Modelling Variability In N2O Emissions From Fertilized Agricultural Fields. (S05-grant165910-Oral)

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Abstract:

We simulated degassing events from an agricultural field with the ecosystem model ecosys in 3-dimensional mode with topography from a digital terrain map. N2O emissions modelled from fetch areas that had received 15.5 and 9.9 g N m-2 in May 1998 were compared with those measured by flux towers during June and July 1998. Degassing events in the model coincided with a key N2O emission event measured in the field during several days after a rainfall in mid-June. During this event, modelled and measured surface fluxes rose above 1 mg N m-2 h-1 for 2-3 days before declining. Emissions modelled concurrently at different topographic positions during the emission event had coefficients of variation that varied over time between 30 and 180%. Much of the spatial variability in modelled emissions was attributed to temporal differences in the progression of emission events at different landscape positions caused by lateral water movement. Modelled N2O emissions accounted for 2.3% and 2.0% of urea N applied at 15.5 and 9.9 g N m-2 respectively. The use of 3-dimensional ecosystem models with input from digital terrain maps may provide a means for spatial aggregation of greenhouse gas fluxes.

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