Assessment of high resolution digital elevation model for deep humus-rich sediments delineation at a plot scale

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Resolution and quality of digital elevation models is a key factor in erosion modeling. Spatial estimates of erosion and sedimentation rates are important for soil organic carbon stocks prediction or delineation of newly formed soil cover by degradation and sedimentation of soil material. Such analysis can be sensitive to DEM vertical accuracy and horizontal resolution. LIDAR data can provide very precise DEMs with very high resolution. In our study we used ground based LIDAR data with 10cm pixel. At such resolution, not only naturally formed terrain features are observed, but also anthropogenic features are depicted. Anthropogenic features are represented by more significant objects like hedges or ditches that can significantly influence the water and sediment movement in the landscape on one hand, on the other hand less significant anthropogenic impact can influence the terrain surface. Plot management forms a regular network consisting of parallel linear features given by plowing operations. At our research plot, such features depicted by DEM form specific flow direction (drainage) pattern over the area comparing to coarser resolution DEMs. We focused on comparison of differently preprocessed DEMs for deep humus-rich sediments depth prediction. We compared success rate of prediction models based on original DEM, DEMs with different resampling (resolution) and modeling of original DEM adding random noise given by size of plowing based terrain pattern. The study showed that original high resolution DEM significantly decreases the possibility of soil depth prediction. The actual very precise surface description is not very relevant for GIS modeling due to sensitivity of the models. DEMs depicting the wider constellations of the terrain were more successful in the prediction.