Geophysical Research Abstracts
Vol. 19, EGU2017-19467, 2017
EGU General Assembly 2017

Grazing reduces soil greenhouse gas fluxes in global grasslands: a meta-analysis

Shiming Tang, Dashuan Tian, and Shuli Niu

Abstract
Grazing causes a worldwide degradation in grassland and likely alters soil greenhouse gas fluxes (GHGs). However, the general patterns of grazing-induced changes in grassland soil GHGs and the underlying mechanisms remain unclear. Thus, we synthesized 63 independent experiments in global grasslands that examined grazing impacts on soil GHGs (CO_2, CH4 and N2O). We found that grazing with light or moderate intensity did not significantly influence soil GHGs, but consistently depressed them under heavy grazing, reducing CO_2 emission by 10.55%, CH4 uptake by 19.24% and N2O emission by 28.04%. The reduction in soil CO_2 was mainly due to decreased activity in roots and microbes (soil respiration per unit root and microbial biomass), which was suppressed by less water availability due to higher soil temperature induced by lower community cover under heavy grazing. N2O emission decreased with grazing-caused decline in soil total N. The inhibitory effect on methanotroph activities by water stress is responsible for the decreased CH4 uptake. Furthermore, grazing duration and precipitation also in[U+FB02]uenced the direction and magnitude of responses in GHGs [U+FB02]uxes. Overall, our results indicate that the reduction in soil CO_2 and N2O emission under heavy grazing is partially compensated by the decrease in CH4 uptake, which is mainly regulated by variations in soil moisture.