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High-resololution topography for the analysis of palaeochannels in the Manawatu river (New Zealand)

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In anthropogenic landscapes, the identification of palaeochannels provides an effective opportunity to improve current estimates of flood risk, extending with sediment analysis short instrumental records, and allowing for the definition of possible preferential flood flow dynamics. New remote sensing techniques in the last decades have led to a dramatic increase in terrain information (Tarolli, 2014), offering a new point of view for such type of landform analysis. Published literature includes a lot of applications of lidar data, and this trend is becoming more prominent due to the wider availability and the lower cost of lidar DTMs for the scientific community and environmental agencies. One of the great advances in using high-resolution topography (HRT) derived by lidar is the capability to provide an accurate and detailed recognition of terrain morphologies also under vegetation cover. The aim of this study is to use lidar HRT to automatically identify palaeochannels in the Manawatu river (New Zealand), flowing in a high-urbanized alluvial plain and for which a high-quality laser scanner data is available in addition to soil sample cores subject to sedimentology analysis and 14C-dating. The palaeochannels geomorphic feature recognition techniques considered in this study is based on a statistical analysis of morphometric parameters (Sofia et al. 2014). Further, the different topographic indices have been read along cross-sectional profiles for each extracted features, and this information together with the relative distance to the main river, combined with sediments analysis, were considered for a preliminary analysis of the relative age of the palaeochannels. The collected results highlighted the capability of high-resolution topography in the identification, mapping, and potentially dating of the palaeochannels in urbanized alluvial plains. In a large-scale context, it allowed to narrow down the area of investigation, thus reducing the cost and time involved in the identification of the features. As well, being based on lidar, it allowed the identification of palaeochannels also under vegetation cover, in areas not visible from ortophotos. This will provide the basis for a suitable flood management planning.

References

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