

Interactive comment on “Pathway of CH₄ production, fraction of CH₄ oxidized, and ¹³C isotope fractionation in a straw incorporated rice field” by G. B. Zhang et al.

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We are grateful for the constructive and detailed expert comments of referee #1, which will help to improve our manuscript. In the following we will consecutively address each point raised and, if appropriate, will make suggestions how to change the manuscript.

The referee #1 considered that the differences in transport fractionation were caused by in diffusion process different physical conditions such as pressure in the rhizosphere other than growth of rice plants. We agreed with the suggestion. Therefore, we rewrote this part (Page 14197, Line 7~14 in the BGD), which was clearly shown below:

On the other hand, CH₄ transportation by plants is basically a diffusion process, and
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a small difference in condition may bring about a great difference in isotopic composition (Chanton, 2005). Pressure and partial pressure in the rhizosphere is possibly higher in Treatment WS than in Treatment CK as well as the $\delta^{13}\text{C}$ -value of CH₄ in the soil. Therefore, those differences in physical condition may cause differences in transport fractionation. Although the processes resulting in the difference in ϵ transport are not fully understood, the differences in physical conditions, such as growth of rice plants and pressure in the rhizosphere, are likely to affect the diffusion process and consequently the ϵ transport.

Moreover, sentence “Reasons for this difference may be related to the decrease in growth of the rice crop as a result of straw incorporation” (Page 14176, Line 24~25 in the BGD) was changed to “Causes of this difference may be related to the diffusion process in transport as affected by growth of rice plants and pressure in the rhizosphere.”

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