**Springtime Deposition Rates of Atmospheric Mercury at Barrow, Alaska Followed by Partial Re-Emission at Snowmelt**

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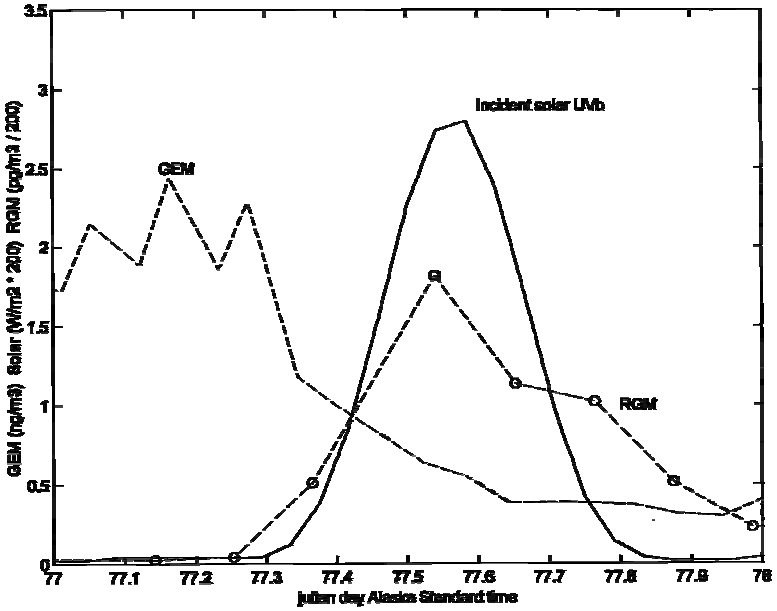
A major input of mercury into the Arctic results from long-range transport of lower latitude air masses. Gaseous elemental mercury (GEM) is an anthropogenic pollutant by-product of coal combustion, waste incineration, and certain types of manufacturing. Its atmospheric lifetime is on the order of 1 year, which permits very long-range transport resulting in typically well-mixed global background atmospheric levels of roughly 1.8 ng $m^{-3}$. These background levels are thought to be increasing by approximately 1% per year.

At Barrow we have used relaxed eddy-accumulation flux measurements, measurements of atmospheric and snow pack Hg concentrations, and boundary layer modeling to elucidate the dynamics of near-surface atmospheric mercury. All results show that local, solar UVB-driven, near-surface atmospheric conversions of GEM to reactive gaseous mercury (RGM) occur during spring at Barrow. The newly formed RGM deposits rapidly (within minutes) to the snow pack (figure) with a deposition velocity of roughly 3 cm $s^{-1}$ based on the relaxed eddy-accumulation runs. Overall, the springtime flux (February-May) at Barrow is approximately 55.1 µgHg $m^{-2}$, comparing well with measured concentrations in monthly snow samples that indicate a total flux into the snow pack of 56.9 µgHg $m^{-2}$. Partial re-emission (41.7 µgHg $m^{-2}$) of this accumulated mercury occurs around snowmelt (early June). Thus a net uptake of ~15 µgHg $m^{-2}$ by the Arctic environment occurs annually. Mercury is a global pollutant that can cause certain birth defects, excessive anxiety, and nervous disorders. Human exposures to mercury are increasing, especially among coastal populations who consume large quantities of fish and marine mammals.




Measured gaseous elemental mercury (GEM) and reactive gaseous mercury (RGM) atmospheric concentration and

incident solar UVB for March 17, 2000, showing conversion of GEM to RGM.