Can this approach be useful to detect, to classify and to filter Large Wood from TLS data clouds?

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The calculation of differences between subsequent DEMs (difference of DEMs, DoD) is a commonly applied method to analyze and quantify morphological changes occurred along a riverine environment. The higher levels of uncertainty in the DoD computation are, typically, localized in area with low point density, steepest slopes and highest roughness values. A common source of roughness in riverine environment is the presence of Large Wood (LW). In turn, in certain conditions, the roughness map can help to detect the LW position. The aim of this research is to define a new approach to detect the LW into DEMs, as to permit its removal from TLS datasets. The study was carried out along the Blanco River (Southern Chile), a fourth order river un-impacted by human pressure. After the 2008 Chaiten volcanic eruption, and the subsequent floods, the Blanco River has been severely affected by sediment and LW input. Huge amount of tephra (up to 8 m) was deposited into the river channel and over 3.5 km2 of evergreen forest. This event generated considerable changes in geomorphological settings, and a considerable input of LW into the active channel (100 m3 /ha). Three TLS surveys were carried out along a 2.2 km-long study reach in 2013, 2014 and 2015, respectively. Thanks to the high point cloud density, has been possible to obtain high resolution DEMs with 0.07 x 0.07 m pixel size. The study area is characterized by consistent differences between grainsize characteristics (D16=0.007 m; D50=0.070 m; D84=0.156 m), and LW diameter (D) and length (L) (Dmax=1.20 m; Dmin= 0.10 m; Dmean= 0.25 m; Lmin=1.00 m; Lmean= 3.36 m). These differences in dimension permit us to define the distribution of LW from the roughness map. Using then, the "Select by Location" tool in ESRI ArcGIS environment has been possible to remove the LW from the DEMs. In fact, Select by Location tool permit to select features based on their location relative to features in another layers. Finally, to fill the empty space was used the "Fill miss data holes" tool in the open source "Whitebox Geospatial Analysis Tools". In this way has been possible to obtain the DEMs without LW, increasing the precision in the detection and quantification of geomorphic changes. This research was funded within the Chilean research Project FONDECYT 1141064 "Effects of vegetation on channel morphodynamics: a multiscale investigation in Chilean gravel-bed rivers".