1.081 Towards reduced human exposure to mercury: The need for near-term global action.

Early Career Scientist

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Abstract:

Toxic pollutants, such as mercury (Hg), are emitted into air worldwide by multiple natural and anthropogenic sources. The atmosphere provides both a route of exposure (via inhalation) and a means for the efficient long-range transport and transformation of such pollutants in the environment. Through a modeling approach, we aim to draw the link between global emissions and local impacts of Hg. Hg is of global concern owing to its long-range atmospheric transport, its persistence in the environment, its ability to bioaccumulate in ecosystems, and its negative effects on human health. The UNEP Minamata Convention on Hg, a global treaty to protect human health and the environment from adverse effects of Hg, entered into force in August 2017. Under this Convention and as a co-benefit of greenhouse gases mitigation policies, global Hg anthropogenic emissions are expected to decrease. Here, we investigate the consequences of delayed global action on global Hg atmospheric deposition and local contamination. Using a global multi-media Hg box-model, we find that, under a business-as-usual scenario, each 5-year delay in near-term peaking of Hg emissions in turns delays by additional extra 3 years the decrease of global Hg deposition to ecosystems under a given targeted threshold. In order to derive local-scale impacts, we use a combination of chemical transport modeling (GEOS-Chem) to predict local Hg deposition, and lake modeling to predict concentrations in fish. Here, we focus on remote tribal regions of Eastern Maine (USA) as Native Americans are particularly affected by Hg contamination due to their traditional dependence on subsistence fishing. We show that each 5-year delay in reducing global Hg emissions leads to a local 2% increase in atmospheric deposition to ecosystems. Consequences on fish contamination will also be discussed.

Overall, our results underline the importance of near-term action for limiting the Hg burden of future generations.