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TITLE: Global Marine N₂ Fixation Estimates: From Observations to Models

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ABSTRACT:

Fixed nitrogen (N) limits productivity across much of the low-latitude ocean. The magnitude of its inventory results from the balance of N input and N loss, the latter largely occurring in regionally well-defined low-oxygen waters and sediments (denitrification and anammox). The rate and distribution of N input by biotic N₂ fixation, the dominant N source, is not well known. Here we compile N₂ fixation estimates from experimental measurements, tracer-based geochemical and modeling approaches, and discuss their limitations and uncertainties. The lack of adequate experimental data coverage and the insufficient understanding of the controls of marine N₂ fixation result in high uncertainties, which make the assessment of the current N-balance a challenge. We suggest that a more comprehensive understanding of the environmental and ecological interaction of marine N₂ fixers is required to advance the field toward robust N₂ fixation rates estimates and predictions.

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