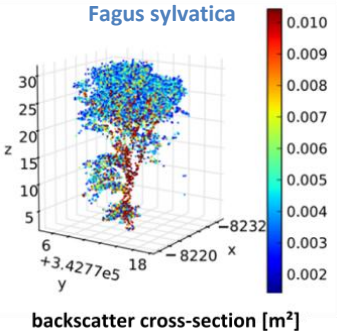
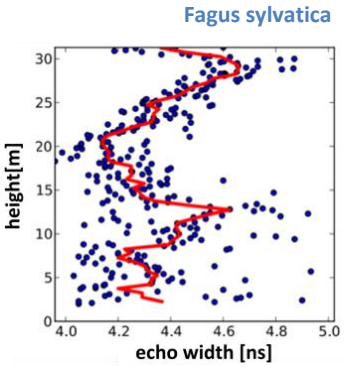
3D Laser Scanning
Vegetation Investigation and Signature Analysis

The major aim of this research is to gain deeper insight and fundamentally enhance the understanding of the characterization and monitoring of vegetation using state-of-the-art laser scanning technology from both airborne (ALS) and terrestrial platforms (TLS). The research is part of the LS-VISA project, aiming the development of a novel system for analyzing point clouds of vegetation: ***LiDAR Vegetation Investigation and Signature Analysis (LVISA)***



Forests cover 30 Percent of the earth's land area. Forested areas play an important role in wildlife habitat or constitute an important and major part of the world's natural resources. Mapping and characterization the three-dimensional ***nature of vegetation*** is increasingly gaining importance. Deeper insight is required for e.g. forest management, biodiversity assessment, habitat analysis, precision agriculture, renewable energy production or the analysis of interaction between biosphere and atmosphere.

Laser scanning (LS) has evolved into the state-of-the-art technology for highly accurate 3D data acquisition. By now several studies indicated a high value of 3D vegetation description by using laser data. The laser sensors provide a detailed geometric presentation (geometric information) of scanned objects as well as a full profile of laser energy that was scattered back to the sensor (full-waveform radiometric information). In order to exploit the full potential of these datasets, profound knowledge on laser scanning technology for data acquisition, geoinformation technology for data analysis and the object of interest (e.g. vegetation) for data interpretation have to be joined. The detection of individual tree species using remote sensing data has proven to be a very difficult task to accomplish. With the advent of scanning LiDAR (light detection and ranging), many aspects of forest inventory and especially tree species classification can now be accomplished.



The research aims in understanding the specific backscatter characteristics of vegetation objects and its influencing factors, as well as the identification and extraction of unique characteristics of selected vegetation objects. The research focused on (i) the exploration and derivation of significant full-waveform LS signatures of vegetation objects (esp. trees) on a multiscale (ALS + TLS) approach, (ii) on the development of methods for improved vegetation detection, and (iii) on the development of a web-based LS signature database (LVISA).

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