The Conservative Transport of Nitrogen in the Mississippi River

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Abstract

A lagrangian sampling transect was conducted on the Mississippi River in late July-early August 1999 to test the hypothesis that nitrate is transported conservatively in the Mississippi River. Water samples for nitrogen species, stable isotopes, and dissolved gases, were collected at 10 sites on the Mississippi River and 7 sites near the mouths of major tributaries from northern Iowa to southern Louisiana, a distance of about 1,466 river miles (2,250 km). Mass balance calculations indicate that more than 80% of the nitrate mass discharged from the Mississippi River (1,933 metric t/d) during the study period originated in the first 300 river mi. of the study reach and more than 1100 mi. from the river's mouth. The mass balance calculations also indicate that no measurable amount of nitrate was lost from the water column within the 1,466 river-mi study reach. This conclusion is supported by stable isotope data ($\delta^{15}N$ and $\delta^{18}O$ of nitrate) and the concentrations of N_20, N_2 and Ar dissolved in river water. Results from this study indicate nitrate loss by denitrification is minimal in the Mississippi River.