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RECONSTRUCTION OF 3D VECTOR MODELS OF BUILDINGS BY COMBINATION OF ALS, TLS AND VLS DATA

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Abstract. Airborne Laser Scanning (ALS), Terrestrial Laser Scanning (TLS) and Vehicle based Laser Scanning (VLS) are widely used as data acquisition methods for 3D building modelling. ALS data is often used to generate, among others, roof models. TLS data has proven its effectiveness in the geometric reconstruction of building façades. Although the operating algorithms used in the processing chain of these two kinds of data are quite similar, their combination should be more investigated. This study explores the possibility of combining ALS and TLS data for simultaneously producing 3D building models from bird point of view and pedestrian point of view. The geometric accuracy of roofs and façades models is different due to the acquisition techniques. In order to take these differences into account, the surfaces composing roofs and façades are extracted with the same algorithm of segmentation. Nevertheless the segmentation algorithm must be adapted to the properties of the different point clouds. It is based on the RANSAC algorithm, but has been applied in a sequential way in order to extract all potential planar clusters from airborne and terrestrial datasets. Surfaces are fitted to planar clusters, allowing edge detection and reconstruction of vector polygons. Models resulting from TLS data are obviously more accurate than those generated from ALS data. Therefore, the geometry of the roofs is corrected and adapted according to the geometry of the corresponding façades. Finally, the effects of the differences between raw ALS and TLS data on the results of the modeling process are analyzed. It is shown that such combination could be used to produce reliable 3D building models.

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