

## ***Interactive comment on “Is Annual Recharge Coefficient a Valid Concept in Arid and Semi-Arid Region?” by Yiben Cheng et al.***

### **Anonymous Referee #1**

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**General comments** This work proposes an extensive review on the evaluation of Deep Soil Recharge (DSR) in arid and semi-arid regions. The validity of Annual Recharge Coefficient is questioned based on the test data of DSR measured by the improved lysimeter. The issue raised by authors is of great significance, but the section of data analysis (part 3.2) is not well structured. There is a lack of explanations on the new apparatus and details on the field test are not clear enough as well. Experiment data presented by the authors is limited to support the conclusions. Thus, the manuscript requires significant improvement before it is accepted for publication.

**Specific comments** Main issues are as follows: 1. Some of the conclusions are not supported by the test data. For example, the authors claim that “The temperature influences the DSR rate” (in line 343). The evaporation intensity varies with temperature and affects the quantity of DSR indeed. However, if temperature influence is consid-

C1

ered, the delay time is an issue remains to be discussed.

2. Authors claim that “recharge is somewhat positively correlated with a few strong precipitation events (greater than 10mm), and very closely correlated with the strongest precipitation event” (line 426-428). However, the data in table 3 seems do not support this conclusion.

3. The quantity of DSR is actually given by the mass balance of surface layer. Surface runoff, evaporation and transpiration are critical components of water balance besides precipitation. It is necessary to present more monitored data, especially about evaporation and surface runoff, to support the conclusions in the paper.

4. Previous studies have shown that Annual Recharge Coefficient varies with the water table depth. To avoid the influence of water table depth, the dynamic of phreatic water table from 2013 to 2015 in the study area is suggested to be presented in the paper.

5. In Figure 1(B), how to measure the flux at depth A? More details about the new lysimeter are required.

6. Precipitation events are suggested to be presented by using columns (or vertical lines) in Figures 3, 4 and 5. 7. English should be improved because the text is somewhat difficult to follow.

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C2