

N₂O_{net}: A Global Collaborative Network Facilitating Advances in Measurement, Modeling, and Mitigation of Agricultural Soil Nitrous Oxide Emissions

Background/Objective

Nitrogen (N) fertilizer supports global agriculture but its use and overuse drive emissions of nitrous oxide (N₂O), a potent and long-lived trace gas. Incomplete understanding of N₂O flux drivers makes it difficult to make spatiotemporal emissions predictions and evaluate management strategies for emissions reductions. N₂O experts evaluated current sources of uncertainty and propose an initiative for accelerating advances in N₂O measurement, analysis, and mitigation.

Approach

Researchers identified major scientific uncertainties underlying the understanding of N₂O flux drivers, including poor process-based understanding of controls on soil N₂O emissions in the field, insufficient data to reduce uncertainty in N₂O budgets from field to regional scales, and high uncertainty in model predictions of soil N₂O emissions across environmental and management conditions. To reduce these uncertainties, they proposed the concept of N₂O_{net}, a global collaborative initiative to accelerate advances in N₂O measurement, analysis, and mitigation.

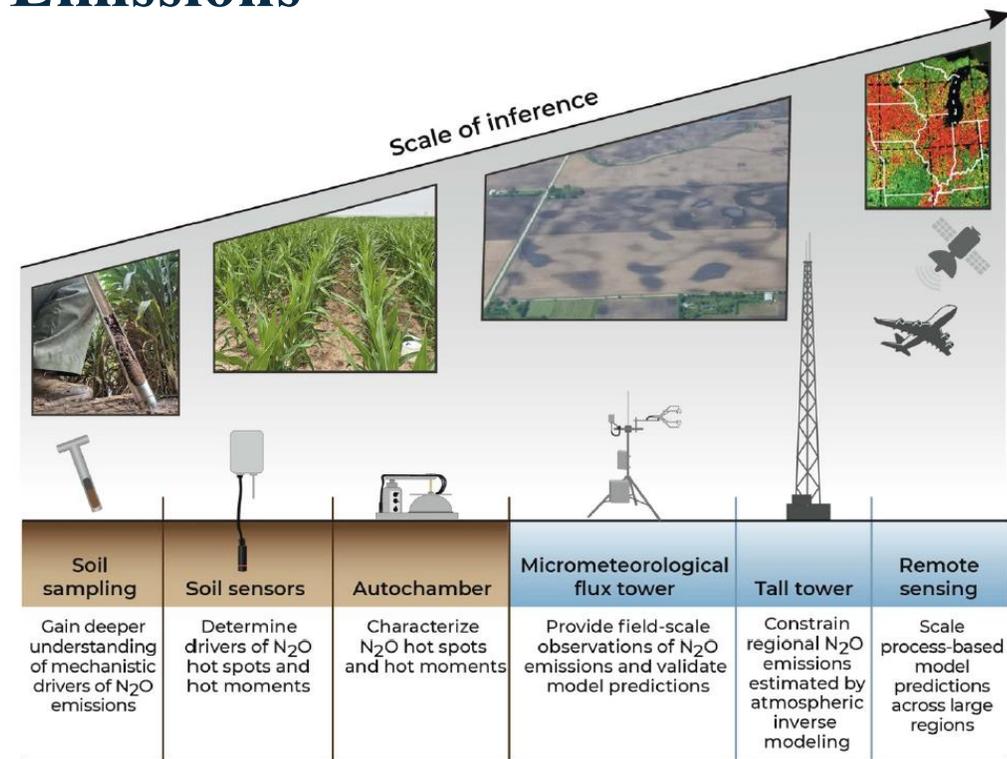
Results

N₂O_{net} will serve as an observational network of supersites with multi-scale measurements (see figure), a database hub for N₂O flux and ancillary data, and a catalyst for community building, information sharing, and training.

Significance/Impacts

N₂O_{net} will provide a roadmap for reducing agricultural N₂O emissions worldwide by coalescing and coordinating the global community of N₂O researchers.

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Multiscale measurements at supersites can link knowledge advances and model improvements across scales of inference.