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Abstract

Keywords

1. Introduction

2. Methods

2.1. Environmental setting



Table 1

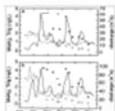
2.2. Precipitation and streamflow, summer 2002



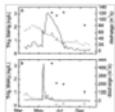
2.3. Sampling and analytical procedures

3. Results and discussion

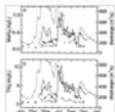
3.1. The Elk and Rum rivers



3.2. Roseau river



3.3. Mississippi river at Anoka



4. Conclusions

Acknowledgements

References



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Elevated methylmercury concentrations and loadings during flooding in Minnesota rivers

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Abstract

Previous studies have identified flooded landscapes (e.g., wetlands, impoundments) as sites of elevated methylmercury (MeHg) production. Here we report MeHg and total Hg (THg) concentrations and mass loadings in rivers in Minnesota during major flooding episodes in the summer of 2002. Frequent intense precipitation events throughout the summer resulted in extraordinarily wet conditions in east-central and northwestern Minnesota. Streamflow remained at record-setting high levels in many rivers and streams in these regions for several weeks. We observed high concentrations of MeHg (> 1.4 ng/L) accompanied by high MeHg / THg ratios (0.39 to 0.50) in the Roseau River in northwestern Minnesota and in the Elk and Rum Rivers in east-central Minnesota. Very high MeHg mass loadings were observed in the Mississippi River just upstream of Minneapolis on July 17 (51 g MeHg/day) and July 23 (42 g MeHg/day), when MeHg concentrations at this site were 0.89 and 0.99 ng/L, respectively. The elevated MeHg concentrations in the Roseau River were associated with low dissolved oxygen and high dissolved reactive phosphorus concentrations, both of which are characteristic of anoxic waters. These rivers drain landscapes containing varying amounts of wetlands, and some of the MeHg discharged is thought to have been flushed from anoxic wetland soils. In addition, the flooding of vast areas of normally dry land surfaces probably also resulted in increased MeHg production, adding to the quantities of MeHg exported from these watersheds. Changing climate patterns are expected to result in more frequent heavy precipitation and flooding events in Minnesota. Our results suggest that as flooding and wet conditions in this region increase, the production of MeHg and its export from terrestrial areas to surface waters will increase also.

Keywords

Methylmercury; Mississippi; River; Flood; Minnesota

Figures and tables from this article:

Fig. 1. Map of Minnesota showing the location of the sampling sites, indicated by an open circle, ○.

Figure options

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