

Assessing Spatial and Temporal Trends in Mercury Deposition in the US from MDN data. The Mid-West as a case study

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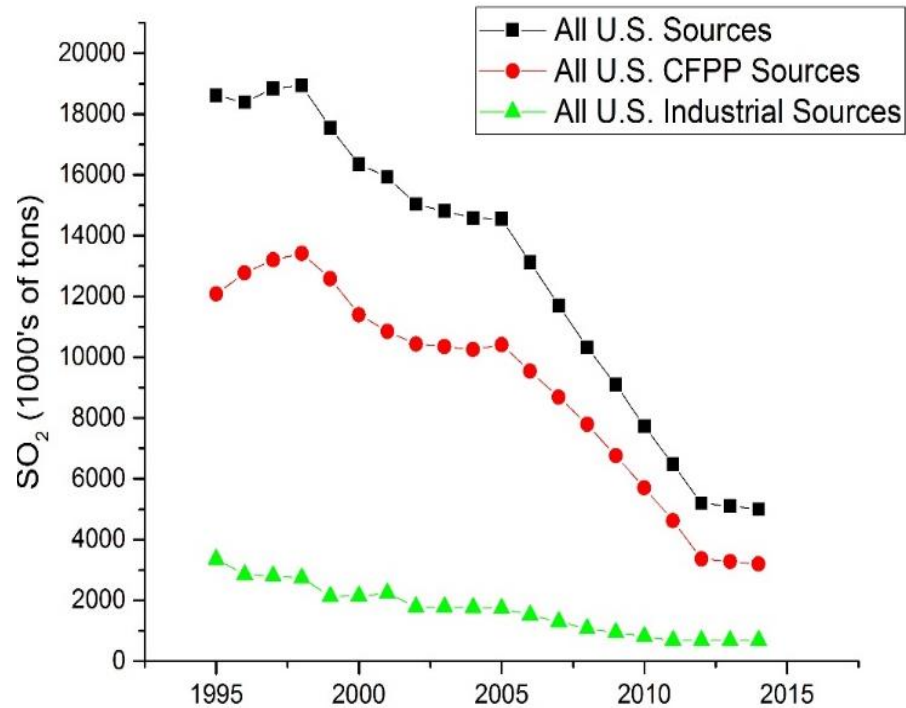
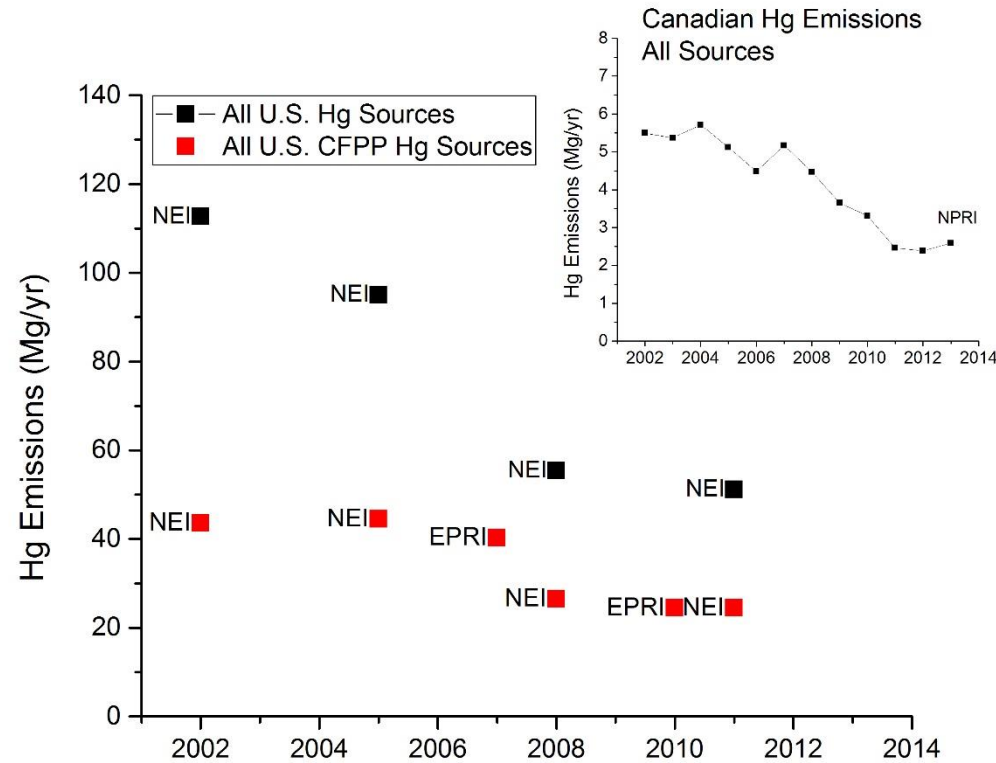
Objective and Hypothesis

- This study examines the spatial and temporal trends in Hg in wet deposition and air concentrations in the United States and Canada.
- Reduced anthropogenic Hg emissions in the U.S. and Canada, resulting from controlling several emissions sources including implementation of the Mercury Air Toxics (MATS) rule in the U.S., could result in detectable trends in Hg concentrations in wet deposition and in air.

Emission Trends

Mercury (Hg) and Sulfurdioxide (SO₂)

Anthropogenic Emissions of Hg and SO₂ in the U.S.A



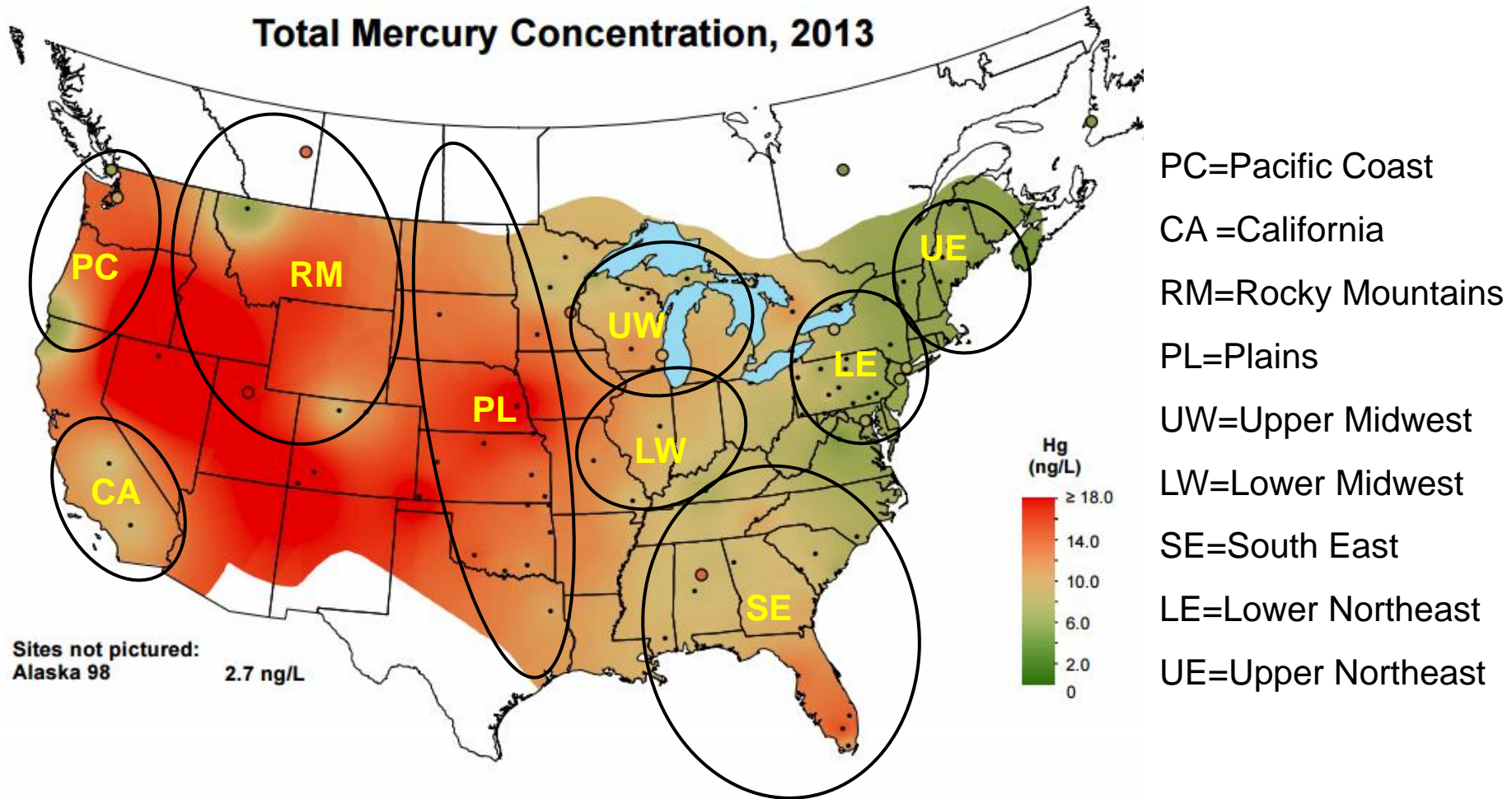
Data sources

Mercury (Hg), Sulfurdioxide (SO₂), Precipitation

Data

- **Mercury concentrations in weekly integrated wet deposition samples, precipitation depth:** National Atmospheric Deposition (NADP) Mercury Deposition Network (MDN).
- **Sulfate concentrations in weekly integrated wet deposition samples:** co-located NADP National Trends Network (NTN) sites.
- **Air concentrations of TGM (or Hg⁰ if other Hg species unavailable):** Atmospheric Hg Network (AMNet), CAMNet and NatChem.

Regions

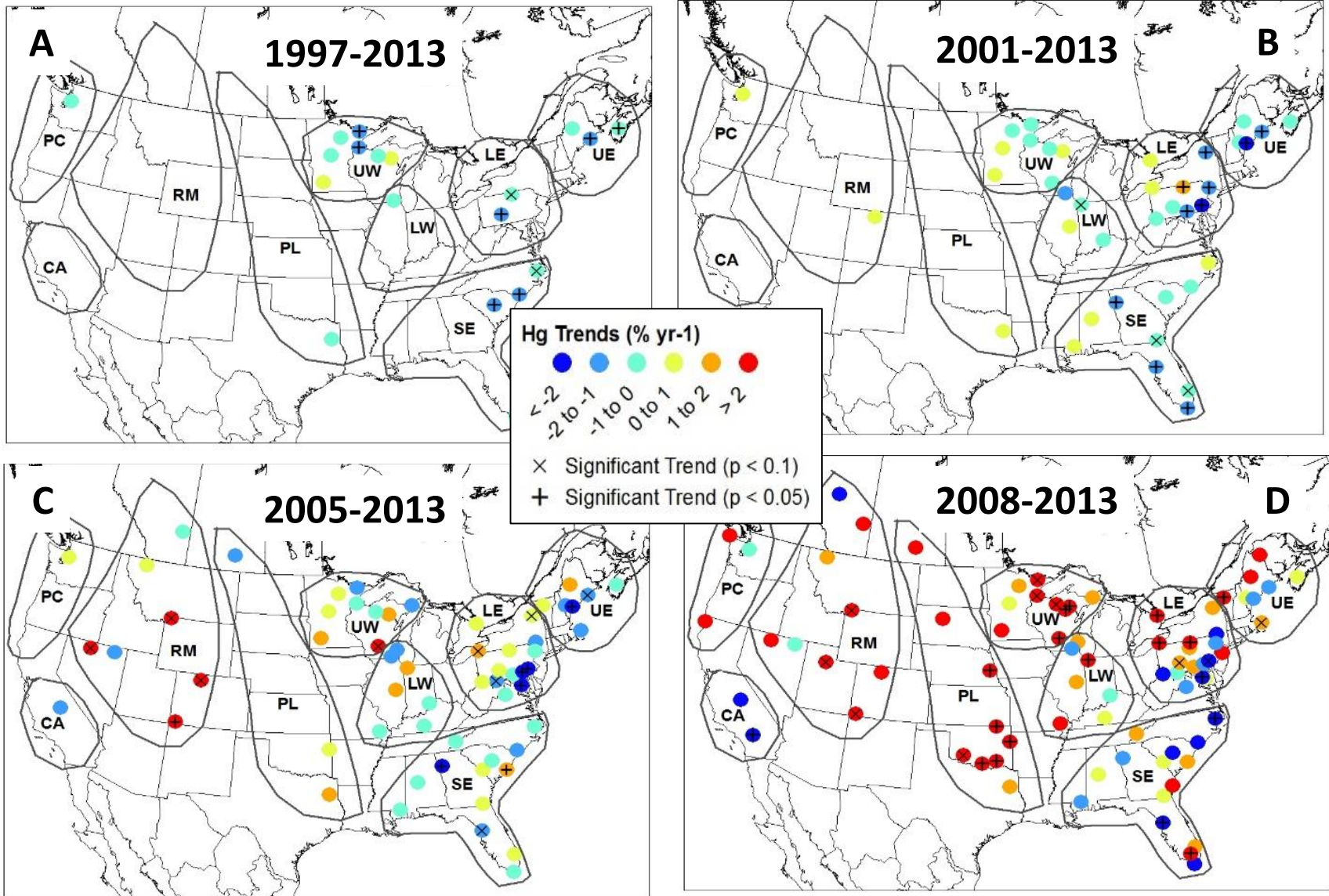


National Atmospheric Deposition Program/Mercury Deposition Network
<http://nadp.isws.illinois.edu>

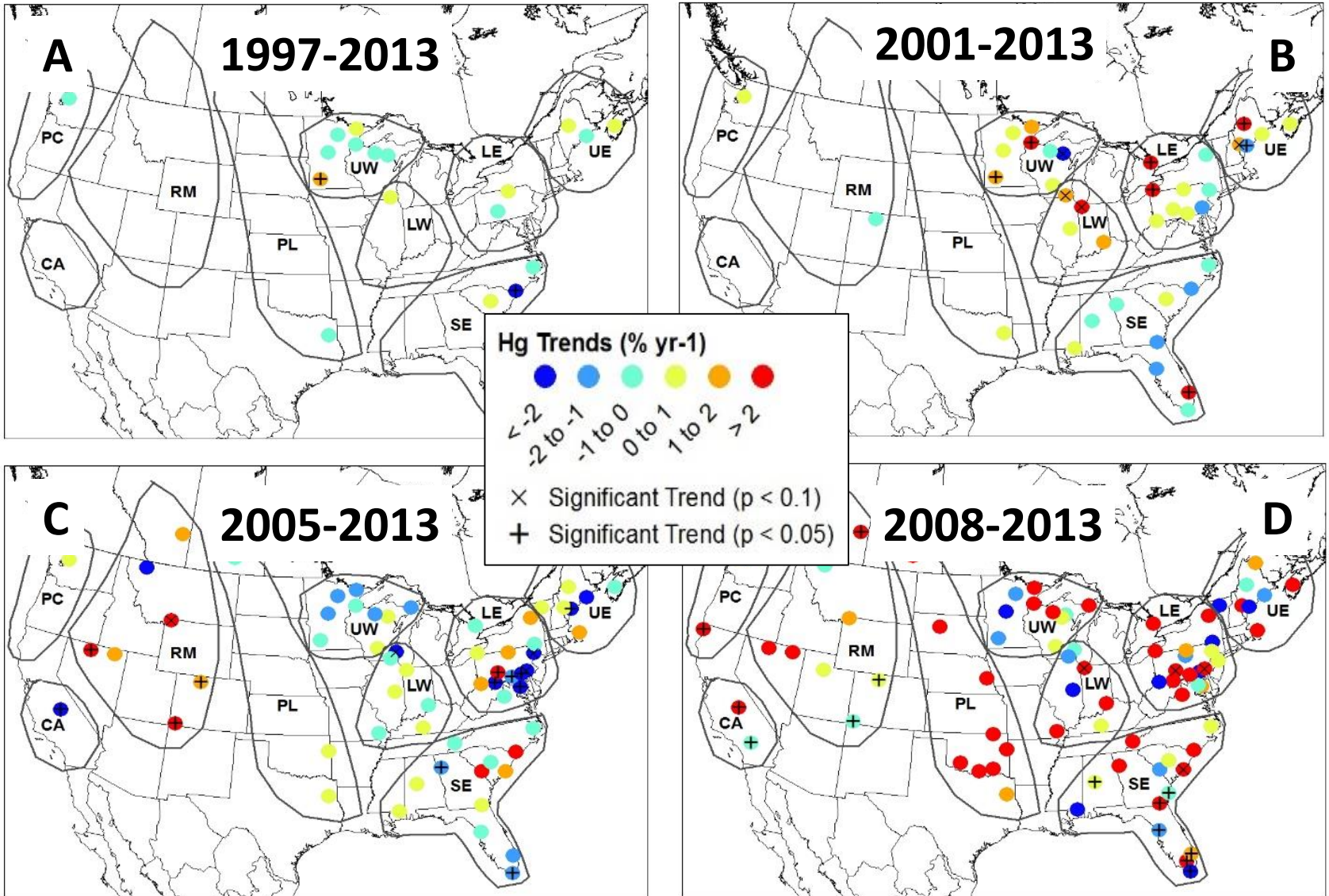
Results

Trend-analyses tools, Annual trends, Regional trends, TGM trends

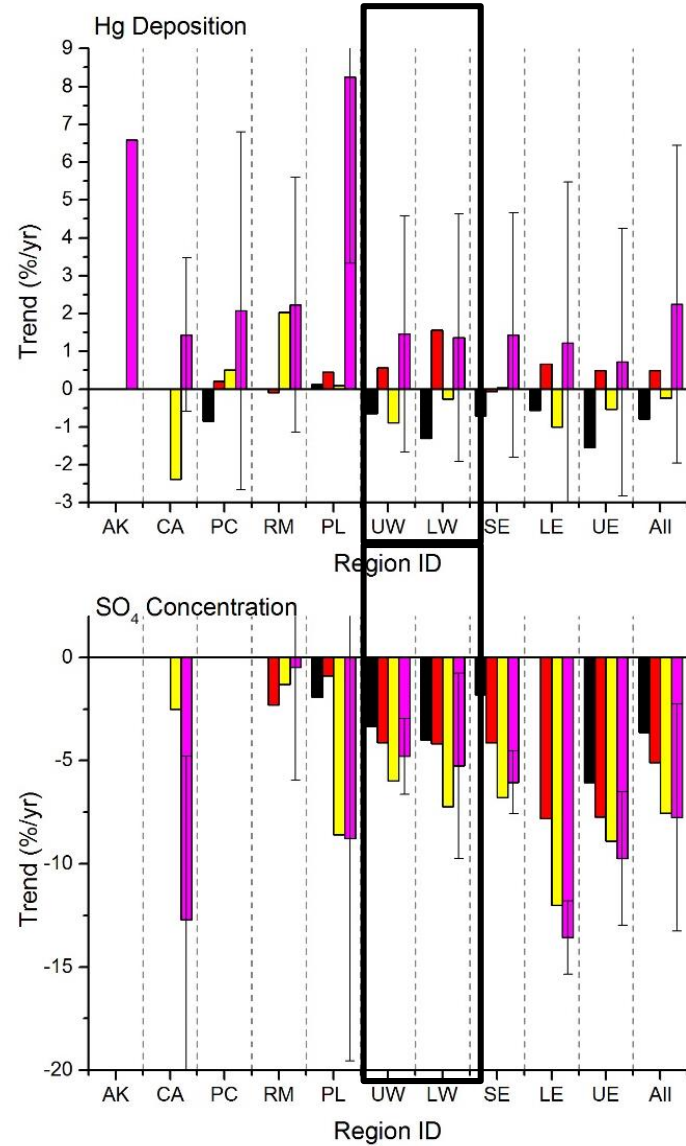
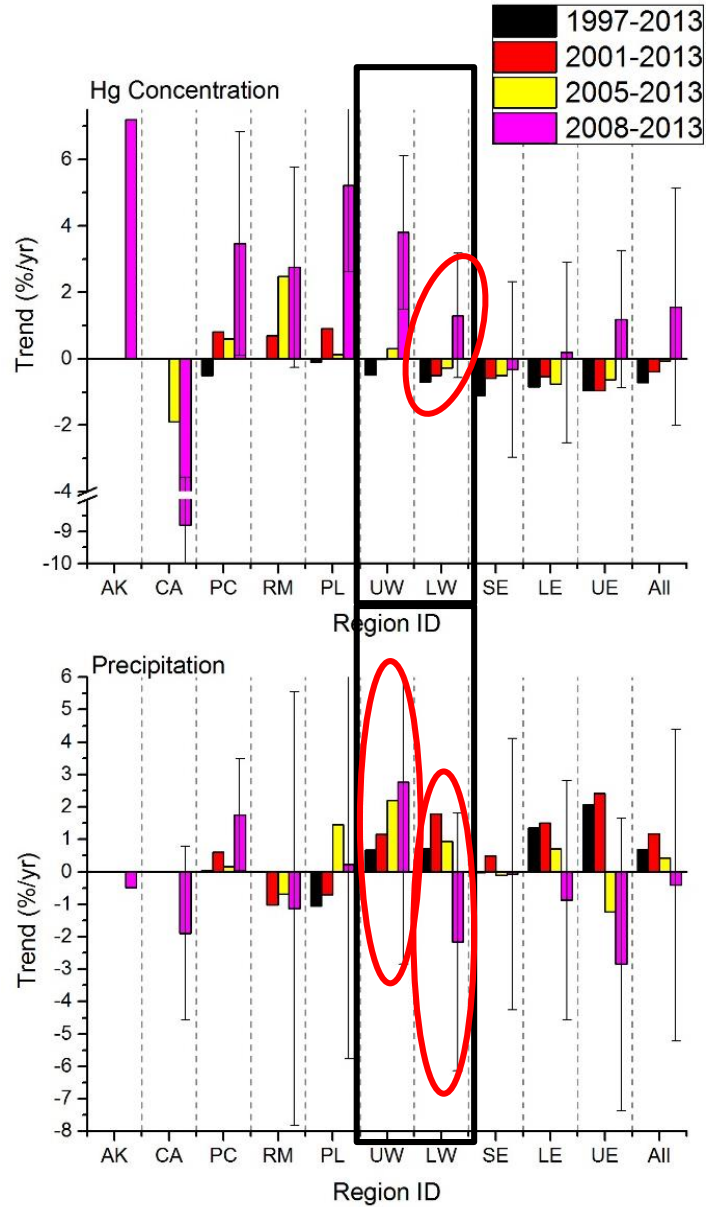
Annual Hg Concentration Trends



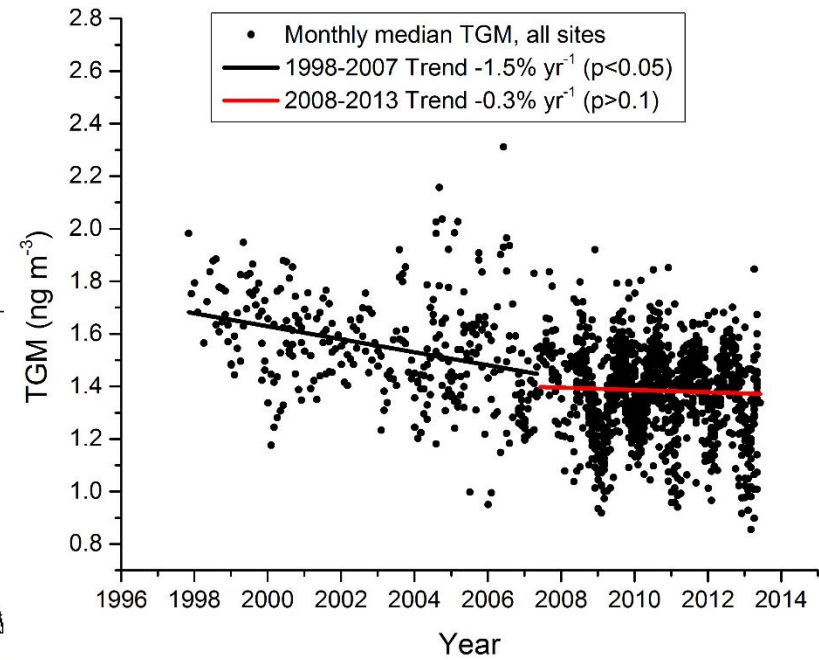
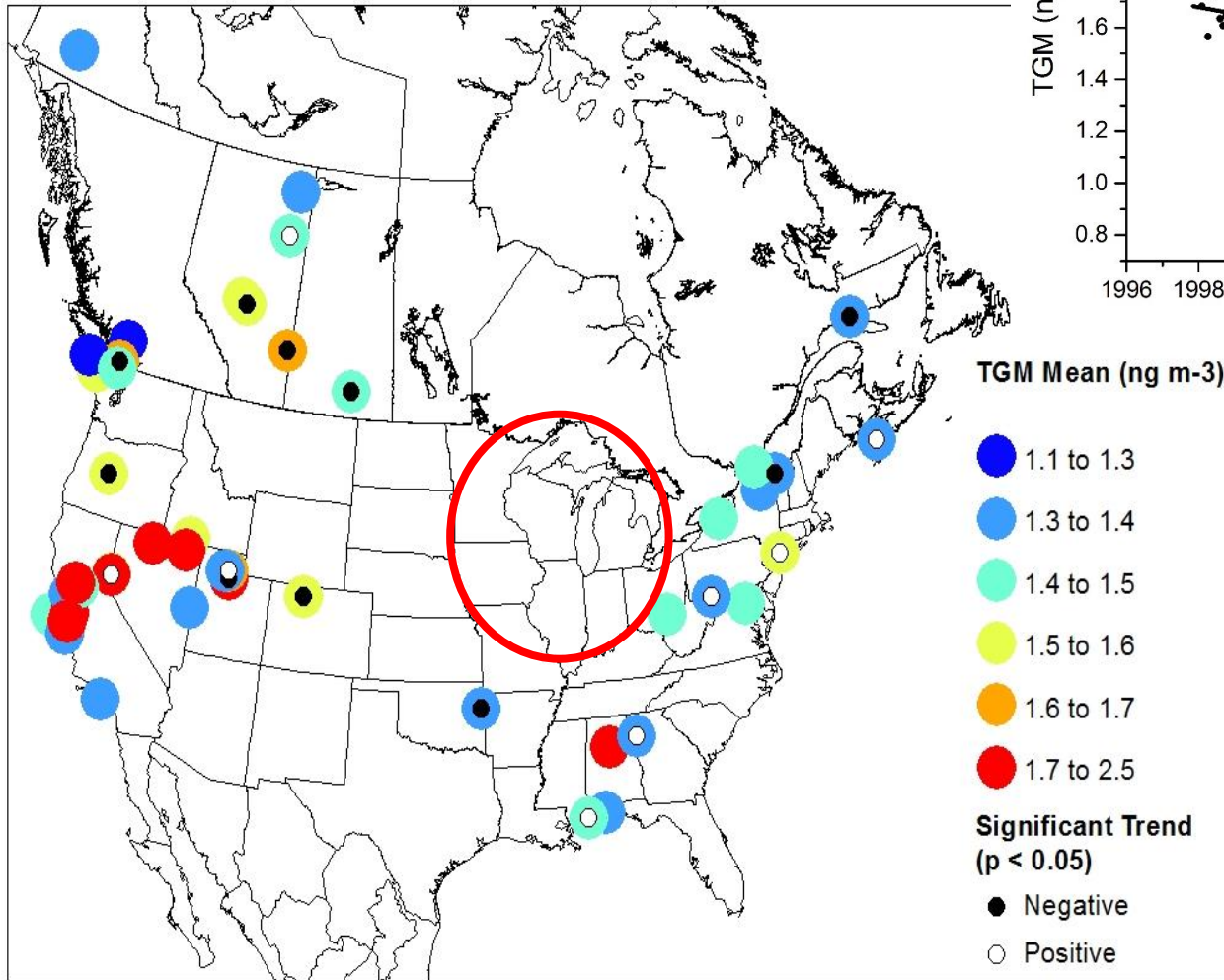
Annual Hg Deposition Trends



Regional Trends



TGM Trends



Conclusions

- Long-term trends are negative and in general agreement with previous studies.
- Short-term Hg concentrations trends are positive to less negative across most regions.
- Intermediate-term Hg deposition trends are positive and widespread: likely driven by increases in Hg concentrations, and not due to increases in precipitation volume.
- CFPP emissions in the U.S. and Canada are not responsible for the observed increasing trends in Hg concentration and deposition across most regions over the short-term.
- Temporal trend of TGM in air is consistent with trends in Hg concentration and deposition: short-term trend more positive than longer-term trends.
- Possible reasons for the observed change in trends: changing oceanic and Asian anthropogenic sources? Trends in background ozone concentrations? Changing precipitation and temperature patterns due to climate change?



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