Hydrology and
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Sciences
Discussions

Interactive comment on "Spatial variations of deep soil moisture and the influencing factors in the Loess Plateau, China" by X. N. Fang et al.

Anonymous Referee #4

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The authors of the manuscript studied the influence of soil, topography and land management on soil moisture variability to a depth of 5 m within a 1300 km2 watershed in the Loess Plateau, China. They employed the results of the analysis on parameters influencing soil moisture to evaluate controlling mechanism of soil moisture and to give some recommendation for land use management. Undisturbed soil samples were collected at 151 sites during two months (July and August 2014) from surface to a depth of 5 m at intervals of 20 cm. Gravimetric soil moisture was assessed by drying soil samples. The authors made standard statistical analysis to evaluate the influence of fifteen parameters on soil moisture content. The title is not representative of the results reported in the manuscript. The authors didn't show the spatial variation of soil moisture. The title should be more tailored on "influencing factors" rather than "spatial variation". The manuscript is too long with several repetition and some confusing

sentences. Equation 1 and 2 are not necessary. Citation should be always necessary. The need of some citation is not clear to me (i.e. at line 21 page 11). Do the authors say that tests on the distribution of data were performed by Shi et al. (2014)? In this case the authors should clearly state the origin of statistical results in table 2. Otherwise I think the citation to Shi et al. (2014) should be removed, because the need of normally distributed data to perform statistical analysis such as ANOVA was already known before Shi et al. (2014). The authors state that data were normally distributed, and then they should probably explain why they choose a non-parametric correlation test (Spearman). The authors collected soil sample during summer 2014 (two months), but they say: "Most rain occurs in the form of thunderstorms during the summer months from July to September." (lines 20-21 page 6). How they took into account the effects of rainfall and actual evapotranspiration on soil moisture dataset? The duration of the sampling campaign is a key point. In the case the measurement campaign of a single soil moisture profile at each of the 151 sites took two months, the study is questionable, because the author considered fifteen parameters without taking into account the effects of water added from thunderstorms or removed by actual evapotranspiration. The authors should clarify this point. According to data presented in table 1 the density of the solid phase of the soil varies from 2.37 to 2.47 Mg m-3. How the authors measured this parameter? Why the authors decided to employ a variable density of the solid phase? A constant solid phase density would establish a linear relation between porosity and soil bulk density. How many soil samples for measurement of particle size distribution were collected at each site? Were the soil samples collected on soil surface or along the soil profile? In some cases the authors drawn conclusions from results of statistical analysis, but in the discussion they didn't give any explanation on the hydrological processes that could have led to such results. Since any influence was observed in the upper layers, why soil moisture between 4 and 5 m depth below David peach should be influenced by grass biomass? Same question should be answered for the influence of litter biomass below apple orchard. Finally, the authors should change "buck density" to "bulk density" and "organic" to "organic matter". Pay attention to the

use of "infiltration", sometimes was used instead of "storage".