

Global estimation of soil nitrous oxide emission using a semi-empirical model

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Nitrous oxide (N₂O) flux is one of the major greenhouse gas fluxes from terrestrial ecosystems. N₂O is generally released from soil surface to the atmosphere. In this study, a semi-empirical model was developed through modifying a model for soil CO₂ flux (Raich et al. 2002), and the global distribution of N₂O flux from soil was examined. The model consists of the functions of nitrogen, air temperature, and precipitation and the parameters of the functions were determined using a global dataset of N₂O emission (Stehfest and Bouwman 2006). The model was applied at a spatial resolution of 5-minute and at a monthly time resolution.

The preliminary calculation revealed that the total amount of N₂O emission was 14 Tg N yr⁻¹, and the monthly flux showed a clear seasonality, and was highest in August and lowest in February. The dry natural land is the major source of N₂O emission while the dry cultivated land was the second major source. Latitudinally, the flux was high around 30 — 40 degreeN and 10 degreeS — 10 degreeN. These results were still based on limited data, especially for wet ecosystems, and will be updated in future.

Keywords: soil, nitrous oxide, model, nitrogen

