Analyses of floodplain flow networks by automatic lidar DEM processing

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Abstract: Floodplain inundation and surface water flow paths are important components of floodplain development and maintenance, and of ecosystem productivity and sustainability. Details on floodplain surface flow networks are especially important for understanding inundation in response to high, but sub-bankfull stages on the main river. Despite their importance few details are known about floodplain flow networks, because in these typically low gradient and low relief landscapes channels may not be readily apparent in imagery and digital elevation models (DEMs). In this study we analyzed the Congaree River floodplain channel network using a fast and automatic scanning-extraction approach that requires a DEM and only two user defined parameters, a scanning line length and a depth threshold. Overall, surface flow networks extend across the entire floodplain and thereby may promote inundation of the floodplain interior without overbank inundation. Hence, the poorly documented sub-bankfull flow networks may have an important influence on floodplain processes.

Key words: floodplain, fluvial geomorphology, channel extraction, connectivity, drainage density, lidar.