

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 #1

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The TOPMODEL was formulated for rainfall-runoff modelling. The basin topography is expected to have a great role in the transformation process and the topographic (wetness) index TWI is the core of this topographic representation. Several papers written in the nineties shew that the TWI is affected by the DEM resolution and in particular that TWI distribution shifts towards larger value as DEM resolution decreases. From a hydrologic point of view, i.e. with respect to the rainfall-runoff process, this dependence is not decisive, since, as shown for example in Franchini et al (1996), it is sufficient to properly modify the calibrated hydraulic conductivity as the grid size changes to obtain the same runoff temporal series. This paper, instead, analyses how DEM scales affect TWI spatial distribution and correlations with soil vegetation properties (soil charac-

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teristics, depths to groundwater, managed vegetation, etc.) within a first order basin with moderate slopes, flat valleys and several wetlands. The analysis is performed in a rigorous and systematic way, describing the site, the methods (“Analysis of TWI”, “Soil, vegetation and groundwater maps”, “evaluation of TWI values along the stream network”, “soil sampling”, “Soil C and N content vs TWI”) and then discussing all the tests and contrasts in a convincing way. I have very little to say about this very good piece of work. The only observation I can rise is related to the fact that conclusions on relationship between TWI and DEM resolution are highly affected by the type of basin considered and thus I feel the affirmation that a DEM of 20-30 m is the most appropriate for deriving information from TWI distribution cannot be generalized. Furthermore, I am not surprise when the authors claim that TWI values provide poor prediction of soil chemistry since I do not find a reason why a topographic information could justify such a soil characteristic which depends on several other factors as randomness in soil thickness and structure. Finally, I would not be so much confident as the authors seem to be in assigning to TWI excessive capacity of explaining, through statistical relationships, the behavior of different basin characteristics, recalling the very origin of the TWI which is related to the runoff formation.

References Franchini M., Wendling J., Obléd C., Todini E., Physical Interpretation and sensitivity analysis of the TOPMODEL, J. of Hydrology, 175, 293-338, 1996.

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