National Institute of Environmental Health Sciences

Worldwide trend of atmospheric mercury since 1995

Author(s): Slemr F, Brunke EG, Ebinghaus R, Kuss J
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Abstract:

Concern about the adverse effects of mercury on human health and ecosystems has led to tightening emission controls since the mid 1980s. But the resulting mercury emissions reductions in many parts of the world are believed to be offset or even surpassed by the increasing emissions in rapidly industrializing countries. Consequently, concentrations of atmospheric mercury are expected to remain roughly constant. Here we show that the worldwide atmospheric mercury concentrations have decreased by about 20 to 38% since 1996 as indicated by long-term monitoring at stations in the Southern and Northern Hemispheres combined with intermittent measurements of latitudinal distribution over the Atlantic Ocean. The total reduction of the atmospheric mercury burden of this magnitude within 14 years is unusually large among most atmospheric trace gases and is at odds with the current mercury emission inventories with nearly constant anthropogenic emissions over this period. This suggests a major shift in the biogeochemical cycle of mercury including oceans and soil reservoirs. Decreasing reemissions from the legacy of historical mercury emissions are the most likely explanation for this decline since the hypothesis of an accelerated oxidation rate of elemental mercury in the atmosphere is not supported by the observed trends of other trace gases. Acidification of oceans, climate change, excess nutrient input and pollution may also contribute by their impact on the biogeochemistry of ocean and soils. Consequently, models of the atmospheric mercury cycle have to include soil and ocean mercury pools and their dynamics to be able to make projections of future trends.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Air Pollution, Food/Water Quality, Other Exposure

Air Pollution: Other Air Pollution

Air Pollution (other): Mercury

Food/Water Quality: Other Water Quality Issue

Water Quality (other): Mercury

Geographic Feature:

resource focuses on specific type of geography

Ocean/Coastal

Geographic Location: ☒

resource focuses on specific location

Global or Unspecified

Health Impact: ☒

specification of health effect or disease related to climate change exposure

Neurological Effect, Other Health Impact

Other Health Impact: Methylmercury poisoning

Resource Type: ☒

format or standard characteristic of resource

Research Article

Timescale: ☒

time period studied

Time Scale Unspecified