Greenhouse gas reporting

Improving soil carbon estimation of GHG inventory

The project is based on extensive litterfall and soil carbon data and evaluates foliar litterfall production rates in comparison to the regional production rates used in GHG inventory model in Finland (Finland's National Inventory Report 2013), and the soil carbon stock development estimated by multiple models.

Foliar turnover rates in Finland – comparing estimates from needle-cohort and litterfall-biomass methods

For evergreens, our regionally averaged needle turnover rates +/- standard deviation (0.139+/-0.01, 0.1+/-0.009 for spruce in south and north of 64° latitude, and 0.278+/- 0.016, 0.213+/-0.028 for pine, respectively) were larger than turnover rates used in GHG inventory model Yasso07 in Finland (0.1, 0.05 for spruce in south and north region, and 0.245, 0.154 for pine, respectively). For deciduous, only if we used our model based on stem diameter, crown ratio and North coordinate to estimate the foliage, then our averaged litterfall/foliage biomass ratios +/- standard deviation (0.784+/-0.162, 0.634+/-0.093 for birch in south and north region) were close to the ratio 0.79 currently used for the whole of Finland. In addition to the regional level estimates we estimated more precise needle longevity and needle turnover rates for the 10x10 km grid in Finland.

Here we provide downloadable data from the spatial kriging model estimates of needle longevity and needle turnover rates for Scots pine and Norway spruce. The X is North and Y is East coordinate (km) in Finnish KKJ-3 (YKJ) coordinate system used with zone 3 countrywide (YKJ). The Finnish KKJ-3 (YKJ) is based on European Datum 1950 (ED50) coordinate system. For more information on methods estimating foliar production rates and needle longevity please email to boris.tupek@metla.fi.

Data for download:

- Needle longevity data (165 kB)
- Needle turnover data (176 kB)

Drivers of soil carbon stock development – comparing estimates from multiple models in different environmental conditions

We evaluate important factors for soil carbon stock development by two approaches. Firstly, we apply boosted regression tree method, a new machine learning scheme for evaluating most influential factors and their interactions. Secondly, we group soil carbon data into homogenous groups depending on the environmental factors (e.g. soil moisture, precipitation, air temperature) and simulate soil carbon stock with process based models (e.g. Yasso07, RothC, and Century). We compare soil carbon stock estimates with measurements for each group and model to identify environmental drivers (factors).