Reviewer #2

This study measured the throughfall kinetic energy (TKE) and throughfall precipitation at concentrated and general locations beneath canopies of the Shiiba research forest in Japan, which were compared with freefall kinetic energy (FKE) and freefall precipitation at both leafed and leafless stages, respectively. Thus, the splash erosion caused by droplet impacts could be investigated, accordingly. The authors found that TKE at the concentrated impact location was 15.2 and 49.7 times higher than that at general locations under beech canopies and FKE, respectively. This study confirmed that canopy drip from woody surfaces can be a hotspot of soil erosion in temperate forest ecosystems. The potentially high rates of sediment detachment could be induced by not only throughfall precipitation but also larger throughfall drop size distributions at concentrated impact locations. This topic is of scientific significance, and falls in the research scope of Earth Surface Dynamics. I recommend accepting this study after the below-mentioned revisions have been addressed.

Response

We really appreciate the reviewer's positive evaluation. We read the comments carefully and revise it according to the comments.

1. *Recommend to add a figure in Section 2 to show the concentrated and general locations for measuring throughfall, and the location where the freefall was measured. It benefits a clear introduction of experimental design in this study.*

Response

Thank you for the valuable suggestion. We will add the figure showing the location of splash cups and rainfall collectors.

2. *Detailed descriptions of the splash cups, such as their diameter, height, etc., are needed, because these cup characteristics affect the quantitative measurements of loss of soil (LOS) and consequent TKE via linear regression.*

Response

We will add the information; diameter and height of the splash cup were 5.0 cm and 5.1 cm, the volume was 100cc. These are slightly larger than those reported by Scholten et al., 2011 (4.6 of diameter and 3.6 cm of height, respectively), but accurately estimated TKE by using a linear equation (Shinohara et al. 2018).

3. *Lines 121–124: There were no introductions on how to get these quantitative relations of freefall precipitation with TKE and throughfall precipitation. If doing regressions based on the*

measurements in this study, please add the data and analysis. If citing other research, add the references, please.

Response

We will add the information. The data was obtained in this study. We obtained data of 10 events (Table 1), but TKE and throughfall precipitation at the impact location were obtained in seven and six events. Thus, the relationship between TKE and freefall precipitation was established using the data obtained in seven events whereas the relationship between throughfall precipitation and freefall precipitation was established using the data obtained the six events.

4. *The authors installed seven splash cups to measure TKE, with six cups at general locations and one cup at possible concentrated location. However, throughfall measurements were not clearly described in this study. Is it that throughfall precipitation and TKE were measured at the same location? If so, how to precisely measure TKE by using the splash cup and avoid the disturbance of throughfall precipitation measurements at the same time and locations via installing rain gauges?*

Response

We will add the explanation about the throughfall measurement. A storage-type bottle with a funnel (diameter: 9.0 cm) was installed next to each splash cups to measure precipitation. Precipitation was measured at the same time with TKE measurement. The distance between the splash cup and precipitation collector was about 20 cm, thus, the location of throughfall precipitation was not exactly same with the splash cup.

5. *The authors measured tree traits, such as diameter at breast height, tree height, LAI, leaf area, leaf mass per area, etc. They particularly addressed the effects of structurally designed high energy points on TKE in Section 3.1. However, there were no quantitative descriptions to introduce what is the structurally designed high energy points like, and no quantitative analysis to defend the claim of its effects on TKE.*

Response

We agree with the reviewer's suggestion that it is interesting to examine the effect of tree traits on TKE under the canopies. However, we did not examine it in the present study because we just showed the tree traits to characterize the studied beech tree, not to examine spatial variation in TKE under the beech canopy. We measured TKE and throughfall precipitation under 10 different tree species in this forest to examine the effect of tree traits on TKE and prepare a manuscript as another paper. Thus, we focus on the TKE at the impact location and does not examine spatial variation in TKE with tree traits.

6. *The authors discussed the effects of leaf status (i.e., leafed and leafless) on TKE and consequent splash erosion risks. They conducted these measurements in spring and summer from March 3rd to April 5th, and in autumn and winter from August 19th to October 11th, respectively. However, in addition to the influence of different leaf statuses, the distinct meteorological conditions also significantly affected throughfall precipitation and TKE. Therefore, the authors might need more evidence to support their claim that leaf status, not the meteorological conditions, dominated the influence on splash erosion risks.*

Response

We agree with the reviewer's suggestion that meteorological condition, such as intensity and amount of precipitation, can affect TKE. Although we did not monitor temporal changes in throughfall precipitation within rain events at the study location, we have been measuring 10-minutes open space precipitation at the University Forest office, situated 4km away from the study site [600 m a.s.l.]. There was high variation in precipitation amount among the months and considerable high precipitation was observed in August. In Japan, it is higher precipitation in the summertime because of rainy and typhoon season. Precipitation amount is the most important factor determining soil erosion risk and precipitation amount in the leafless season after soil thawing is relatively less than that in the leafed season in Japan. We will add some discussion relating the effect of meteorological condition. We will also add such kind of meteorological data in the site description section.

Table Precipitation data at the University Forest Office in 2021.

	Precipitation amount (mm)	Number of precipitation event	Precipitation intensity during rainfall event (mm h^{-1})	Number of erosive precipitation events (>12.7mm $event^{-1}$)
March	162	9	1.44	4
April	133.5	8	1.30	3
August	958.5	15	2.67	7
September	170	11	1.40	4
October	41.5	6	1.47	0

Minor suggestions:

Line 85: No need to start a new paragraph to state the hypotheses.

Line 159: Delete "The" before "It".

Response

Thank you for the suggestion. We will revise them.