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PRODUCT CONTENTS

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Carbon stock and carbon stock change in Swedish soils

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The map product *Carbon stock and carbon stock change in Swedish soils* consists of six GIS layers in raster format (TIFF) with a resolution of 10×10 m. The geographical delimitation is Sweden and the projection SWEREF99 TM.

The map product includes the two carbon pools, dead organic matter (DOM) and soil carbon (SOC), whose carbon stocks and carbon stock changes are reported separately for each carbon pool, and combined for the land as a whole. For the carbon stock maps, the unit is kilograms of carbon per hectare (kg C ha^{-1}) and for the carbon stock change maps, the unit is kg carbon dioxide equivalents per hectare and year ($\text{kg CO}_2 \text{ eq. ha}^{-1} \text{ year}^{-1}$). The values are representative for the period 2000 – 2020, for soils whose land use corresponds to what is stated *Nationella Marktäckedata 2018* (Naturvårdsverket, 2021).

The carbon pool DOM includes the dead wood, litter and organic humus layers. Dead wood consists of dead tree trunks and large branches with a diameter over 10 cm and a length over 1.3 meters as well as stumps and roots down to 2 mm in diameter. Litter consists of coarse roots with diameters between 10 and 100 mm, annual litter fall and living fine roots with diameters less than 2 mm. Organic humus layers includes fine litter (living roots < 2 mm). The SOC stock values represent the carbon stocks down to a soil depth of 50 cm.

With four exceptions, values of carbon stock and uptake of carbon dioxide are represented by averages of a larger region (in most cases county averages) obtained from either *the Swedish Forest Soil Inventory* (SLU, 2021a)) or *the Swedish National Forest Inventory* (SLU, 2021b). The exceptions are the following:

- For arable land, the carbon stock change is represented by modelled averages for eight different production areas (however, model input includes data from *the Soil and Crop inventory* (SLU, 2021c)).
- The carbon stock change on peatland is represented by emission factors (national or IPCC default factors, stratified with respect to climate and nutrient status of peat) that has been averaged based on the respective county's distribution of nutrient status (according to *the Swedish National Forest Inventory*).
- For minerogenic forest soils, the majority of the carbon stock values for SOC and organic humus is represented by the median of the carbon stocks within an area of 50×50 m based on maps by Hounkpatin et al. (2021) where the carbon stocks were estimated using an AI method. However, carbon stocks

on areas that these maps do not cover are represented by county averages obtained from *the Swedish National Forest Inventory*.

The map product therefore does not constitute factual values of carbon stocks, carbon stock changes and greenhouse gas emissions at specific locations. Partly due to that many values are based on regional averages (most often at county level, but also due to the fact that averages for emission factors are based on averages also including studies carried out in countries outside Sweden), partly because the values are based on limited data. Above all, insufficient mapping of peatlands causes major uncertainties in the maps because such lands are very carbon-rich and often constitute large emitters of carbon. However, the maps give a good overall picture of which soil types and carbon pools contribute as a carbon sink or carbon source and where these are located in Sweden.

The reporting convention for change in carbon dioxide equivalents (given by the carbon sink maps) is that a positive value means a loss of carbon, while a negative value indicates a gain of carbon. For a land area's total greenhouse gas balance, a positive value thus means a net emission of greenhouse gases from the land area to the atmosphere, while a negative value means a net absorption of greenhouse gases from the atmosphere. In the first case, the land area constitutes a carbon source, in the latter a carbon sink.

References

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