Review of: "Role of water in unexpectedly large changes in emission flux of volatile organic compounds in soils under dynamic temperature conditions"

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Potential competing interests: The author(s) declared that no potential competing interests exist.

This paper describes the unexpected large changes in VOC emission fluxes from soil under dynamic temperature conditions. This type of experimental study is of special necessity and significance in today's changing climate due to changing soil temperature, moisture, and texture. Air-soil exchange of VOCs in not studied extensively. The results authors showed can draw the attention of climate scientists to look into the land-atmosphere modules implemented in climate models, and do more experiments of this kind in future.

The experiments were designed well, and the report is very well written, and explained. The authors proposed the mechanism of the partition of VOCs (evaporation/dissolution) between air/dissolved water in soil for the high emission flux (or air-soil exchange rate).

The concept of Henry's law is known to be used in other studies (Ruiz et al., 1998). The experimentation with dynamic temperature is unique in this study. The results in this study supports the portioning of VOCs in the water/aqueous phase present following Henry's law.

I have the following comment:

1. The dynamics (air-soil exchange) of VOCs in soil depends on the type of soil material. Acidity/alkalinity of the soil medium also affect the exchange rate (Serrano et al., 2006). In this study silica sand material is used. What will be effect of other types of soil material on the proposed mechanism under dynamic temperature conditions? Had the authors tried the experiment with other materials?

References:

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2. Serrano, A., & Gallego, M. (2006). Sorption study of 25 volatile organic compounds in several Mediterranean soils using headspace–gas chromatography–mass spectrometry. Journal of Chromatography A, 1118(2), 261-270.