Spatial-Temporal Variabilities of Nitrous Oxide Emission from *Acacia mangium* Soils

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We compared spatial structures of N_2O fluxes in an *Acacia mangium* plantation stand in Sumatra, Indonesia between dry (August) and wet (March) seasons. A 60 × 100 m plot was established in an *A. mangium* plantation that included different topographical elements of the upper plateau, slope and valley bottom. The plot was divided into 10 × 10 m grids. The N_2O fluxes and soil properties were measured at 77 grid points of 10 m intervals in the plot. Spatial structure of the gas fluxes and soil properties were identified using geostatistical analysis. The means (± SD) of N_2O fluxes in a wet season, 1.85 (± 1.18) mg N m^{-2} d^{-1}, were significantly higher than that in a dry season, 0.55 (± 0.42) mg N m^{-2} d^{-1}. This seasonal fluctuation of N_2O fluxes suggests that *A. mangium* soils function as a larger source of N_2O than natural forest soils on Sumatra. Spatial structure of N_2O fluxes in a wet season was considered to be mainly governed by that of water-filled pore space (WFPS), while that in a dry season seemed to be controlled by spatial patterns of soil resources distribution. In *A. mangium* stand soils, we suggest that the factors controlling spatial structure of N_2O fluxes are different between wet and dry season because of seasonal changes of both WFPS and fresh substrate supply into the soils.

Keywords: *Acacia mangium*, fast wood plantation, nitrous oxide, seasonal change, spatial structure