RIEGL LiDAR in Forestry & Precision Agriculture

Various LiDAR Sensors & Systems for Most Challenging Projects



Based on innovative and proprietary Waveform-LiDAR technology *RIEGL* laser scanners and systems provide an outstanding high-density point cloud ideally suited for applications in forestry and precision agriculture. Advanced processing algorithms account for a full exploitation of the information included in scan data. Multi-target capability enables excellent vegetation penetration and the computing of detailed terrain models. Point classification is the basis for growth monitoring, height modeling, or the detection of deadfall.

WAVEFORM-LiDAR TECHNOLOGY

RIEGL VZ-400i/VZ-600i
High Performance
3D Terrestrial Laser Scanners



RIEGL Airborne LiDAR Scanning Systems
for High-Point Density Mapping Applications



RIEGL UAS-based LiDAR Sensors
for integration in various types of renowned UAVs



RIEGL VQ-480 II / VQ-580 II-S
Airborne Laser Scanning Systems for use in small aircrafts, helicopters, or large UAVs



Contact us

RIEGL®

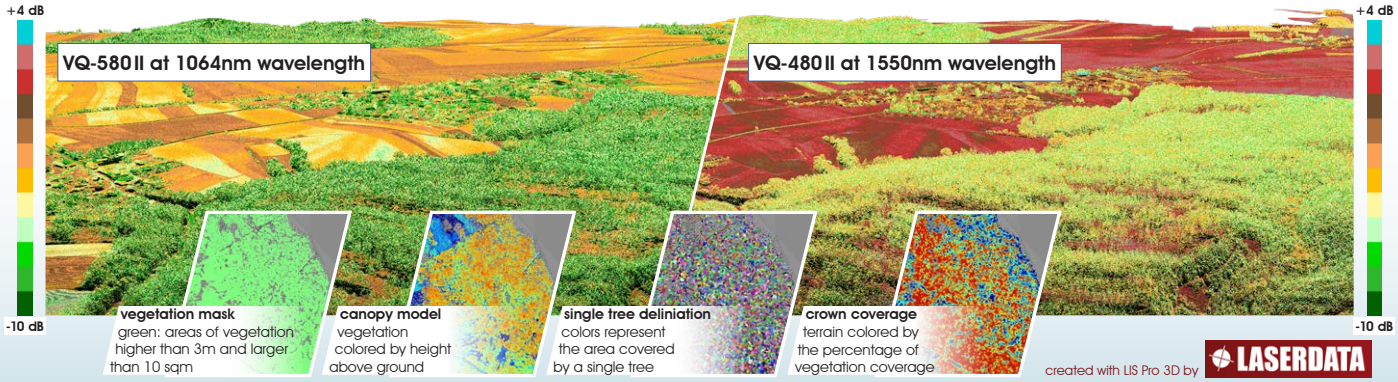


Forestry Applications

Data Acquisition using Airborne, UAV-based, and Terrestrial Laser Scanning

AIRBORNE

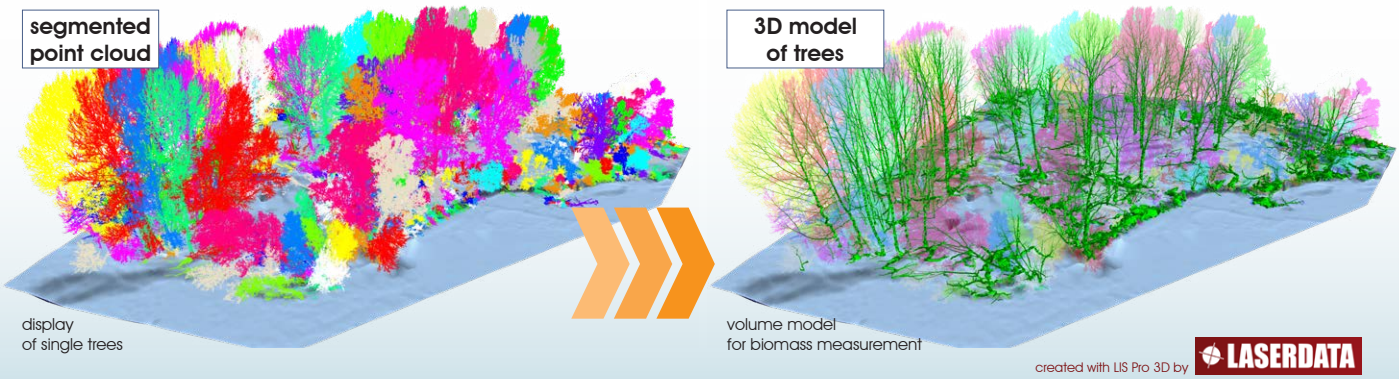




created with LIS Pro 3D by LASERDATA

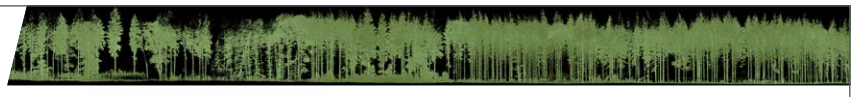
UAV-BASED

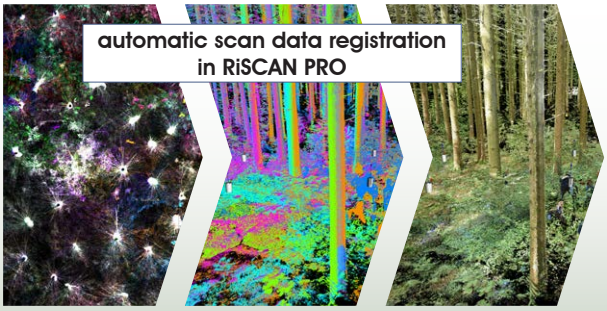


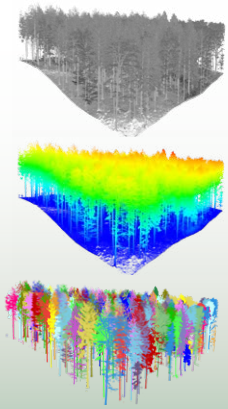


created with LIS Pro 3D by LASERDATA

TERRESTRIAL







- scan data preparation
- different filter options

- seperation of ground & non ground points
- stem extraction
- georeferenced tree position

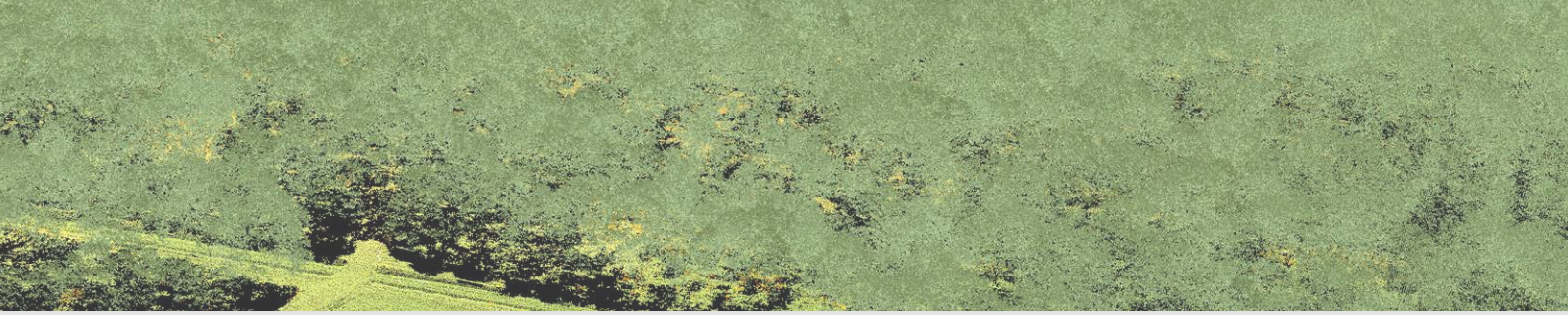
key features:
- tree ID
- DBH – Diameter at Breast Height
- tree height
- crown area
- crown diameter
- volume calculation



LIS TreeAnalyzer Plugin
RiSCAN PRO – Single Tree Segmentation and Analysis

created with LIS TreeAnalyzer Plugin

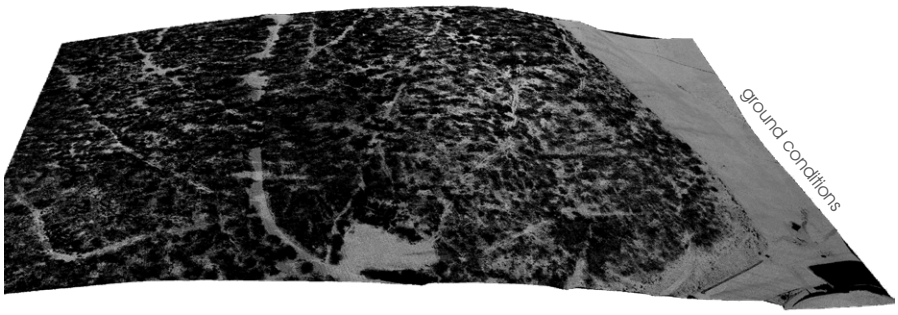
Copyright *RIEGL* Laser Measurement Systems GmbH © 2026– All rights reserved.





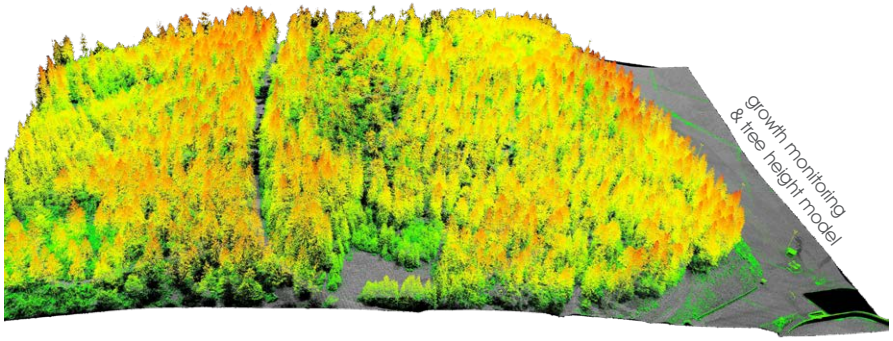
VEGETATION

Due to the extremely high scanning rates up to 2.4 MHz, *RIEGL* laser scanners provide an outstanding high-density pointcloud, which makes it ideal for forestry applications.



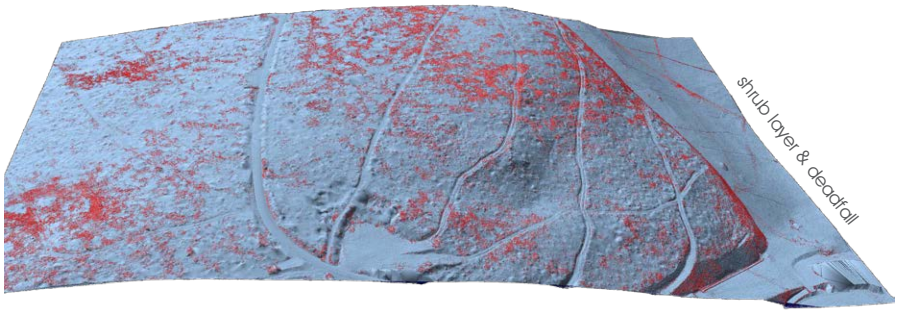
GROUND CONDITIONS

The excellent vegetation penetration rate results in a high number of ground returns that can be used to generate very detailed terrain models. The sample to the left depicts points classified as ground coloured by reflectance.



GROWTH MONITORING & TREE HEIGHT MODEL

All points classified as vegetation can be coloured by relative height above ground. This results in a relative estimation model of the trees revealing regions of low and high vegetation stands. Growth rates can be documented by comparison of height models collected over a period of time.



SHRUB LAYER & DEADFALL

The undergrowth of a forest consists of shrubby vegetation and seedling trees. It plays an important role in the forest eco system and is a habitat for wildlife and birds. The image to the left shows points classified as low vegetation (red) and clearly shows areas of dense natural cover. Furthermore deadwood can be detected in this data layer.



BARE EARTH

With all vegetation data removed, the remaining points define a very detailed terrain model. This model clearly reveals roads and trenches as well as results of slope instability and erosion.

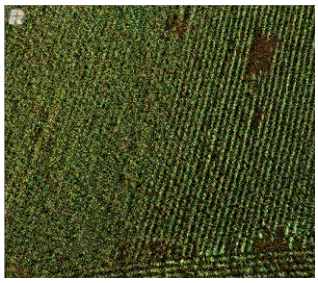
Copyright *RIEGL* Laser Measurement Systems GmbH © 2026– All rights reserved.



Precision Agriculture Applications



- continuous crop monitoring during growth period
- observation of irregularities in plant growth
- detection of hail damage
- analysis of terrain changes
- yield estimation
- observation of nutrient over- or undersupply
- longterm regular observation of growth characteristics for geological evalution and classification



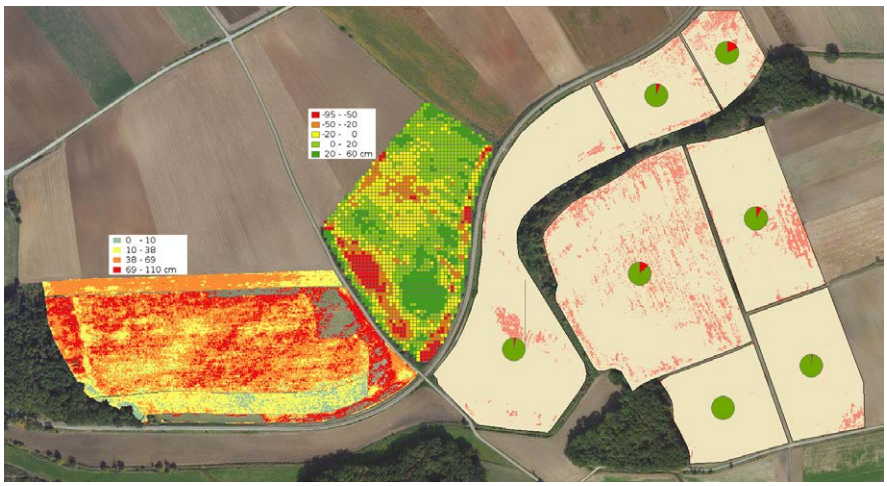
corn
colored pointcloud



sunflowers
colored pointcloud



illustration of
penetration capacity



crop stand variations

ADVANTAGES OF LASER SCANNING IN VEGETATION MONITORING

By contrast to photogrammetry, which is limited to determining Digital Surface Models (DSM), the technique of laser scanning enables the user to capture data suitable for the generation of DSM and Digital Terrain Models (DTM).
Advanced processing algorithms account for a full exploitation of the information included in scan data. A typical target situation is measuring areas covered by vegetation. Several target echoes resulting from a single laser pulse emission are obtained by echo digitization and subsequently resolved by online waveform processing, resulting in measurement ranges, echo amplitudes, calibrated target reflectance and pulse shape information.

CROP GROWTH

Crop growth and health is closely monitored in Precision Farming in order to minimize the use of fertilizers or irrigation. Airborne laser scanning data enable to observe plant growth – while at the same time displaying changes in ground surface – or to detect areas of irregularities.

FIELD CHARACTERISTICS

While plant height cannot per se be interpreted as a direct factor for yield calculation, irregularities due to, e.g., different soil composure, variety of seed type or damage (e.g., weather-related, caused by storm, hail, or rainfall) can easily be discerned and taken as an indicator for further developments and estimation of yield at harvest.

MONITORING

Constant monitoring of agricultural areas enables early yield estimation based upon differences in plant growth development.

Copyright *RIEGL* Laser Measurement Systems GmbH © 2026 – All rights reserved.
Use of this data sheet other than for personal purposes requires *RIEGL's* written consent.
This data sheet is compiled with care. However, errors cannot be fully excluded and alternations might be necessary.

www.riegl.com

RIEGL®