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Soil transplant experiment: the initial results of coring the original permafrost peatland soils to the “warm” plots

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Peatlands located in Russia contribute up to 35% of the global carbon stock in peatlands and it should be focused on due to predictable climate changes. Considering this fact we performed our study to comprehend the permafrost peatland soils initial response to temperature increase by placing the original “cold” soil cores to the “warm” plots (soil transplant experiment).
The 1st field part of experiment was performed in a frozen bog ecosystem in forest-tundra (65°18′55″N, 72°52′34″E). In august 2016/2017 we established two experimental sites with contrasting soils summer daily average temperatures (0-10 cm): "cold site", 5.5 °C, and "warm site", 11.8 °C. Undisturbed forest-tundra soil samples in PVC tubes were cored from cold site and transported to the warm site (FTT soils). Other samples from cold site weren’t transported and remained as a control. After 10 days of CO_2 efflux measurements we’ve found the FTT soils CO_2 efflux rate to be 4 times higher comparatively to control (320 and 76 mg/m2*per h. correspondingly). The next year (august 2017) we’ve fixed the FTT soils CO_2 efflux rate being 3 times higher than control (134 and 43 mg/m2*per h.).
During the 2d field part of experiment (october 2016) the control permafrost peatland soils from forest-tundra were transported to identical bog ecosystem in southern taiga (STT soils) (56°1’36"N, 37°11’54"E). CO_2 efflux measurements taken in may-october 2017 revealed the relatively low STT soils CO_2 efflux rate (137 mg/m2*per h.) in contrast to control southern taiga soils (240 mg/m2*per h.).
The laboratory part was conducted after 1 year of field experiments and included soil respiration (basal & substrate-induced respiration, BR&SIR) and labile soil organic carbon (CLOC) analysis of transplanted soils. We found the BR&SIR values of FTT soils being 2 times lower in comparison with STT soils. Instead of this the CLOC content of FTT soils was also 2 times lower comparably to STT soils thus indicating the possible labile substrate depletion of FTT soils after 1 year of field transplant experiments.
In summary our preliminary results showed the intensive response of FTT soils: CO_2 efflux rate from "warm" plots was 3-4 times higher as compared to control plots on average both in short-term (10 days) and long-term (1 year) cases. We also note the 2 times lower reaction of STT soils comparably to control. These findings might be taken into account when predicting the peatland soils respiration due to upcoming climate changes in permafrost areas.