



Increase of mycorrhizal C flux in Siberian temperate forests during the extreme drought of 2012

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Extreme climatic events have strong effect on the terrestrial carbon cycle. The soil C flux is the major uncertainty in the global C budget. Autotrophic (roots and mycorrhizae) component and heterotrophic microorganisms respond differently to altered precipitation and temperature, however their responses might vary in different ecosystems.

We studied mycorrhizal, heterotrophic and total soil CO₂ fluxes using in-growth mesh collars in forest soils under different tree species. The fluxes were measured between May and October of 2010-2012. The summer of 2012 was extremely hot and dry in Siberia, breaking records for the past 70 years of meteorological monitoring.

The drought reduced soil surface CO₂ flux for 20-30 % depending on the tree species. It is very surprising that the mycorrhizal flux in 2012 was under most species similar to the flux in a wetter years (2010-2011), under birch the mycorrhizal flux was even 1.5 times higher during the drought. Thus, decline in overall soil surface CO₂ flux was mainly due to reduction of heterotrophic activities. Since the proportion of heterotrophic and autotrophic activities is related to soil C sequestration, we conclude that under the most tree species in Siberia soil C will be accumulated during the drought. The most positive effect of the drought for soil carbon accrual is to be expected under birch.