

***Interactive comment on* “New measures of deep soil water recharge during vegetation restoration process in semi-arid regions of northern China” by Yiben Cheng et al.**

Anonymous Referee #1

Received and published: 27 July 2020

Via measuring deep soil water recharge during vegetation restoration process in Mu Us Sandy land, and relevant root system survey, soil texture analysis, and soil moisture monitoring, this study tries to understand the difference of infiltration processes between re-vegetated and bare sandy land. Although the manuscript is generally well structured and written, this reviewer found only little contribution of this study to the community. Particularly, the plant type and relevant root distribution as controlled by precipitation infiltration depth (&rate) and capillary rise height (&rate) from groundwater is well known and has been summarized by Yin Fan (2017, PNAS). Perhaps, the most novel part of this study is the measurement of DSR using a new instrument. On the other hand, the explanation and discussion on this instrument is very limited.

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Some major concerns are as follow: 1) The author claims that the DSR measurement performed in this study, being a task never reported before. On the other hand, the explanation on the DSR measurement and relevant principles/details were not presented. For example, it is understood a lysimeter installed at the depth of 3.2 meter, to enable the measurement of DSR as being below the deepest root c.a. 100cm. However, the length and width of this lysimeter is only 0.3m*0.3m, while the root distribution can reach a 200cm diameter horizontally. This makes this reviewer questioning the reliability of DSR measurements. Also within the deep soil, the relative humidity is rather high (e.g., 99.9%), which will lead to vapor condensation on lysimeter device, how this vapor condensation effect is removed also needs some explanations. 2) The author claims that the direct measurement of ET is not reliable, but the current approach deployed to measure DSR combined with water balance equation will give accurate estimation of ET. This is a very strong statement while way beyond the reality. If one looks back the point one about the reliability of DSR measurement in this study. 3) The way the author investigate the soil texture change is too much data-limited (e.g., only one plot, and the averaged mixed information was used), which renders the reliability of relevant analysis. 4) There are no any numerical analysis/experiment to investigate/validate relevant hypothesis, which also jeopardized the credibility of this study.

Please see some minor comments attached.

Please also note the supplement to this comment:

<https://hess.copernicus.org/preprints/hess-2020-200/hess-2020-200-RC1-supplement.pdf>

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2020-200>, 2020.

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