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Landscape partitioning and burial processes of soil organic matter in permafrost-affected soils

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Soils in the northern high latitude regions are a key component in the global carbon cycle, with important feedbacks on climate (Hugelius et al., 2014). As the storage of soil organic matter in permafrost soils represents an enormous carbon sink in the past and a potentially relevant carbon source in a warmer future, knowledge about total stocks and factors controlling organic matter pools are of utmost importance for our understanding of climate change feedbacks (Davidson et al., 2006).
A significant fraction of the soil organic matter in permafrost soils (permanently frozen ground) is buried by cryoturbation and preserved because of reduced decomposition rates under low temperatures (Bockheim, 2007). Since soil organic carbon (SOC) pools have large regional and landscape-level variability, with mean SOC 0–100 cm storage among our study sites ranging from 4.8 kg C m−2 to 30.0 kg C m−2 (Palmtag et al., 2015), detailed SOC inventories from across the northern permafrost region are needed to assess potential remobilization of SOC with permafrost degradation. This study provides:
• High-resolution land cover and landform classification data on total SOC storage from contrasting regions of continuous permafrost (Russia and Greenland) highlighting the need to consider numerous factors as topography, geomorphology, land cover, etc. in the assessment of landscape-level and regional SOC stock estimates.
• Insight into the effect of grain size distributions in permafrost soils on burial mechanisms through cryoturbation.

References:

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