

## ***Interactive comment on “Surface complexation modeling of Cd(II) sorption to montmorillonite, bacteria, and their composite” by Ning Wang et al.***

### **Anonymous Referee #2**

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**General comments** The CA-SCM model was used to simulate adsorption behaviors of Cd on composite of montmorillonite and bacteria *Bacillus subtilis*. The model fitted the experimental data well and the modeling results were also confirmed by extended X-ray absorption fine structure spectra analyses. The montmorillonite is a major clay mineral in the soils from temperate regions, and bacteria exist in soil widely. Therefore, the topic of this study is important and within the scope of the Biogeosciences. The results presented are relevant and interesting, and will provide useful references for the understanding the mechanisms and fate of heavy metals in the soils from temperate regions.

**Specific comments** Line 313 and Table 1: X2Cd represents out-sphere complexes. The complex stability constant ( $\log K_{X2Cd}$ ) for out-sphere complexes should be small and much lower than these for inner-sphere complexes. However, the data is great (8.3)

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and greater than these for inner-sphere complexes in Table 1. I cannot understand this data. Please provide more explanations.

Lines 409-424 (Discussion section): Authors cited the results of the composites of iron (hydr)oxides with bacteria in literature for comparison. While, in Introduction section, authors also mentioned that the model was used for Cd adsorption onto composite of kaolinite with bacteria. Therefore, in addition to the results of the composites of iron (hydr)oxides with bacteria, authors were suggested to compare their results with these of composite of kaolinite with bacteria. Because the surface chemical properties of montmorillonite were opposite to these of (hydr)oxides, but similar to kaolinite.

In the section of Environmental Implication: please provide some examples of Cd-contaminated soils with montmorillonite as major clay mineral in temperate regions to show practical significance of this study.

Line 407: do not repeat the data in the section of Results (69.1%:30.9%)

Figure S2: Please provide the AFM images of single montmorillonite, single bacteria and their composite for reader to find the attachment of bacteria on montmorillonite. At present, it is difficult to distinguish bacteria from the composite from the images.

Line 245: “binding constant” should be “binding stability constant”.

Lines 313 and 336: “Complexation constant” should be “complex stability constant”.

English corrections Line 192: change “finial” to “final”.

Line 215: some words need to be added after “of”.

Line 246: “was” should be “were”.

Line 247: change “mol/g” to “mol g<sup>-1</sup>”.

Line 317: “sdsorption” should be “adsorption”.

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