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A new Open Top Chamber designed to test *in situ* effects of climatic and atmospheric changes on nitrogen fixation in boreal forest floor mosses

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Biological nitrogen fixation (BNF) by cyanobacteria dwelling in forest floor moss layers is an important determinant of boreal black spruce forest productivity. Recent studies have suggested that these BNF rates may increase with increasing atmospheric CO_2 and increasing temperature, as predicted by current weather models. This potential increase in BNF may be offset, however, by increasing atmospheric deposition of nitrogen, or by increasing demands for phosphorus (i.e. driving nodular ATP content) and for micronutrients such as Mo, Va and Fe (i.e. co-factors of nitrogenase enzyme). In order to study the relative and interactive effects of these factors controlling *in situ* BNF rates in boreal forest floor moss layers, a new Open Top Chamber (OTC) was developed in summer of 2013. The chambers measure 1.60 cm dia. $\times$ 60 cm height, and are equipped with an automated CO_2 delivery system designed to maintain atmospheric daytime CO_2 concentrations at 800 ppm, as well as buried heating coils that increase soil temperature by 4 $^{\circ}$C for 3 weeks in springtime. These 2 experimental factors are crossed in a full factorial (2×2) design that is replicated in 4 complete blocks. Each of the 16 OTCs is divided into 4 compartments, each of which are assigned 1 of 4 sub-plot factors. These include chronic additions of either atmospheric nitrogen, phosphorus, micronutrients or a non-amended control. Staring in summer 2014, a series of measurements will be made to assess the effects of treatments on BNF rates, cyanobacterial colonization and soil nitrogen cycling. Our poster will describe in detail the design and operation of the OTCs, as well as their construction and maintenance costs.