P4. Reduction of CO_2 uptake in response to decreasing precipitation regimes in east-Siberian taiga: evidence of positive feedback to global warming

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Abstract

The impact of global warming-induced changes in precipitation regimes on the carbon sink properties of forest ecosystems is a constant threat in semi-arid regions. The planet's driest climate with established boreal forest is in Eastern Siberia. IPCC (2001) predicts that the largest increase in annual precipitation will occur in Siberia, leading to a negative feedback to increasing atmospheric CO_2 due to the mitigation of drought limited CO_2 uptake. Contrary to this prediction, annual precipitation records for the past half century tend to show slight decreases of -8.2 mm per decade (3.8% of mean annual precipitation) with warming. However the effect of decreasing precipitation on CO_2 uptake in the taiga ecosystem is still unclear. Here we show observational and experimental evidence demonstrating that CO_2 uptake by a mature larch (*Larix cajanderi*) forest in eastern Siberia is sensitively, strongly and frequently limited by air and soil drought in summer. These results indicate that decreasing precipitation will accelerate soil moisture depression and dryer atmospheric conditions, and cause a positive feedback to global warming by reducing atmospheric CO_2 uptake.