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EstSoil-EH - Developing a high-resolution eco-hydrological modelling parameters dataset for Estonia

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To understand, model and predict landscape evolution, ecosystem services and hydrological processes the availability of detailed observation-based soil data is extremely valuable. Estonia has a national digitized soil map based on decades of Soviet era field mapping. It maps more than 750 000 soil units throughout Estonia at a scale of 1:10 000 - with 75% of mapped units smaller than 4.0 ha. However, due to the way it was recorded the data is not immediately useful for numerical modelling. We synthesized the EstSoil-EH dataset - more than 20 eco-hydrological variables on soil, topography and land use for Estonia as numerical and categorical values - using data fusion and machine learning.

As additional feature information we used a 5m DEM, the Estonian Topographic Database, and EU-SoilHydroGrids layers. For each soil unit, we analysed type, texture, and layer information from the originally recorded composite text-based soil information, which contains the actual texture class, classifiers for rock content, peat soils, distinct compositional layers, and their depths. Subsequently, we derived soil layering, clay, silt, and sand contents and coarse fragments of the soil layers. In addition, we aggregated and predicted physical variables related to water and carbon cycles (bulk density, hydraulic conductivity, organic carbon content, available water capacity). We validated our modelled data and achieved satisfying degrees of agreement depending on the variables type.