Mapping peat layer thickness using machine learning and aerial laser scanning data

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The surface of the earth's surface together with the granulometric composition of the soil are among the main parameters that determine the flow and accumulation of surface and underground water. Poorly drained and wet soils are important for biodiversity, water exchange, various chemical and biological processes, as well as for organic carbon accumulation. This research was done within the framework of the project Demonstration of climate change mitigation potential of nutrients rich organic soils in Baltic States and Finland (OrgBalt) and its purpose is to map the thickness of the organic layer on a national scale for the territory of Latvia. The mapping was done using machine learning methods and NFI sample plot data on peat layer thickness, ALS laser scanning data and other additional data were used as training data. As a result, a raster map was obtained, which depicts the depth of the peat layer in three different classes - No peat, peat layer thickness from 1 to 20 cm and peat layer thickness more than 20 cm. The accuracy of the machine learning classification algorithm reaches 0.88, while the kappa value is 0.74. Separately by different classes, the sensitivity of the model is 0.94 for the first class, 0.63 for the second class and 0.81 for the third class.