Modelled and Observed Atmospheric-Temperate Exchange of Hg in a Temperate Hardwood Forest

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Goals
- To quantify the nightly dry deposition velocity of Hg and the importance of terrestrial deposition and exchange of Hg to the global Hg budget, using long-term atmospheric observations at a rural, forested site.
- To understand dew uptake of Hg and the relationship of leaf dew to nocturnal deposition.
- To examine driving physical factors in the diurnal and seasonal variability of atmospheric Hg at background sites.
- To improve modelled diurnal cycles of atmospheric Hg.

Introduction
Nocturnal deposition of Hg to the terrestrial surface, is a significant sink of Hg, especially during the growing season, with an avg. nighttime \( V_D \) of 0.2 cm s\(^{-1} \) and up to ~3.4 \( \mu \)g m\(^{-2} \) of foliar accumulation at Thompson Farm, NH.

Background

\section*{Nocturnal Depletion Mechanisms}
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- Warm-season nocturnal Hg\(_0\) deposition is due to dry deposition.
- Nighttime Hg\(_0\) deposition by 
- Concurrent Hg\(_0\) and O\(_3\) building point to the formation of a nocturnal inversion layer preventing replenishment.
- We do not observe significant systematic error in our instrument as has been noted in other studies.
- DEPs begin before high-humidity (ideal RH), and also increases under high RH.

\section*{Leaf Exchange}

- Nighttime anthropogenic Hg\(_0\) deposition is reduced during precipitation.
- Leaf wetness and dew uptake

\section*{Results: Nocturnal Hg\(_0\) Deposition and Dry Deposition Velocity}

\begin{itemize}
  \item Yearly and monthly averaged \( V_D \) and Hg\(_0\) deposition were calculated during
  \item windspeed is minimized in July/August, no inversion strength and thus aerodynamic resistance are minimized.
  \item The emphasis of the nocturnal inversion layer, and windspeed follows length of nights.
  \item Max. deposition and \( V_D \) occur in September.
  \item Average \( V_D \) is 0.1-0.7 cm s\(^{-1} \) for background sites.
  \item Nocturnal Hg\(_0\) deposition: 0 \( \mu \)g m\(^{-2} \) of foliar accumulation at Thompson Farm, NH.
\end{itemize}


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References