Persistent Decline in Soil Respiration Following Forest Fire in Interior Alaska. (S07-valentine132832-Oral)

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Abstract:

Forest fires increase light penetration through the canopy, reduce albedo of the ground surface, decrease transpiration, remove at least some of the insulating forest floor material, and produce dead roots. Thus I hypothesized that in interior Alaska, where low soil temperatures frequently limit microbial activity, an experimental wildfire (Frostfire) would increase rates of soil respiration. Before and after the fire in July 1999, we monitored soil respiration in three replicates of mixed hardwood (Populus tremuloides and Betula papyrifera) and black spruce (Picea mariana) stands in areas that were to be burned as well as in unburned controls. Soil respiration initially declined following the fire by 50% in the mixed hardwood stands and by 15% in the black spruce stands, probably due to cessation of root respiration. Despite warmer soils in the burned stands during the three subsequent years, however, we have detected no post-fire increase in soil respiration relative to unburned controls. These results suggest that fire's negative impacts on carbon balance in boreal forests are primarily through combustion and reduced photosynthesis, but not through stimulation of microbial respiration.

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