Read me: Basic information about the data files here in Zenodo

This data set is comprised of three packed zip files and they include text files of 3D information from terrestrial laser scanning (TLS) and aerial imagery from unmanned aerial vehicle (UAV) from individual Scots pine trees within 27 sample plots from three test sites located in southern Finland.

TLS data acquisition was carried out with Trimble TX5 3D laser scanner (Trible Navigation Limited, USA) for all three study sites between September and October 2018. Eight scans were placed to each sample plot and scan resolution of point distance approximately 6.3 mm at 10-m distance was used. Artificial constant sized spheres (i.e. diameter of 198 mm) were placed around sample plots and used as reference objects for registering the eight scans onto a single, aligned coordinate system. The registration was carried out with FARO Scene software (version 2018). Aerial images were obtained by using an UAV with Gryphon Dynamics quadcopter frame. Two Sony A7R II digital cameras were mounted on the UAV in +15° and -15° angles. Images were acquired in every two seconds and image locations were recorded for each image. The flights were carried out on October 2, 2018. For each study site, eight ground control points (GCPs) were placed and measured. Flying height of 140 m and a flying speed of 5 m/s was selected for all the flights, resulting in 1.6 cm ground sampling distance. Total of 639, 614 and 663 images were captured for study site 1, 2, and 3, respectively, resulting in 93% and 75% forward and side overlaps, respectively. Photogrammetric processing of aerial images was carried out following the workflow as presented in Viljanen et al. (2018). The processing produced photogrammetric point clouds for each study site with point density of 804 points/m^2, 976 points/m^2, and 1030 points/m^2 for study site 1, 2, and 3, respectively.

The sample plots within the three test sites have been managed with different thinning treatments in either 2005 or 2006. The experimental design of the sample plots includes two levels of thinning intensity and three thinning types resulting in six different thinning treatments, namely i) moderate thinning from below, ii) moderate thinning from above, iii) moderate systematic thinning, iv) intensive thinning from below, v) intensive thinning from above, and vi) intensive systematic thinning, as well as a control plot where no thinning has been carried out since the establishment. More information about the study sites and samples plots as well as the thinning treatments can be found in Saarinen et al. (2020).

The data set includes stem points of individual Scot pine trees extracted from the point clouds. More about the method of extraction can be found in Saarinen et al. (2020) and Yrttimaa et al. (2020). The title of the zip file refers to the study sites 1, 2, and 3. The title of the text files includes the information on the test site, the plot within the test site, and the tree within the plot. The text files contain stem points extracted from the TLS point clouds. The columns “x” and “y” contain x- and y-coordinates in a local coordinate system (in meters), in column “h” is the height of each point in meters above ground, and treeID is the tree identification number. The columns are separated by space.

Based on the study site and plot number, files from different thinning treatments can be identified by using the information in Table 1 in Saarinen et al. (2020).

References

Saarinen, N., Kankare, V., Yrttimaa, T., Viljanen, N., Honkavaara, E., Holopainen, M., Hyyppä, J., Huuskonen, S., Hynynen, J., Vastaranta, M. 2020. Assessing the effects of stand dynamics on stem growth allocation of individual Scots pines. bioRxiv 2020.03.02.972521. https://doi.org/10.1101/2020.03.02.972521

Viljanen, N., Honkavaara, E., Näsi, R., Hakala, T., Niemeläinen, O., Kaivosoja, J. 2018. A Novel Machine Learning Method for Estimating Biomass of Grass Swards Using a Photogrammetric Canopy Height Model, Images and Vegetation Indices Captured by a Drone. Agriculture 8: 70. https://doi.org/10.3390/agriculture8050070

Yrttimaa, T., Saarinen, N., Kankare, V., Hynynen, J., Huuskonen, S., Holopainen, M., Hyyppä, J., Vastaranta, M. 2020. Performance of terrestrial laser scanning to characterize managed Scots pine (*Pinus sylvestris* L.) stands is dependent on forest structural variation. EarthArXiv. March 5. https://doi.org/10.31223/osf.io/ybs7c