Mercury Concentrations in Estuarine Sediments of Maryland's Eastern Shore

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Introduction

Mercury (Hg) is a known environmental contaminant and human toxin that can have detrimental effects. One way that Hg can be tracked is through sediment analysis. In this study, we examined how sediment Hg concentrations vary across the Delmarva region.

Using data from the 2010 National Coastal Condition Assessment (NCCA-2010) as well as data we collected from Maryland's Eastern Shore (UMES-2020), we mapped out Hg concentrations across this region (*Figures 1 & 2*).

From these samples, we examined how Hg levels varied within each data set (NCCA-2010 & UMES-2020). We also compared Hg levels between 2010 and 2020 for the Maryland Coastal Bays (MCB).

Within the NCCA-2010 data set, we found no significant differences in Hg concentrations among the sites. Within the UMES-2020 data set, we found that Hg levels in the Manokin River were significantly lower than in the northern MCB. We also found significantly lower levels of Hg in the MCB for 2020 compared to 2010.

Methods

- We downloaded data for 2010 from the NCCA (NCCA-2010) site.
- We categorized the NCCA-2010 sites into four site types: Sites east of the Chesapeake Bay (CB_East), sites west of the Chesapeake Bay (CB_West), sites in the northern Maryland Coastal Bays (MCB_North), and sites in the southern Maryland Coastal Bays (MCB_South).
- We collected Hg concentrations from sediments in the Manokin River and in the northern and southern MCB in 2020 (UMES-2020).
- The UMES-2020 sediment samples were analyzed for Loss on Ignition (LOI).
- The Hg was analyzed via thermal decomposition.
- We standardized Hg due to significant correlations between it and either LOI or Total Organic Carbon (TOC).

Results and Discussion

Figure 1. Hg Concentrations - NCCA-2010 Data

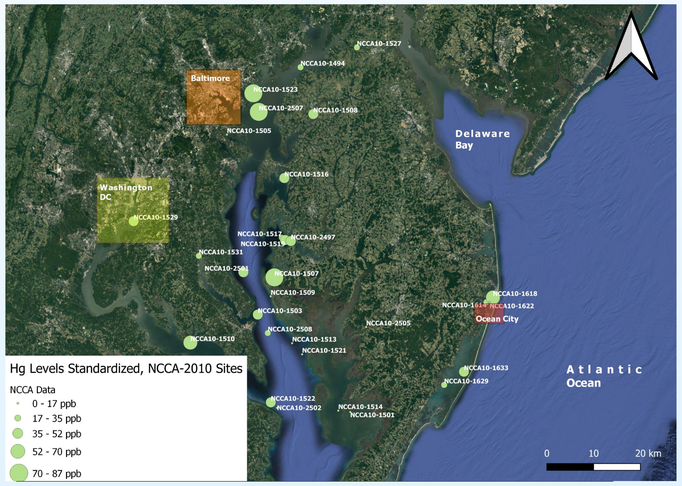


Figure 2. Hg Concentrations - UMES-2020 Data

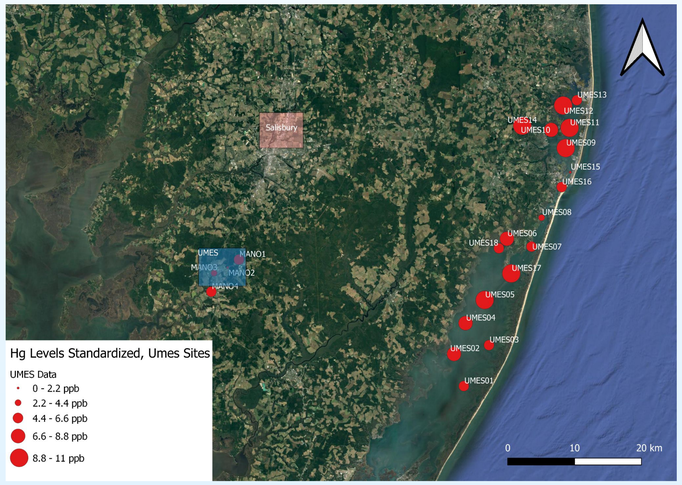


Figure 3. NCCA-2010 Hg Standardized by Site Type

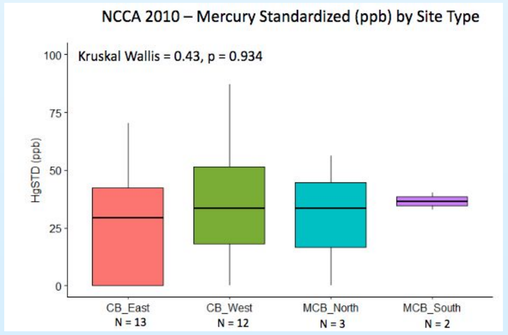


Figure 4. UMES-2020 Hg Standardized by Site Type

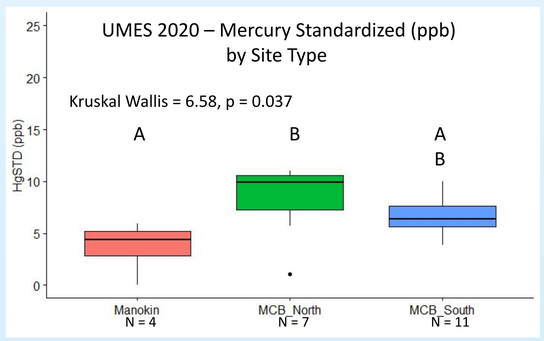
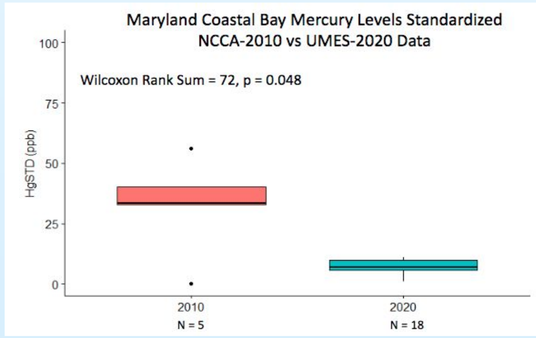


Figure 5. NCCA-2010 vs UMES-2020 Hg Data



In the NCCA-2010 data, higher Hg concentrations, but not significant (*Figure 3*), were found further inland of the Chesapeake Bay. This could be due to differences in atmospheric deposition of Hg.

In the UMES-2020 data, significantly higher Hg concentrations (*Figure 4*) were found in the northern MCB compared to the Manokin River. These differences may be due to local sources of Hg contamination.

We found significant differences in Hg concentrations in the MCB between 2010 and 2020 (*Figure 5*) with lower concentrations in 2020. However, this difference could be an artifact of our data analysis due to the NCCA-2010 data being standardized by TOC while the UMES-2020 data were standardized by LOI.

Acknowledgements

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References

National Coastal Condition Assessment (NCCA). (2020, December 28). https://www.epa.gov/national-aquatic-resource-surveys/ncca.