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AN ATTEMPT TO USE OF THE PRINCIPAL COMPONENT ANALYSIS TO MONITOR THE FLUVIAL TRANSPORT IN THE MOUNTAIN RIVER BED

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Abstract

A major problem in the research of fluvial transport in mountain rivers is to determine the movement of the large parts of the rubble. This issue occurs mainly because of two reasons. Firstly, equipment that is traditionally used for investigation of fluvial transport enables detection of only small fractions of rocks. Secondly, hydrological incidents that are strong enough to move the greatest rocks are extremely rare. During this experiment also moves of the greatest rocks were considered.

In this paper, the possibility of applying Principal Component Analysis (PCA) for change detection in mountain river bed has been investigated. The PCA has been performed on the digital surface models (DSMs) created using terrestrial laser scanning (TLS) data that was collected annually over three years. Each DSM was considered as separate vector of data – different image band. The analysis showed that the data was strongly correlated, since the result the first component contained almost 80% of information about data. The analysis of second principal component values enabled detection of places where both small and numerous rocks and large stones have been moved. The investigation of third principal component showed that it is mostly attributed to the noise. The obtained results are a promising start for future research.

Keywords

Fluvial transport, terrestrial laser scanning, LiDAR, Principal Component Analysis, change detection