Interactive comment on "Understanding Tropical Forest Abiotic Response to Hurricanes using Experimental Manipulations, Field Observations, and Satellite Data" *by* Ashley E. Van Beusekom et al.

Anonymous Referee #2

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General Comment

This study integrated the observations both from in-situ and satellite platform for studying the dynamics of vegetation change in Luquillo Experimental Forest. Two canopy trimming experiments, one in 2004 and another in 2015, were designed as control experiments to reveal the vegetation recovery in response to the wind damage to the trees, especially for the case caused by the tropical storms (Irma and Maria) in 2017. The authors reported long term and continues time series of under-canopy solar radiation, throughfall, air temperature (under and above), soil water, and relative humidity

and leaf saturation in the manuscript. This work can provide an insight into the vegetation recovery due to the wind disturbance in the tropical climate zone. However, the structure of the manuscript and approach for analysis the data are a bit confusing. I suggested that the authors provide a general review of the vegetation recovery in the introduction section and try to focus on the study results for the tropics. Here, I provided a few studies (listed in the reference) including observation and modeling works which are relevant for providing a general review of the wind disturbance research. The introduction of the canopy trimming experiment can move to the methodology section which can be the design of canopy trimming and natural disturbance events. Along with this discussion, the method applied for this study to identify the recovery period is questionable, and the authors didn't include or calculate the uncertainty caused by instruments, sampling approaches, or data analysis (smoothing). Regarding the issue for identifying the recovery period, I recommended the authors to analysis the annual maximum observations, for example the study made by Lin et al. (2016). By comparing annual maximum values over a long-term time series is helpful to identify the status of vegetation recovery period. I had several specific comments for the authors to improve the current version of this manuscript.

Specific comments

1.Using the measurement of wetness of litter leaves and soil water to understand the canopy recovery physically is not reasonable. Although the wetness of litter leaves and soil moisture can be affected by the coverage of the over-story canopy, the magnitude of soil moisture and litter leaves are fixed which might only depend only on the soil property and leaf types. Please explain how to use the observation of soil moisture and wetness of litter leaves to reveal the status vegetation recovery.

2.P2L61: (wetness of canopy and litter leaves) How to determine the wetness of canopy leave and litter leaves.

3.P3L79: "locally to the points", Can you show the original points in your results?

4.P3L90: The MODIS only measured the sink temperature of the surface. Why did the authors compare the air temperature observations to the MODIS LST observations?

5.P3L92: How many 5TM sensors were deployed for soil water observation? What is the minimum requirement for avoiding the spatial heterogeneity under canopy at this study site?

6.P4L115-L124: Too many details were lost or cannot be found. For example, the relationship between the 8-day MODIS LAI and 8-day in-situ solar radiation was built up for converting the MODIS LAI to solar radiation for the study site, but the authors didn't present this information and uncertainty.

7.P5L149-150: The reason for applying 1year smooth window is not clear, please explain in the method section.

8.P5L159-161: The way for justifying the recovery period is not clear, please explain the method in detail.

9.P6L169-176: I didn't understand why the authors reported the residuals of the statistical analysis in this paragraph. Is this information helpful for understanding the uncertainty of various measurements?

10.In the Discussion section: It is very difficult for me to find/justify the information of the recovery periods, such 10 years, 2.8 years and others values from Figs 1 and 2. I recommended the authors to indicate such a piece of information both in this section and key Figs.

References Chen et al., 2018: Simulating damage for wind storms in the land surface model ORCHIDEE-CAN (revision 4262), Geosci. Model Dev., 11, 771-791. Lin et al., 2017: Impacts of increasing typhoons on the structure and function of a subtropical forest: reflections of a changing climate, Scientific Reports, 4911. Mitchell S.J., 2013: Wind as a natural disturbance agent in forests: a synthesis, Forestry, 86, 147-157. Negrón-Juárez et al, 2014: Multi-scale sensitivity of Landsat and MODIS to

forest disturbance associated with tropical cyclones, Remote Sensing of Environment, 140, 679-689. Rebane et al., 2019: Direct measurements of carbon exchange at forest disturbance sites: a review of results with the eddy covariance method, Scandinavian Journal of Forest Research, https://doi.org/10.1080/02827581.2019.1659849 Uriarte, et al, 2019: Hurricane María tripled stem breaks and doubled tree mortality relative to other major storms, Nature Communication, 1362. Wu et al., 2019: Sensitivity analysis of the typhoon disturbance effect on forest dynamics and carbon balance in the future in a cool-temperate forest in northern Japan by using SEIB-DGVM, Forest Ecology and Management, 451, 1, 117529.