we can estimate how the moss and lichen cover changes with time and how this affects the C/H_2O/Energy balance at high latitudes.

Clash of Plants—the role of *Sphagnum* in the vegetation dynamics and greenhouse gas emission in Northeast Siberia

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Global climate change largely influence the vegetation dynamics in high latitude ecosystems. For instance, shrub expansion in tundra was widely observed during the decades. However, in Siberian moist tundra, the vegetation dynamics is hardly unknown. In this ecosystem, *Sphagnum* mosses probably played a large role which is important to potential shrub expansion and greenhouse gas flux. Therefore, we started a *Sphagnum* carpet addition field experiment in Kytalyk nature reserve since summer 2011. After a three-year observation, we found out that *Sphagnum* not only obviously limit local sedge growth, but also suitable for seed germination of deciduous shrubs such as *Betula nana*. Moreover, the presence of *Sphagnum* carpets pronouncedly decreases local methane emission, but did not largely affect carbon dioxide resorption rate.

Effects of Arctic tundra vegetation types on the shortwave radiation balance

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Shrub expansion in high latitudes is commonly associated with reduced albedo and thus a positive feedback to climate warming. However, the vegetation which may actually be replaced by shrubs is often not considered in much detail. The lowland at the Kytalyk research site in north-east Siberia is dominated by wet sedge (mainly common cottongrass, *Eriophorum angustifolium*) and dwarf shrub (mainly dwarf birch, Betula nana) patches at the scale of a few meters. We investigate the differences in the shortwave radiation balance of these two major vegetation types using field measurements and radiative transfer modelling. In particular, we analyse the effect of vegetation type and structure on canopy albedo and the amount of radiation transmitted to the soil and ultimately warming or thawing the permafrost. We parameterise and validate the 3D radiative transfer model DART for tundra vegetation in order to investigate extreme scenarios that could not be observed in the field. Our field data highlights the differences between cottongrass and dwarf birch canopies and the importance of weather conditions and sun angle for the shortwave radiation balance. Clouds strongly influence the radiative balance as direct and diffuse radiation are reflected and transmitted differently. As compared to direct radiation, the albedo of diffuse radiation is smaller while