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# *Interactive comment on* "Plant trait response of tundra shrubs to permafrost thaw and nutrient addition" *by* Maitane Iturrate-Garcia et al.

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General comments: In this work the authors present their results of bio-ecological investigation on tundra shrubs. They used an experimental setup for examining the change of physiological plant conditions induced by actual climate change. The basic assumption was that climate warming leads to enhanced permafrost thaw, which simultaneously will add nutrients to the system. Leaf and stem traits of four different shrubs species were statistically analysed. The manuscript is generally well structured, clearly written and substantially justified by literature. The results about the potential adjustments of plant growing strategies contribute new insights for future environmental development in the subarctic region.



Specific comments: There are two general obstacles in the experiment setup, which I propose to consider more for discussion and conclusion: A main result of the experiment was that no significant response of plant traits was found due to permafrost thaw, whereas significant plant-trait response to fertilization was proofed. The general assumption was that the nutrient supply will increase caused by enhanced mineralization and thawed soil due to climate warming. This means that solely the soil heating would already lead to an increase of nutrient supply during the experiment. I am wondering, why an effect of increased nutrient supply is not observed in the data for the solely heating part of the experiment. Parallel soil analyses would have underlined the presumed causal chains. The fertilization part of the experiment represents an extraordinary nutrient input into the system, which are marginal under natural conditions, when a slight input of nitrified dust from anthropogenic sources, desiccated lakes and desertificated landscapes is taken into account. The heating cables are buried in a depth of 15 cm. This brings along a systematic problem for the study design when compared to expected environmental changes under natural conditions. Climate warming controls soil temperatures along air temperatures. Thus, soil heating begins at the top surface and temperature changes move downward with decreasing amplitude. The high content of organic material in subarctic topsoil has a specific influence on the thermal conductivity into the subsoil. During summer, it may have an isolating effect, when it becomes dried-up; during winter, the thermal conductivity increases caused by soil moisture content.

Technical corrections: L25: Here you are talking of "all four species" but until now you didn't introduce them in the abstract. L59: Please give detailed information about the distinct methods used in "several experiments and satellite imagery" L120: When did you select and cut the individuals? I think after 4 years at the end of the experiment. This should be mentioned here. In addition: Why not selecting the individuals already in the beginning of the experiment; to measure some initial parameters such as plant height and LA? Then you would be able to document relative changes for individuals over the period? L135: Space between 1 and cm2

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