

## ***Interactive comment on “Riparian zone processes and soil water total organic carbon (TOC): implications for spatial variability, upscaling and carbon exports” by T. Grabs et al.***

**Anonymous Referee #1**

Received and published: 19 April 2012

This paper presents spatial and temporal variability of TOC in soil water and groundwater in riparian zone of boreal forest. Then, the authors argued topographic effects on TOC concentration of soil and groundwater. Also, they discussed roles of spatiotemporal variability of TOC concentration in riparian zone in stream water TOC concentration. I consider that the dataset of this study is important and might be helpful to understand controlling factors of TOC concentration of surface water, soil water, and groundwater in forest ecosystems. I think that not only researchers in cold regions, but also other regions should be interested in this study. However, I have two major concerns about current version of this paper. So, I would like to suggest that the paper is worthy for publication in Biogeoscience, but several revisions are necessary..

C702

1. Difference in TOC concentration and profile between till and sedimentary parts The authors suggested that there were different controlling factors for TOC concentration between till and sedimentary parts. So the authors excluded data of sedimentary parts to conduct regression analysis for predicting TOC concentration (Fig. 7). While, the authors argued that TWI should control TOC concentration in till parts. I consider that there are some confusions and discrepancies. I would like to they argued both effects of material and topography simultaneously. For example, I feel that there were no significant differences in absolute concentration and profile of TOC between R15 (sedimentary part) and R1 and R9 (till part). Also, there were no significant differences in TWI. Moreover, as indicated by the authors, TOC concentration in R14 was surely very low, but there was no data for till part with similar large TWI. So, I think that it is very difficult to differentiate effects of material and topography on low TOC concentration in R14. According to Fig. 6c, I suspect that the TOC concentration exhibited the highest value, when the TWI was around 8. In spite of till part, large TWI sties, likes R10, showed relatively small TOC concentrations. Anyway, I would like to the authors conduct more detail and careful discussions about roles of material and topography.

2. Temporal variability of TOC concentration and its relation to stream TOC The authors argued temporal variability of TOC concentration and its relation to stream TOC concentration at the last paragraph of section 6,1 and section 6.2), However, I consider that this parts were not directly related to the observation results of this study. I fell that several discussions, like effects of hydrologic connectivity, are very speculative and general. The authors showed only time-series data of TOC concentration, TOC export rate and discharge in Fig. 5. Unfortunately, there were no time-series data of groundwater level, spatial variability of TOC concentration, hydrologic connectivity etc. If the authors want to discuss about temporal variability of stream water in detail, I would like to the authors add several time-series data and discuss more carefully.

Minor points I cannot find Table 2.

I feel that several figures are too small.

C703

C704