Point-to-point Reply and Rebuttal to Anonymous Referee #2

General Comments:
Overall, this is a well written paper using a long-term dataset to analyze the DOC export flux of three subtropical small mountain rivers in Taiwan. The authors have well highlighted the scientific significance of their study given the location and vulnerability of the system to future changes in climate and that POC rather than DOC is more often studied in these systems. Their approach is well founded and presentation clear and logical. The authors stated main objective was to assess the patterns in DOC with respect to river discharge during both typhoon and non-typhoon periods. The main points, that DOC export flux is strongly controlled by hydrology (e.g. stream discharge) and export occurs disproportionately during typhoons, are well supported and well summarized in the conclusion. Specific comments below indicate a few areas where I think the readers would benefit from more information and further discussion from the authors.

We really appreciate the commendation the Anonymous Referee #2 gives to our efforts.

Specific Comments I am interested for the authors to further discuss their interpretations of flowpaths and DOC sources within the watershed. For example, you give a [DOC] value for groundwater, but don't show data. You also mention and then refute in-stream processing as source as well as discuss high soil infiltration as a reason for likely high groundwater contribution of low DOC water under certain conditions. I'd like to see further discussion / conceptual model behind these flow paths.

According to the C-Q relations in this study, the conceptual model of DOC transport can be illustrated as Figure S4 below. In the low-flow condition during non-typhoon periods (Fig. S4a), groundwater with little DOC is the primary input of river discharge. However, higher DOC concentrations are observed in the river, implying the in-stream production of DOC. Higher temperature usually accompanies lower river discharge, perhaps resulting in higher DOC concentration in the river. With the increasing discharge during non-typhoon periods (Fig. S4b), the dilution effect could be attributed to the inputs from groundwater and deep soil water with lower DOC concentration. High infiltration capacity in our study watersheds limits the generation of overland flow during non-typhoon periods. During typhoon periods (Fig. S4c), the elevated DOC concentration may result from the inputs of shallow soil water and overland flow (flushing out the litter layer). Higher DOC concentration from the two flowpaths hence elevates the DOC concentration in the river.

Figure S4 will be shown in the revised version.

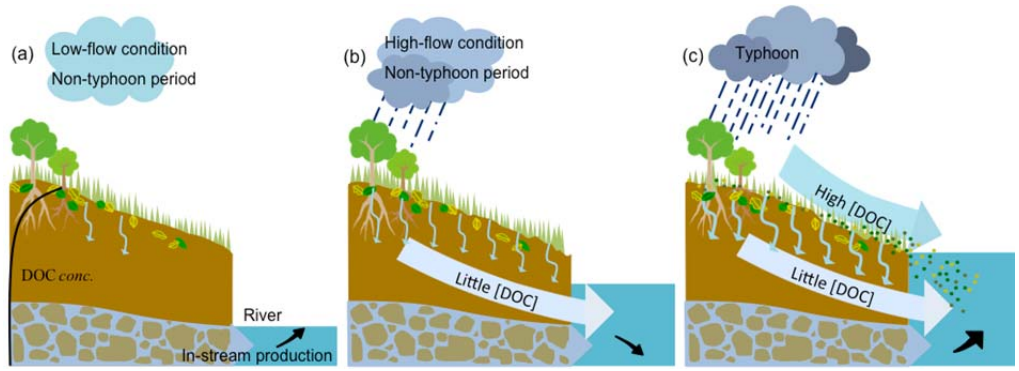

Figure S4. The schematic diagram of the conceptual model of DOC transport (a) in low-flow condition, (b) in high-flow condition during non-typhoon periods, and (c) during typhoon periods (revised from Fig. 9 in Lee et al. (2013))

Also, are there more studies of yours, collaborators, or others in subtropical watersheds, that are supportive of this?

To my knowledge, there are really few relevant studies in subtropical watersheds (actually we did not find any), highlighting the scientific values of our study.

Regarding methods, I have three specific comments. Each highlights where readers could benefit from more explanation of what you have done: 1. How are typhoon and non-typhoon periods determined? Dates of typhoons are given, but, for example, when is it determined that the receding limb of the event hydrograph transitions from typhoon to non-typhoon hydrologic regime? This decision effects both field sampling that was conducted as well as data inclusion into the two separate DOC rating curves.

As for the DOC flux estimation during typhoon periods, the Central Weather Bureau (CWB) records the invading duration of every typhoon. The entire typhoon-induced hydrograph, from the rise till the recession to the pre-event level, is determined on a daily basis. The typhoon-induced hydrograph is distinguishable because it is often spiky showing sharp increase and decrease compared to the hydrograph during non-typhoon periods. As for the typhoon samples, the sampling crew started off when CWB announced the typhoon warning. Ideally, the sampling work did not stop until the hydrograph receded to the pre-event level. However, in reality, sampling work sometimes ended earlier owing to some uncertain factors, e.g. destruction of road.

2. How frequently was discharge measured? As you use DOC concentration measured either every few days or every 3 hours, how frequently are the discharge records you use the rating curve to ‘fill in’ for unmeasured DOC points? Also, do your DOC samples (and you have a great, long record!) cover the majority of flow conditions?

Hourly discharge is recorded every exact hour. Daily discharge is calculated by taking the mean of

the 24 hourly discharges. For the typhoon periods, hourly discharge is used to fill in DOC flux for every hour. For the non-typhoon periods, daily discharge is used to derive the daily DOC flux. Nevertheless, the summation of hourly DOC fluxes (substituting hourly discharge to the rating curve) would derive a very similar value with the daily flux (substituting daily discharge to the rating curve) during the non-typhoon periods, given the condition that hourly discharge fluctuates little within a day. But it is not the case during typhoon periods. Therefore, hourly discharge is recommended to derive hourly DOC flux before summing them up to get the daily flux.

Our sampling scheme, 2 samples per week plus typhoon samples, definitely covers the majority of flow condition, which can be demonstrated by Figure S5.

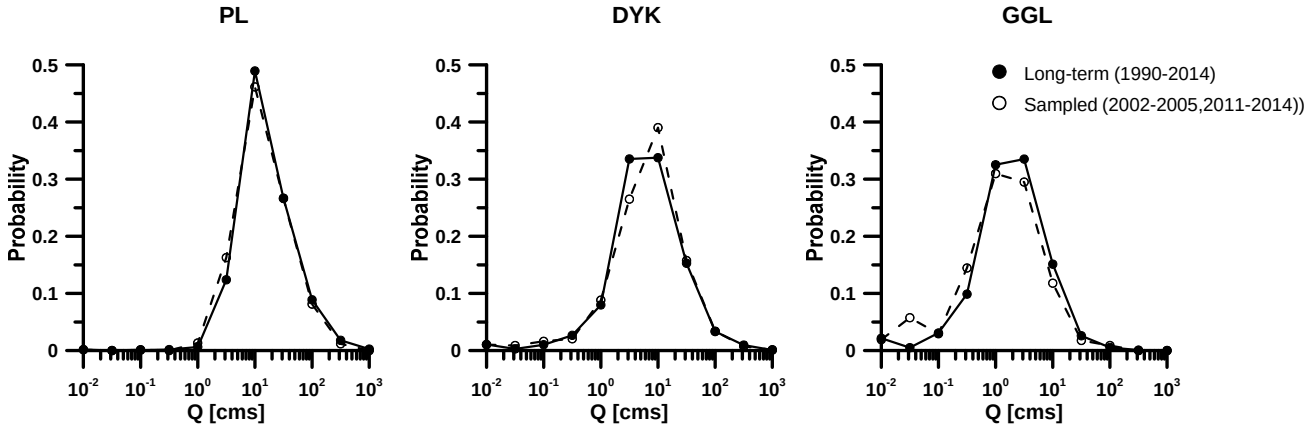

Figure S5. Comparison of frequency distribution of long-term consecutive daily flow with that of flow on sampling days during the study periods.

3. The authors mention 0.45 micron pore size GF/F filters (line 109). To the best of my knowledge, GF/F filters are 0.7 micron pore size. As this was done as pre-screening prior to analysis this larger pore size does mean some additional constituents would be included in the filtrate (e.g. liquid) portion of the sample. Scientists interested in colloidal fraction of exports, and any other chemical species associated with organic carbon, will be sensitive to this detail.

We are sorry for the typo. It should be 0.7 μm pore size GF/F filter.