Controlling Factors of Soil CH_4 Uptake in Temperate Alpine

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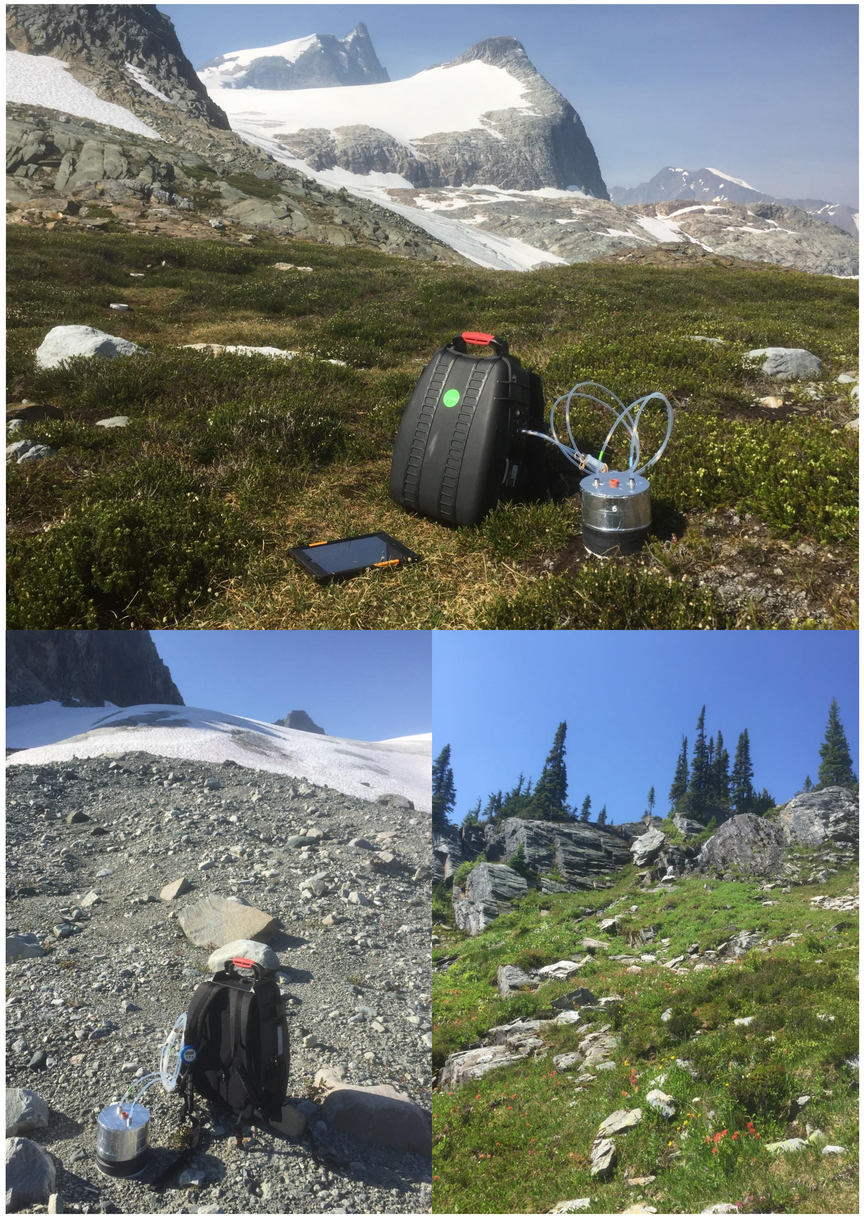

Fig. 1 Methane fluxes were measured *in situ* in Bachelor Pass, Northern Selkirk Mountains, Canada using a laser analyzer and closed-chamber method. Sites ranged from alpine heath sites to recently-deglaciated terrain and downslope to the treeline ecotone. Soil physico-chemical properties and vegetation coverage were measured at each chambers.

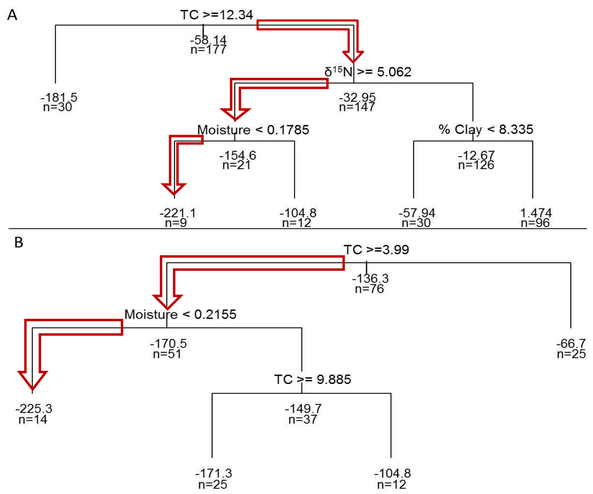

Fig. 2 Regression trees analyzing the methane uptake measured in Bachelor Pass. Data that meet the condition split to the left. **A** full methane dataset found total carbon (TC), $\delta^{15}N$, % clay and moisture to be the drivers of methane uptake. **B** the non-zero methane dataset found TC and moisture to be the primary drivers. Very high total carbon (>9.9%) functioned to reduce some of the loss of uptake experienced in moist conditions.

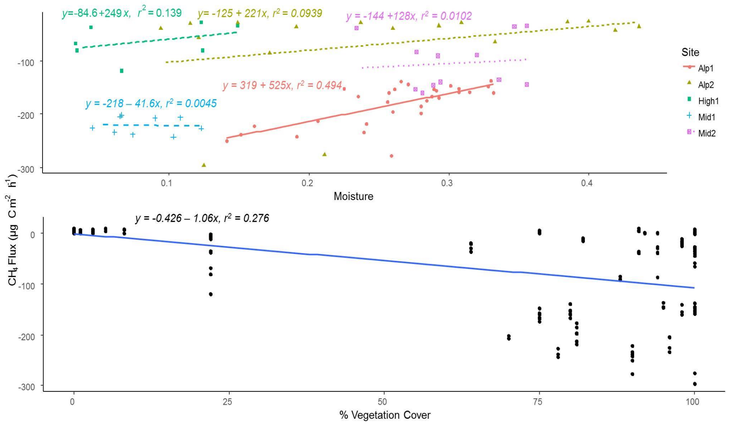

Fig. 3 Linear relationships between methane fluxes and previously identified mechanistic drivers volumetric water content and % vegetation cover. Top panel showcases the relationships between moisture and non-zero methane fluxes for grouped by site. Generally lower moisture conditions resulted in greater methane uptake. The bottom panel shows the relationship between vegetation cover and total methane fluxes. Sites with higher vegetation coverage generally corresponded to greater uptake of methane

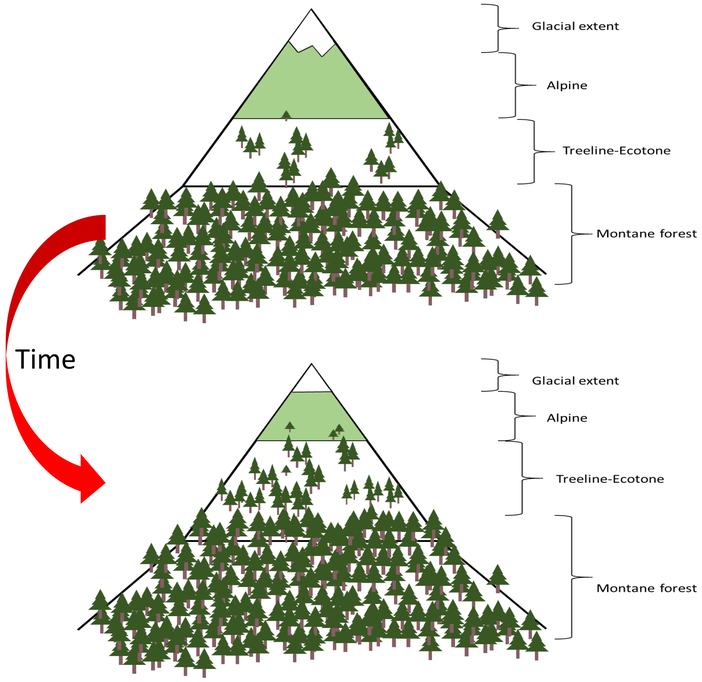

Fig. 4 Vegetation shifts are expected to occur as a consequence of climate change in alpine regions. These changes will have direct and indirect effects on methane fluxes through changes in carbon inputs and moisture dynamics on a local scale.

Fig. 5 Mountains are heterogeneous environments. Therefore, it is necessary to understand methane fluxes across a wide range of community types as they are currently and how they are projected to be in the future; a component of global methane balance that is not well-understood.