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Identification of fluvial landscape elements from regionally available airborne LIDAR imagery

B. Notebaert, G. Verstraeten, J. Poesen, G. Govers

Physical and Regional Geography Research Group, K.U. Leuven, Belgium
(Bastiaan.notebaert@geo.kuleuven.be / Phone: +32 16 326420)

High-resolution airborne LIDAR imagery offers enormous possibilities for characterizing fluvial landforms with minimal topographic variability. Several studies have employed such topographic datasets for geomorphologic mapping of river floodplains. However, the potential of LIDAR for identifying fluvial landforms strongly depends on its accuracy. Recently, several regionally available LIDAR-derived digital elevation models (LIDAR-DEM) have become available. However, because of their large spatial coverage, these LIDAR-DEM's are not of the same quality as the original LIDAR-surveys. In this study, we tested the potential of two regionally available LIDAR-DEM's for characterizing geomorphic features in the floodplains of two contrasting rivers in Belgium (Dijle and Amblève). The Dijle floodplain is characterized by an important Holocene valley infilling. The Amblève river is characterized by important lateral river bed erosion with a very limited vertical valley infilling. In both valleys the height differences are limited. Two LIDAR datasets with different quality were available for parts of the floodplains of both catchments.

The qualitative analysis of LIDAR images includes the identification of former channel patterns, levees, colluvial hillslope and fan deposits. These results were confirmed by field data, topographic surveys and historical maps. The pixel resolution proved to be an important factor in the identification of small landforms: features with a width equal to or larger than LIDAR resolution can be detected. This poses limits on the usability of regionally available LIDAR-DEM's, which often have a horizontal resolution of several m.