

Interactive comment on “Mineral physical protection and carbon stabilization in-situ evidence revealed by nano scale 3-D tomography”

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Anonymous Referee #2

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This study aimed to develop the 3-D tomography of organic carbon-mineral consortium using the synchrotron based transmission X-ray microscopy. Both lab-made and natural black carbon were tested. Results of in-situ 3-D tomography directly indicate the association between OC and minerals in both samples. For the natural black carbon, other spectroscopic results including XRD and FTIR also demonstrate the abundance of Fe (hydr)oxides and their significance in the physical stabilization of OC. Although the association between Fe minerals and OC has been well known for decades, this study showed the direct and clear evidence for such mechanism. The contribution of this study lies in the fact that authors developed the methodology to obtain the 3-D images using the TXM. In terms of the C sequestration, the degree of C stabilization

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is related to the structural development of Fe/C assemblages. Previous studies could only gauge the adsorption vs. coprecipitation between OC and Fe minerals via the indirect spectroscopic evidences. The 3-D technique developed here provides a new insight to determine the structure of such micro-aggregates. In this case, I would suggest authors to add more information regarding the differentiation of adsorption vs. coprecipitation between OC and Fe minerals using the 3-D tomography results to shed light on its significance toward the C stabilization.

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