Oceanic emissions of nitrous oxide: from global patterns to regional processes

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Assessment of the global budget of nitrous oxide (N₂O) is limited by poor knowledge of the oceanic N₂O flux to the atmosphere, the magnitude, variability, and drivers of which are still uncertain. In the first part of the talk, I discuss a new, data-based reconstruction of oceanic N₂O emissions that captures coastal hotspots and reveals a vigorous, globally synchronous seasonal cycle. In the second part of the talk, I discuss results from a high-resolution model of the Eastern Tropical South Pacific that resolves N₂O cycling in oxygen-deficient waters. I show that denitrification is a dominant source of N₂O, and that “eddy reaction” terms at the boundary of oxygen minimum zones enhance the rate of N₂O production and reshape the anaerobic nitrogen cycle.