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Editorial Open Access

# Points in Forest

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## Editorial

Implementing and maintaining sustainable forest management requires the use of comprehensive and accurate information. Therefore, planning should be based on detailed and accurate methods of measuring tress and vegetation parameters. On the one hand, this requires improving the statistical basis of the measurement methods, on the other - the use of new, more accurate and efficient techniques for measuring trees and forests.

In recent times there has been a significant increase in interest in the topic of advanced digital processing of high resolution aerial photographs in order to generate the Digital Elevation Models (DEM/DTM) and the Digital Surface Models (DSM). Currently used technology through the implementation of advanced algorithms and specialized photogrammetric software and hardware enables the automatic generation of point clouds based on stereoscopic pairs of aerial photographs. The obtained cloud of points has properties similar to the ALS point cloud, and can be successfully used to create digital elevation models for open areas and digital surface models. By automating the process of extracting the DSM using the stereoscopic aerial photographs to generate the model, the human labor was limited to a minimum, what is more the high resolution images makes the models very detailed and accurate. The interest in the processing of digital aerial images in order to generate models of DEM and DSM increases not only because the technology is usually less expensive to purchase than ALS, but model generated using stereo-photogrammetry have higher resolution and more regular coverage of the area. In contrast the biggest advantages of LIDAR based point cloud is capability to penetrating forest cover.

Regardless of the method used for the image adjustment, the stereo parameters, image resolution, the angle of sunlight and the differences in geometry can have a significant impact on the quality of the point cloud and DSM generated using aerial photographs. While technological innovation can improve the image adjustment, problems with the angle of sunlight and geometry are limiting factors in each of this type of imaging. Below a few limiting and problematic issues associated with the use of photogrammetry to produce DSM are presented:

Noncontiguous boundaries between objects (eg: the boundary between discrete stands and harvested area);

Objects of different sizes

Multiple objects

Occlusions

moving objects and shadows

Multi-layered and transparent objects

Radiometric artifacts

When using an image-based matching, points / edges of objects in images differ because of the different points of view.

Between the point clouds generated using aerial imagery and those arising as a result of airborne laser scanning, there are some fundamental differences that concern not only the technology, but also the possible utilization of the data, accuracy, cost, processing and data collection. Unfortunately, based on studies conducted so far cannot be concluded whether digital surface models derived from aerial images are sufficiently precise and detailed to use them for purposes such as periodical forest inventory. Maybe in the future ALS point cloud will be partly replaced by image based 3D point cloud. But for sure both will have their own characteristics useful in environmental study and modeling.