I really thank the reviewer (#1) for providing detailed comments. The major concern about the UV sensor, which had previously been raised by the same reviewer during the first technical review phase, was carefully addressed in revising the original manuscript, resulting in the current discussion paper accepted by the editor. Here, I will first clarify some misunderstanding the reviewer had regarding the analyzed POC data sets and then reiterate previous responses to the comment on the uncertainties associated with sensor-based POC monitoring. Other minor comments will be responded later in the final author comments.

**<Reponses to major comments>**

**Reviewer comments**:

"…DOC and POC concentrations were calculated and corrected here on the basis of water samples analyzed in Jeong et al. 2012 (p. 6882 lines 22-26, Jeong et al. 2012, G03013 p. 4). However, the present study obviously includes a much higher number of events (6888 line 19 – p. 6889 line 2) exhibiting "large magnitudes and variations in POC" (p. 6889 line 3). Because of the uncertainties associated with optical measurements **I am not confident if empirical validations of the method in Jeong et al. 2012can be extrapolated to the larger dataset of this study**. Different events potentially mobilize POC and DOC of different quality and composition from soil layers or aquatic sediments of a catchment. Heavy rainfall can increase soil erosion and can change the contribution of mineral soil particles to suspended particulate matter. In conclusion, the **uncertainties in POC values appear too high. A direct measurement of POC after filtration is strongly recommended**."

**→ Author response**:

The reviewer might have misunderstood the data sets analyzed in the discussion paper (Fig. 1). We used the sensor data just for the period from 17 July 2009 through 29 October 2010, as described in P. 6882, L. 13. During this period, the optical measurements were corrected by lab analysis results of the samples that had been collected in parallel during 20 routine samplings, five monsoon storm events, and a snowmelt period (P. 6882, L. 25-26). Lab analysis results from the five storm events during this sensor employment period, together with other lab measurements from four to six times per year over four years from 2008 through 2011 (P. 6882, L. 6), were analyzed in Fig. 2. In addition, the sensor-employment period was relatively dry as reported in Jeong et al. (2012), so most of the large events analyzed in Fig. 1 were based on lab measurements (TOC analyzer for DOC and CN analyzer for POC on GFF filters). I will make all these clearer in the revised manuscript during the final author response phase.

**Reviewer comments**:

"I have concerns with respect to the optical method used to measure the POC concentrations. POC is derived here from the difference between total organic carbon (TOC) and DOC. Both, DOC and TOC were measured in situ by light attenuation. While DOC can be monitored fairly well by UV absorption (R2 typically around 0.75, 0.84 in Jeong et al. 2012 as cited in the manuscript), optical TOC estimates include high uncertainties. **First, there is large variation in the relationship between (VIS) light attenuation and particulate matter quantity depending on e.g. particle size or surface quality. Secondly, suspended particulate matter consists not only of organic carbon (POC) but also of mineral fractions.** Changing concentrations of minerals between events seriously affect TOC estimates and therefore calculated POC values.

**→ Author responses:**

- I understand the reviewer's concerns that UV absorption cannot fully capture POC signals under high-turbidity storm conditions, due to compounding effects of particle morphology and mineral interference. We were well aware of this fact, so took an approach of post-measurement correction using samples collected simultaneously. Although the reviewer thought that one large storm event might have leveraged too much the good relationship between in situ and lab data, we actually used 114 data from >20 routine samplings at various discharge levels, five monsoon storm events (the largest storm event shown in the Fig. A), and a snowmelt event. In addition, data from another large event (when POC peak conc. reached over 25 mg C L-1) was used to validate the established relationship and the fit between the regression and these validation data was excellent (Fig. B).

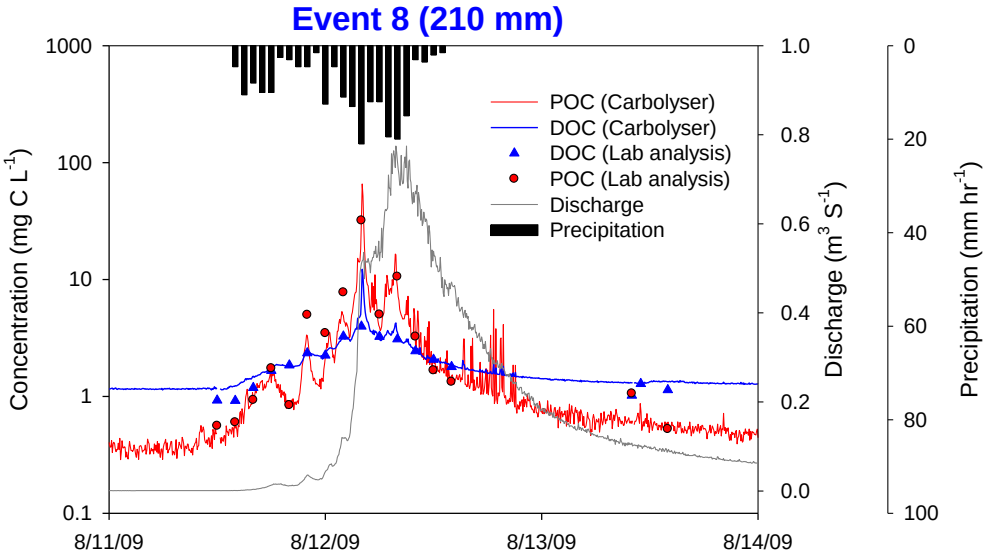


Fig A. Comparison of sensor-based and lab measurements of DOC and POC. *Modified from Jeong et al. 2012. Journal of Geophysical Research-Biogeosciences 117: G03013*

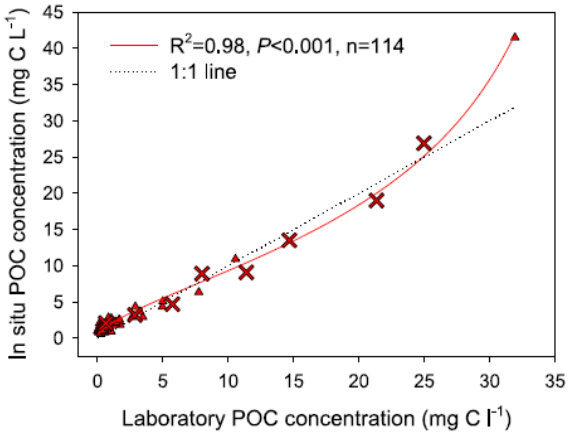
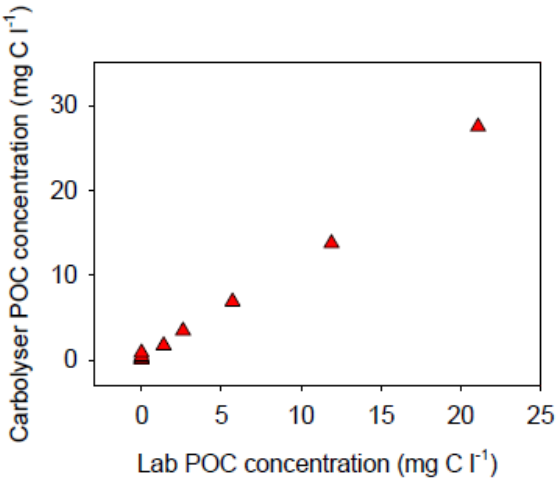



Fig. B. Relationships between laboratory and in situ measurements of POC concentrations in the forest stream over the monitoring period from July 2009 to September 2010 (n = 114). X symbols indicate validation samples collected during an intense storm event before July 2009 (from Fig. 2 in Jeong et al., 2012).

- Regarding the concern over the large leverage of one extreme event in Fig. B, we analyzed the relationship without large values: $R^2$ was 0.90 without values > 10 mg C $L^{-1}$ and 0.77 without values > 5 mg C $L^{-1}$. Please check the good match between our in-situ optical measurements and lab results in Fig. A and also remember that for this largest event we had lab analysis results.

- With respect to the concern over mineral interferences, we had tested in the lab using artificial high-turbidity streamwater samples whether UV absorbance would be specific enough to detect POC under high-turbidity conditions. Please look at the following unpublished data from the master thesis of the first author of Jeong et al. (2012). We concocted high-POC artificial samples with sediments collected from the same stream, so the overall good match between sensor-based and lab measurements suggests that UV-based measurements of TOC are quite reliable even in high-TSS samples. And the relationship found in this lab test is actually quite similar to that we found in the field, as shown in the Jeong et al. (2012). This test offered us confidence in the UV-based system and therefore we decided to use the sensor for in-situ POC monitoring, because no other alternative is available for in-situ, continuous monitoring of POC.




Data source: Jeong, J. J. (2010), Hydrologic controls on the export of dissolved and particulate organic carbon in a forest stream investigated by high-frequency in-situ monitoring, M.S. thesis (in Korean), Dep. of For. Environ. Prot., Kangwon National Univ., Chuncheon, South Korea.

**In summary, we have based our sensor-based POC measurements on robust empirical relationships. Even when we should accept some uncertainties associated with sensor-based POC measurements, the main finding based on Fig. 2 in discussion paper will not be affected because lab POC measurements were used for most of large events. Although I added the limitations of UV absorbance-based TOC detection and cautions required to process optical measurements in the discussion paper, I will add more on the issues raised by the reviewer in the final revision.**