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# Linking C Sequestration Service and High Arctic ecosystem multi-trophic functionality

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## Abstract

The mechanistic response of Arctic terrestrial ecosystems to ongoing climate changes is a key of carbon (C) sink status of the soil. The assessment of the sustainability of Arctic soils C sequestration service requires deeper understanding of the ecological mechanisms leading to C accumulation in the soil. We explored the links among plant, soil invertebrate and microbial communities, and the C biogeochemical cycle along environmental gradients in different valleys of central Svalbard. This multi-trophic functional approach integrates the holistic aspect of the ecosystem structure and aims at stressing the association of ecosystem service resilience with the functional links among the compartments. We sampled (1) plant composition, abundance, above and belowground traits, (2) soil invertebrate composition, abundance and feeding traits, (3) soil microbial communities functional composition and activity; and (4) soil C organic and inorganic contents. Our preliminary analyses showed functional clustering across the compartments and also different levels of sensitivity to environmental gradient depending upon the compartments. Analyses need to be deepen and complete with manipulative experiments to disentangle the mechanisms but our results already illustrates a breakthrough in functional ecology with an explicit consideration of multi-trophic response-effect framework.

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