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USING FULL WAVEFORM DATA IN URBAN AREAS

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Abstract. In this paper, the use of waveform data in urban areas is studied. Full waveform is generally used in non-urban areas, where it can provide better vertical structure description of vegetation compared to discrete return systems. However, waveform could be potentially useful for classification in urban areas, where classification methods can be extended to include parameters derived from waveform analysis. Besides common properties, also sensed by multi-echo systems (intensity, number of returns), the shape of the waveform also depends on physical properties of the reflecting surface, such as material, angle of incidence, etc. The main goal of this investigation is to identify relevant parameters, derived from waveform that are related to surface material or object class. This paper uses two waveform parameterization approaches: Gaussian shape fitting and discrete wavelet transformation. The two classification methods tested are: supervised Bayes classification and unsupervised Self-Organizing Map (SOM) classification. The results of these methods were compared to each other and to manual classification. The initial conclusion is that, though waveform data contains classification information, the waveform shape by itself is not enough to perform classification in urban regions, and, consequently, it should be combined with the point cloud geometry.

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