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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Effects of DEM scale on the spatial distribution of the TOPMODEL topographic wetness index and its correlations to watershed characteristics" *by* D. R. Drover et al.

Anonymous Referee #2

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This paper presents a research based on the analysis of the effects of DEM scale on the spatial distribution of the topographic wetness index and its correlations to watershed characteristics. The authors explored how various DEM resolutions (2, 5, 10, 20, 30, and 50 m) subsampled from high definition LiDAR altered the spatial distribution of TWI values and the correlations of these values with soil characteristics determined from point samples, Natural Resources Conservation Service (NRCS) soil units, depths to groundwater, and managed vegetation distributions within a first order basin with specific geomorphic characteristics.

The main findings are: (1) At the finest DEM resolutions, valleys disappeared as TWI

values were driven by local microtopography and not basin position. (2) Spatial distribution of TWI values most closely matched the spatial distribution of soils, depth to groundwater, and vegetation stands for the 10, 20, and 30 m resolutions. (3) DEM resolution affected the shape and direction of relationships between soil nitrogen and carbon contents and TWI values, but TWI values provided poor prediction of soil chemistry at all resolutions.

Well, where is the novelty in this work? The points (1) and (2) are quite obvious and something already presented in literature. Why the authors didn't consider the work of Lin et al. (2010)? In my opinion this paper gives enough information about the effect of the grid cell size on the calculation of the TWI. The fact that at coarser DEM resolution there is a better interpretation of a process is logic and clearly comprehensible: a process may occur at a larger scale than the scale of a single cell of 2x2 m. Also this point was already demonstrated in literature. Why the third point should be a novelty? Soil chemistry may be related to different factors, not only the topography. In addition: why the authors used the term "TOPMODEL" in the title? The authors used only the TWI, not the full application of TOPMODEL package.

Unfortunately the paper, in its present form, is not ready for publication. The authors should present a real novelty and advance to the scientific community.

References

Lin, K., Zhang, Q., Chen, X., (2010). An evaluation of impacts of DEM resolution and parameter correlation on TOPMODEL modeling uncertainty. Journal of Hydrology 394, 370-383.

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