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The effect of landscape position on the flux of nitric and nitrous oxide from a semi-arid savanna in South Africa

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Emissions of nitric (NO) and nitrous (N_2O) oxides have important local, regional and global environmental impacts. Biological processes in the soil are one of the main sources of these gases and are controlled by the soil moisture, temperature and nutrients. As a result, landscape processes influence the biological production of NO and N_2O from soil. The Skukuza Flux Tower and Nkuhlu exclosure sites in the Kruger National Park in South Africa are biogeochemically well characterised sites and include nutrient rich fine-leaved and nutrient poor broad-leaved savannas which are the dominant savanna types found in the region. This makes this area in the Kruger National Park a unique site for the study of the landscape level processes on emissions of NO and N_2O in a semi-arid savanna ecosystem. NO production rates as a function of soil moisture and temperature were studied in laboratory incubation experiments from soil collected along a soil catenal sequence at the Skukuza Flux Tower Site, while potential and *in situ* N_2O emissions were measured at the Nkuhlu exclosures. The maximum NO flux occurred at between 5 and 10% gravimetric soil moisture content. Differences in the potential NO emissions between the nutrient rich and nutrient poor savanna were observed. Potential denitrification rates were between one and three orders of magnitude higher in the nutrient rich fine-leaved savanna than the nutrient poor broad-leaved savanna. No differences between landscape positions were observed due to the generally low N_2O emissions produced.