Sampling atmospheric Mo content and isotopic composition on a global scale

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The extensive global survey of Pb concentrations and isotopic compositions by Rosman and Bollhoefer [1] [2] enabled the authors to describe specific geographic regions on the basis of $^{206}Pb/^{207}Pb$ and $^{208}Pb/^{207}Pb$ isotope abundance ratios. Rosman and Bollhoefer identified the long range transport of Pb from China and Russia in addition to lead derived from lead additives added to fuel as contributors to atmospheric lead in the western US and Europe. Molybdenum might also be used to trace anthropogenic emissions to the atmosphere because of its use in many industrial activities including MoS_2 added to diesel fuels, as a catalyst in hydrocarbon production, and because of emissions from coal-fired power plants. Lane et al., [3] measured the isotopic composition of Mo sampled from the air in Calgary, Canada and found $\delta^{98/95}$Mo values ranged from -0.18 ‰ to +0.94 ‰. This variation in $\delta^{98/95}$Mo values suggested that Mo isotope abundances could be used to determine the sources of Mo in the air. To explore this opportunity, we have begun to measure Mo concentrations and $\delta^{98/95}$Mo values from the archive of air samples studied in [1] [2]. Early results reveal variation in Mo concentrations among samples collected from different geographical locations and resolvable seasonal variations at a given location (e.g. 0.6 ng/m^3 from January to March and 0.4 ng/m^3 from June to August in Calgary, Canada). Seasonal trends are seen in $\delta^{98/95}$Mo values for some locations (~1.5 ‰), however there does not appear to be evidence for distinct regional isotope compositions.

[1] Rosman, K. and Bollhoefer, A. (2000) *Geochmicia et Cosmochimica Acta*, **64**, 3251-3262. [2] Rosman, K. and Bollhoefer, A. (2001) *Geochmicia et Cosmochimica Acta*, **65**, 1727-1740. [3] Lane, S., Proemse, B.C., Tennant, A., and Wieser, M.E. (2013) *Analytical and Bioanalytical Chemistry*, **01**, 405-414.