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Biogeosciences Discussions

Interactive comment on "UV-induced carbon monoxide emission from sand and living vegetation" *by* D. Bruhn et al.

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Received and published: 23 August 2012 This paper presents observations of UV-induced CO release from sand and living vegetation in terrestrial systems and extrapolations of the observed CO emissions rate to estimate global CO burden from these sources. This is a study that adds to the ongoing efforts in understanding the effects of UV radiation on terrestrial systems, which included live vegetation and litter. UV radiation induced CO release from live plants has been observed previously, but only on small scale laboratory observations. This study is a nice addition to previous studies as conducting field observations allows better extrapolation of observations into estimating global burden. More importantly, the careful extrapolation method the authors present in combination with their observations could be valuable for future research.

Hence, the topic of this study is timely and relevant to the 'Biogeosciences'. I appreciate the authors' efforts to address my comments from the referee report and I think the paper is much more improved from the previous version. However, I still have some concerns regarding this paper. First, the introduction is very focused on global CO burden and does not effectively explain the background of the study. Only in the end of the introduction, the authors touch up on CO emissions from living plants and still did not explain what the rationale was behind including sand in this experiment. I previously pointed out that several recent work suggest that trace gas release maybe a direct breakdown from organic compounds within plants and organic matter. This said, I would like the authors to discuss the reasoning behind UV induced CO production from low organic content sand. Second, I appreciate the authors for adding detailed explanation on UV induced CO production from pure sand. However, I would like to see a detailed discussion on why this might happen. Even the small amount of release should have been originated from a source, which previous studies suggest was a breakdown from organic compounds. If the organic compounds are minimal in sand by pre-treatment, than where does CO come from? I think the most interesting part of this study is up-scaling, but I am not very comfortable seeing global scale up-scaling results from an unknown source. I think this paper would be an important contribution with these issues addressed.

âĂć The original idea for studying the potential CO release from sand was that our field measurements of CO from vegetation were conducted on a sandy soil. Thus, it was interesting to examine the potential contribution from sand itself in the local budget. âĂć We believe that sand most places contain organic matter to some extent. As pointed out by the reviewer, UV may cause breakdown of this organic matter and hence release trace gasses such as CO. âĂć Subsequent to submission, we have also measured UV-induced CO emission potential from sand washed in HCl and ignited, respectively. This resulted in a CO emission rate of only ca. 1.5% of that by untreated sand (just washed in water). Thus, upon clearing or organic material (heat treatment) and carbonates (HCl treatment) the UV-induced CO emission from sand was almost eliminated. This clearly

indicates that there is a potential CO source on the sand. This point will be added to the revised manuscript. âĂć Further, to the Discussion will be added a consideration of i) surface structure of types of soil, ii) types of organic material, iii) distribution of types of soil, and that iv) sand is a conservative choice of soil regarding content of e.g. humus. Specific comments: P8450L20: Awkward sentence. âĂć Language corrected in revised manuscript.

P8455L21-2: Meaning not clear. âĂć Language has been corrected in revised manuscript, hopefully making the meaning more clear..

P8456L3: Add 'CO' in nmol h-1 m-2 âĂć Corrected

P9457L19: It is Brandt instead of Brand âĂć Thanks for the correction

P8458L24: I believe that Derendorp et al., 2011 used litter instead of green leaves. âĂć So do we. We only mean to cite Derendorp for the linear light response

P8459L28-P8460L2: Awkward sentence. âĂć Language corrected in revised manuscript

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