Laser scanning data 2008 – 2019

Laser scanning data refers to three-dimensional point-like data depicting the ground and objects on the ground. Each point is provided with x, y and z coordinate information.

Laser scanning data is collected i.a. in order to produce elevation models and collect information about forest resources.

Laser scanning data is available from all of Finland.

The product belongs to the open data of the National Land Survey of Finland. More information: Topographic data and how to acquire it http://www.maanmittauslaitos.fi/en/maps-and-spatial-data/expert-users/topographic-data-and-how-acquire-it

From 2020 onwards, laser scanning data according to the laser scanning programme will be produced. The product description of the 'Laser scanning data 5 p' according to the scanning programme is available: https://www.maanmittauslaitos.fi/en/maps-and-spatial-data/expert-users/product-descriptions/laser-scanning-data-5-p

A spaced-out open dataset will be created from the new Laser scanning data 5 p: https://www.maanmittauslaitos.fi/en/maps-and-spatial-data/expert-users/product-descriptions/laser-scanning-data-05-p . The characteristics of this dataset correspond to the Laser scanning data 2008–2019 dataset.

Purpose:

Laser scanning data is utilised i.a. for making topographic models. Topographic models are used in route optimisation and data collection applications and in applications studying water discharge and the forms of the ground surface. Laser scanning data is also utilised for creating contour lines.

Laser scanning data and three-dimensional models derived from it are applicable to be used in depicting the urban environment, e.g. in noise modelling. Laser scanning data is also utilised in land use planning and collecting information about forest resources and also in other analysis and monitoring of changes in the natural environment.

Geographic location

Entire Finland

Responsible party

National Land Survey of Finland

Pixel size

0.5 p/m2

Spatial representation

Vector

Data content

Point cloud where the points representing the ground surface are automatically classified

An automatically classified point cloud has been processed to form the foundation for the nationwide elevation model and to be suitable as source data for the interactive production of the elevation model. Other users of the data can filter and classify the data according to their own

needs. The point density is at least 0.5 points/m2, i.e. the mean distance between laser points is at most approx. 1.4 m. The distribution of points (scanning image) is not necessarily completely even, but it depends on the type of scanner and the settings of each scanning flight.

Point classes according to the processing order of the classification:

Unclassified (class value 1 according to LAS 2.0 format, Unclassified). Before classification, all the laser points are in this class. After classification, this class includes all the points whose class has not changed in the classification process.

Overlap area (class value 13, Overlap, is not included in the LAS 2.0 format) since the laser scannings of the year 2010. In case of overlapping trajectories, further classification only includes points from one trajectory. The rest of the points are included in this class.

Low vegetation (class value 3 according to LAS 2.0 format, Low Vegetation).

Low vegetation is a general class for all those points that do not correspond to the only or final return echoes of the laser pulses. These points correspond to return echoes that are reflected by objects that the laser pulse has partly bypassed or penetrated (in practice mostly vegetation).

Low error points (class value 7 according to LAS 2.0 format, Low Point). These points are usually formed because of strong glare, bright objects or multiple reflections of the laser pulse. There can also be points high up in the air that are created by objects reflecting different return echoes. Some of these kinds of points have been removed from the data. The points that have not been removed are in classes 1, 13 or 3.

Ground (class value 2 according to LAS 2.0 format, Ground). These points represent the lowest surface that can be perceived from the air. The result depends on the values chosen for the parameters of the classification algorithm, and it is always a compromise between the number of points not belonging to the surface of the ground and points that the surface of the ground is lacking.

Point cloud where the points that represent the ground surface are classified with the help of stereo models:

This data set comes about when automatically classified data is controlled and interactively classified further with the help of stereo models for aerial photos and in a graphic working environment. In this working phase, no points are deleted from the dataset, only the class can change. The point cloud corresponds to the needs of the calculation of the elevation model, and other users of the data can filter and classify the data according to their own needs.

Point classes:

Overlap area (class value 13, Overlap, is not included in the LAS 2.0 format) since the laser scannings of the year 2010. In case of overlapping trajectories, further classification only includes points from one trajectory. The rest of the points are included in this class. The class of these points does not change in the stereo working phase after the automatic classification of the points representing the surface of the ground.

Low vegetation (class value 3 according to LAS 2.0 format, Low Vegetation).

Low vegetation is a general class for all those points that do not correspond to the only or final return echoes of the laser pulses. The class of these points does not change in the stereo working phase after the automatic classification of the points representing the surface of the ground.

Low error points (class value 7 according to LAS 2.0 format, Low Point). The class of these points does not change in the stereo working phase after the automatic classification of the points representing the surface of the ground.

Ground (class value 2 according to LAS 2.0 format, Ground). Significant errors observed after the automatic surface classification, in other words objects that do not belong to the ground or are lacking from it are corrected. When corrected, the class of the points change respectively from class 2 (Ground) to class 1 (Unclassified) or vice versa.

Standing water (class value 9 according to LAS 2.0 format, Water). The elevation of these points is calculated according to the level of water in the Topographic database and according to the average level of the standning water points of the scannings. Large water areas are divided into subareas in the Topographic database and the stereo working phase because of the division of map sheets. Subareas can have different water levels due to scannings having been performed at different dates. Within a subarea, there can also be parts that have a different water level due to scannings having been performed at different dates. One subarea can only have one representative water level. Points that are close enough to this level according to noise tolerance are classified in the class Standing water. The masking height of the elevation model is the average level of the standing water points within each subarea's borders.

Streaming water (class value 14 according to LAS 2.0 format, Stream). These are points that are within the fluvial areas of the Topographic database and which have since the automatic surface classification been in the class Ground. Due to the location of the shoreline and the variation of the water level, there are often points also outside the actual water surface area, so the actual information of the point class is the "channel area". Points that do not belong to the lowest surface, i.e. points that are not included in the calculation of the elevation model, can be changed from this class to class 1 (unclassified) with the help of stereo models.

Bridge points (class value 10 according to LAS 2.0 format, Bridge). This class includes bridges that have a free passage for water under them. Does not apply to tight culverts or tunnels. These points have been classified manually.

Unclassified (class value 1 according to LAS 2.0 format, Unclassified).

Maintenance

Point cloud where the points representing the ground surface are automatically classified:

The data covers the whole of Finland. From 2020 onwards, the data will be updated with the new 'Laser scanning data 0.5 p' according to the laser scanning programme.

Point cloud where the points that represent the ground surface are classified with the help of stereo models:

Laser scanning data is available only from certain parts of Finland.

The product's coverage corresponds to the coverage of elevation model KM2 quality class I. Coverage index (in Finnish): https://www.maanmittauslaitos.fi/laserkeilaus-ja-ilmakuvaus.

▼ Quality information

Lineage

The product Laser scanning data is the National Land Survey's most accurate elevation data set. The point density of the data is at minimum 0.5 points per square metre (the distance between the points is about 1.4 metres). Regarding unambiguous objects, the standard error of the elevation accuracy is at maximum 15 centimetres and the standard error in planimetric accuracy 60 centimetres.

The purpose of the automatic classification of ground surface is to find the laser pulse hits that represent the ground surface. This dataset is at the latest available by the end of that year when the scanning of the area has been performed.

The automatic classification of the points that represent ground surface is checked with the help of NLS aerial images. Streaming and standing waters are classified at the same time according to shorelines in the Topographical database. In addition, bridges are classified manually.

Calculations of Elevation model 2 m are based on the laser scanning data that has been classified with the help of stereo models. This laser scanning dataset is available at the same time as the Elevation model 2 m regarding the area is complete.

Conformity

The product does not meet the specifications.

Close

▼ Distribution and further information

Distributor

National Land Survey of Finland customerservice@nls.fi

Conditions applying to access and use

The product belongs to the open data of the National Land Survey of Finland. Open data CC 4.0 license http://www.maanmittauslaitos.fi/en/maps-and-spatial-data/expert-users/en-maastotiedot-ja-niiden-hankinta/open-data-cc-40-licence.

More information: Topographic data and how to acquire it http://www.maanmittauslaitos.fi/en/maps-and-spatial-data/expert-users/topographic-data-and-how-acquire-it.

You can download datasets from the NLS File service of open data https://www.maanmittauslaitos.fi/en/e-services/open-data-file-download-service

Limitations on access

The copyright and the other immaterial rights on the Laser scanning data are owned by the National Land Survey of Finland. The data material is not confidential. Public access to the material is not restricted by the INSPIRE Directive. Pursuant to section 14 of the Territory Surveillance Act, the dataset may be spaced out from the original point density to below 0.3 p/m2. You can gain access to the original dataset by applying for permission from the Finnish Defence Forces.

Reference system

ETRS89 / TM35FIN(E,N) (EPSG:3067)

N2000 height (EPSG:3900)

Distribution format

LAZ

Close

▶ Pricing