand radionuclide resuspension and transport from natural disasters like forest fires.

References

[1] Dalaka, Gini, Diapouli, Elftheriadis (2019), *Air Qual Atmos Health* 12, 627–634.

[2] Evangeliou, Balkanski, Cozic, Hao, PapeMøller (2014), *Environment International* 73, 346–358.

[3] Hirose & Povinec (2015), *Sci. Rep.* 5, 15707.

[4] Lujanien, Ogorodnikov, Budyka, Skitovichh, and Lujanas (1997), *J. Environ. Radioactivity* 35, 71-90.