Fluxes of CO_2, CH_4, and N_2O in boreal forest soils since FROSTFIRE burning experiment, interior Alaska

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FROSTFIRE Burning Experiment

Static flux chamber measurements were done in unburned and burned black spruce forest soils since the prescribed forest burning experiment (8-15 July, 1999) to estimate the fluxes of CO_2, CH_4, and N_2O during the growing seasons of 1998 to 2002, central Alaska.

Discussion of results

Fluxes of CO_2, CH_4, and N_2O have significant temperature dependence at 5 cm in unburned and burned black spruce forest soils. This demonstrates that soil temperature elucidates at least 50%, 50%, and 30% of the variability of annual Q_{10} value at 5 cm for fluxes of CO_2 (Fig.1), CH_4, and N_2O (Fig. 2) respectively.

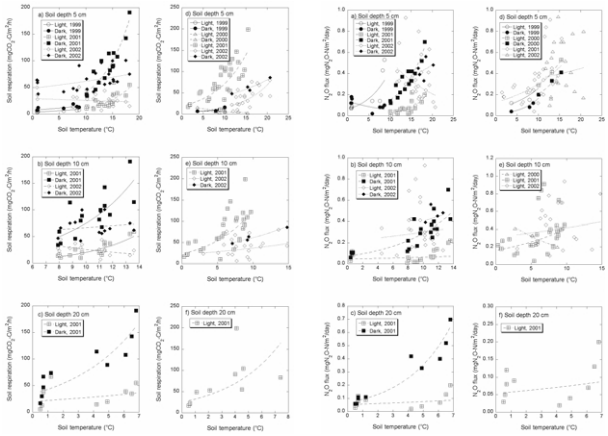

Figure 1

Figure 2

The post-burn microbial decomposition and root respiration rate can be estimated at 27 tC/ha and 15 tC/ha over a decade in burned soils since the burning experiment, respectively.

Conclusions

Caron emissions in the post-burn boreal forests may transfer as much terrestrial carbon to the atmosphere as that due to wildfire combustion and dynamics of carbon in boreal stands soils are clearly significant to regional and global carbon budgets.

References

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Marine chemistry of the Neoproterozoic Doushantuo formation: Environmental significance for the phosphatized embryos

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A geochemical investigation on the terminal Proterozoic Doushantuo Formation in Weng'an county, South China reveals a dramatic paleoceanographic history that may have been linked to the fossil Lagerstätten and animal evolution before the Ediacaran radiation. The formation comprises shallow marine sediments yielding phosphatized embryos in the top unit. The $\delta^{13}C$ stratigraphic pattern exhibits covariation between carbonate and kerogen, suggesting a depositional signature. Integrated analyses of the $\delta^{13}C$ chemostratigraphy, sequence stratigraphy and biostratigraphy through coeval strata around the world indicate that the unfossiliferous unit spans between the two major ice ages of the terminal Proterozoic (c. 600-580 Ma) and that the overlying fossiliferous unit corresponds to the Ediacaran biozone IIB. Trace element abundances in the marine fraction and their interelemental relationships show marked differences between the two units, including different magnitudes of Ce anomaly (c. 0.8~1.0 vs. 0.5~0.6). Their comparison with modern seawater chemistry indicates that Black Sea-type ocean stagnation with anoxic deeper waters persisted during the unfossiliferous period, followed by a well-ventilated oxic ocean during the fossiliferous period. Additional lines of evidence suggest that mixing of two different water masses, possibly upwelling of a previous deeper water, introduced high concentrations of nutrients into surfacial environments at this geochemical transition.