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A strong molecular biomarker signal for *Sphagnum* suggests importance of peatlands as a carbon source to Russian and Scandinavian sub-Arctic coastal surface sediments.

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The vast Arctic and sub-Arctic peatlands contain over a third of the global stock of soil organic matter and are predicted to experience among the largest climate warming. This could lead to significant changes in carbon release dynamics from northern peatlands by e.g. permafrost thawing. In combination with an already observed increased river run-off this will change the fluvial input fluxes and composition of terrestrial organic carbon. River-dominated coastal sediments are here studied to provide an integrated signal of the provenance, transport and degradation dynamics of land-derived organic matter export to the sub-Arctic to Arctic shelf.

Bulk geochemical parameters and molecular biomarkers in surface sediments of five Russian Arctic estuaries and along an off-river transect in the northern Baltic Sea suggest a strong predominance of terrestrial organic matter. The molecular n-alkane proxy $C_{23}/(C_{23}+C_{29})$ is used to determine the relative abundance of *Sphagnum*-derived organic matter. To be able to compare $C_{23}/(C_{23}+C_{29})$ in surface sediments with the endmember values in northern *Sphagnum* species, we performed analysis on eight *Sphagnum* species spread out over six sub-Arctic locations in Finnish and Swedish Lapland. The surface sediments along the complete 140 degree longitude climosequence show $C_{23}/(C_{23}+C_{29})$ values between 0.54 – 0.60 (northern Baltic) and 0.47 – 0.33 (Russian Arctic) suggesting a large contribution of *Sphagnum* to the recalcitrant

coastal carbon pool. The west to east decreasing proxy trend is consistent with the areal extent of peatland declining from the relatively wet and warm areas of Scandinavia and the west-Siberian Lowlands to the drier, colder regions in East-Siberia.