

SESSION 19

Carbon stocks, soil properties, greenhouse gas fluxes and atmospheric feedbacks of permafrost regions

Herbivore-Induced Effects on Arctic Soil Carbon Storage

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Abstract

Permafrost degradation and organic matter decomposition in the terrestrial Arctic are strongly depending on soil temperature throughout the year. These temperatures are affected in numerous ways by activity of large herbivorous animals. We identified snow compaction and animal-induced vegetation changes as key elements. Therefore, we analysed soil parameters along transects following grazing intensity in both a permafrost environment (northeastern Siberia) and seasonally frozen ground (norther Finland). Parameters included TOC, C/N ratio, $\delta^{13}\text{C}$, bulk density and radiocarbon age. While we observed a strong increase in soil carbon storage with high grazing intensity under permafrost conditions, this effect does not show in seasonally frozen ground. However, an obvious animal-induced change in both areas was a shift in vegetation composition and structure, following the grazing gradient. We conclude that material and water fluxes in seasonally frozen ground outweigh the animals' effects, contrary to permafrost environments, but state that on permafrost, animals could help maintaining low soil temperatures and hence reduce organic material decomposition.