Response to referee #2

Overall comment:

The paper "Microphysical features of typhoon and non-typhoon rainfall observed in Taiwan, an island in the northwest Pacific", by Janapati and co-workers, presents a study based on disdrometric data, aiming to describe precipitation characteristics in case of rain produced by Typhoons over Taiwan. A large Joss-Waldvogel (2009-2017) disdrometer dataset is separated in Typhoon and no-Typhoon samples, that are analysed to highlight similarity and differences between the two subsets, also considering other data such as reanalysis and weather radar data. The subject is interesting and the Authors did a significant work in processing such a large amount of data. However, I think that the manuscript should go under a major revision, for a number of reasons that I list below.

Response: We are grateful to the reviewer for providing constructive and positive comments on our manuscript. We tried to modify our manuscript as per the reviewer's suggestions, and the responses to individual comments are given below.

Specific comments:

1. *First, the writing is extremely poor: in many cases the reader cannot understand the text. I suggest a deep language revision of the manuscript.*

Response: We thank the reviewer for this comment. We have thoroughly modified the complete manuscript to minimize the grammatical errors, and the revised version of the manuscript is submitted.

2. *Second, the J-W disdrometer has a number of known deficiencies (see Tokay A, Kruger A, Krajewski WF. Comparison of drop size distribution measurements by impact and optical disdrometers. J Appl Meteor 2001;40:2083–97 among many others), especially in case of heavy rain, that should be reported and discussed in detail.*

Response: We are thankful to the reviewer for providing this comment. We have done some quality control of the JWD data before using it for further analysis. However, we didn't mention it in the initial version. A brief description of the JWD deficiencies and the JWD data quality control is provided (as given below) in the revised manuscript (second paragraph of section 2: lines 122-138).

"The JWD has its advantage and disadvantages over the other disdrometers (Lee and Zawadzki, 2005;McFarquhar and List, 1993;Sauvageot and Lacaux, 1995;Sheppard, 1990;Sheppard and Joe, 1994;Tokay et al., 2001;Tokay et al., 2013). For instance, JWD can't measure fall velocity; hence, to evaluate the RSD parameters from the JWD, we assumed that raindrops reach the ground with terminal velocity. Further, in heavy rainfall events, the JWD measures the spurious values for the raindrops of diameter < 1 mm, and it was named as the dead-time of the instrument. To deal with the dead-time of the JWD, the manufacturer provided an error correction multiplication matrix based on a correction scheme from Sheppard and Joe (1994). However, as the JWD can‟t record any drops for the first three to four channels in heavy rainfall events, the multiplicative matrix algorithm does not increase the counts when the channel has no drops (Tokay & Short, 1996; Tokay et al., 2001); hence, in this study, we didn't apply the dead-time correction to the JWD data. On top of that, 1-min RSD samples with raindrops count < 10 and rainfall rate < 0.1 mm h^{-1} were discarded (Tokay & Short, 1996). The daily rainfall accumulations from the JWD are related to the collocated rain gauge for both TY and NTY rain regimes and are illustrated with scatter plots in Fig.2. Strong correlations between JWD and rain gauge measurements for both TY and NTY days provide the trustworthiness of the JWD data for further analysis".

3. *The analysis of CAPE, water vapour and temperature profiles seems a bit out of context here. The paper deals with precipitation microphysical structure and these environmental quantities are not so relevant to the whole analysis. I suggest to drop this part of the work.*

Response: We thank the reviewer for this comment. In the initial version of the manuscript (line nos.127-129) we mentioned

"Along with the disdrometer data, remote-sensing (TRMM and MODIS) and reanalysis (ERA-interim) data sets are used to elucidate the typhoon and non-typhoon rainy days' microphysical characteristics", and this typographic error is rectified by modified this sentence as

"In addition to disdrometer data, remote-sensing (TRMM and MODIS) and reanalysis (ERA-interim) data sets are used to elucidate the thermodynamical and microphysical characteristics that are accountable for the possible disparities in RSDs between TY and NTY rainfall." at line no. 149-152 of the revised manuscript

As we tried to report the thermodynamical and microphysical processes that are responsible for the RSDs variations between typhoon and non-typhoon rainy days, we continue to keep this part of the work in the revised version too. We once again thank the reviewer in understanding our reasoning for not dropping this section in the revised manuscript.

The conclusions are very weak and should be more deep, reporting main results, and not simply saying ": : :relations were different for TY and NTY rainfall". There is a recent paper by Bao and co-workers (Distinct Raindrop Size Distributions of Convective Innerâ˘A ˘ Rand Outerâ˘AR˘ Rainband Rain in Typhoon Maria (2018), Journal of Geophysical Research: Atmospheres, 125, e2020JD032482. https://doi.org/10.1029/2020JD032482) that can be useful to comment some result. Please, put the right units for all the entries in the tables.

Response: We are grateful to the review for providing this comment. We tried to enhance the conclusion section by providing more details in the summary and conclusion section of the revised manuscript (as given below at line no. 391-415).

"Raindrop size distributions (RSDs) of typhoon (TY) and non-typhoon (NTY) days have been analyzed using long-term (2004-2016) disdrometer measurements from north Taiwan. Along with disdrometer data, other auxiliary (remote-sensing, re-analysis, and ground-based radar) data sets have been used to elucidate the feasible mechanisms liable for the distinctions in RSDs concerning TY and NTY rainfall. The NTY days have more big size drops and less small size drops than TY days, resulting in larger D_m and smaller N_w values in NTY days. Likelihood for the diverse microphysical processes between TY and NTY rainfall is exemplified by exclusive separation in TY and NTY rainfall normalized raindrop spectra at $D/D_m > 2$. The classification of RSDs to varying rainfall rates and precipitation (stratiform and convective) regimes clearly show smaller D_m and larger N_w values in TY than NTY days. The percentage contribution of large (small and mid-size) drops to N_t and R is lower (higher) in TY than NTY rainfall. For both TY and NTY rainy days, stratiform precipitations D_m and N_w values are smaller than the maritime and continental clusters, while, convective precipitations D_m values are approximately within the range of maritime clusters. The rainfall kinetic energy and intensity ($KE_{time}-R$ and $KE_{mm}-R$) relations evaluated for both TY and NTY rainy days reveal greater performance of power relation than other types, and confirms to use power form of $KE-R$ relations in assessing the rainfall erosivity factor for TY and NTY rainfall events. The enumerated $Z-R$, D_m-R, N_w-R, $KE_{time}-R$, $KE_{mm}-R$, and $KE_{mm}-D_m$ relations showed profound diversity between TY and NTY rainfall and substantiate the significance of adopting precipitation specific empirical relations in evaluating the rainfall rate and kinetic energy values. Overall, present study confirms that relatively higher convective activity with drier conditions in NTY than TY days significantly wedged the disparities in RSDs with dissimilar microphysical processes. The current observational outcomes could benefit in appraising the radar precipitation estimation algorithms, cloud modeling, and rainfall erosivity in north Taiwan for TY and NTY rainfall events."

The discussion on Bao et al. (2020) results is provided in the introduction (section 1 at line no. 46-50) and results (section 3.2: line no. 240-245, and Section 3.4: line no. 299-301) sections of the revised manuscript.

"Owing to the aforementioned implications of RSDs, ample literature exists on RSDs for spatial, seasonal (Thompson et al., 2015;Jayalakshmi and Reddy, 2014;Seela et al., 2017;Seela et al., 2018;Krishna et al., 2016;Seela et al., 2016) variations, storm to storm, within the storm (Kumari et al., 2014;Maki et al., 2001;Jung et al., 2012;Bao et al., 2020;Janapati et al., 2017), and different precipitations (Tokay and Short, 1996;Krishna et al., 2016)."

“As can be seen from Fig. 7a, with the increase in rainfall rate class, D_m values increase for both TY and NTY rainfall, which is due to a raise in large size drops concentration and a reduction in small drops concentration (Rosenfeld and Ulbrich, 2003;Krishna et al., 2016), and similar finding were noticed by previous researchers for both tropical cyclones and non-tropical cyclones rainfall (Bao et al., 2020;Deo and Walsh, 2016;Jayalakshmi and Reddy, 2014;Radhakrishna and Narayana Rao, 2010).”

“The current TY rainfall $Z{-}R$ relations show disparity with the other locations tropical cyclones rainfall relations (Bao et al., 2020;Wen et al., 2018;Janapati et al., 2020).”

Missed units for second column parameter (rain rate threshold) of Table 1 are provided in the revised manuscript as mm h^{-1}.