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# ***Interactive comment on “First measurements of continuous $\delta^{18}\text{O}$ -CO<sub>2</sub> with a Fourier Transform InfraRed spectrometer in Heidelberg, Germany” by S. N. Vardag et al.***

**Anonymous Referee #3**

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The paper entitled "First measurements of continuous  $\delta^{18}\text{O}$ -CO<sub>2</sub> with a Fourier Transform InfraRed spectrometer in Heidelberg, Germany" describes the methodologies of using this type of FTIR and briefly goes into 2 cases studies that examine  $\delta^{18}\text{O}$  measurements in Germany during the winter and summer. I thought the paper was generally well written, though it felt like some parts needed more clarification. The introduction was a little oversimplified, and did not mention any of the more recent studies that have examined the controls on  $\delta^{18}\text{O}$ -CO<sub>2</sub> variations. For example, there has been a couple of modeling studies that have shown that CA activity in soils may be more important than previously thought (Wingate et al., 2009; Buenning et al. 2014). Also, the

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influence of RH is not mentioned here at all, but the latest papers suggest that it has a huge influence (Still et al. Welp et al. Buennning et al). I think that section 4 had the potential to be the most intriguing part of the paper, but it was too brief and could have used a more rigorous analysis on the controls. The paper ends feeling a little bland, with a conclusion that sounds like "we have a continuous record of d18O-CO<sub>2</sub>, but we still need more measurements to make any sense of the data". It seems like if there was an actual hypothesis that was tested, then it would strengthen the conclusion and the overall paper.

Specific Comments: page 6503, line 20: Is this true at every latitude? Recent studies have shown that it eventually changes sign to the north.

Section 3.1 line 11: where is 1 permil taken from? The results below or is a reference needed?

Section 3.2, lines 23-24: How does Figure 7 show this. Some clarification is need here. And where does 1/5 come from? 0.27permil of 1 permil is not 1/5th, or am I reading this wrong?

Section 4, line 18: fast equilibration needs a reference

Section 4, lines 18-19: "18O signature of soil respired" is this different than what was said in the previous statement. It sounds the same.

Page 6512 line 6: 5 permil change in d18O-CO<sub>2</sub> is large though.

Page 6512 line 9: You mean invasion flux?

Page 6513, equations 3-5: These equations are little sloppy (words rather than symbols), an the variables are not defined very well.

Page 6513, Lines 14-16: Why are these values so low? Are these not the atmospheric values?

Page 6514, Lines 14-15: But they would still deplete the signal, no?

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Page 6514, I think this paper would be more interesting with some additional measurements of atmospheric data. For instance, Does RH or temperature change during the d18O-CO<sub>2</sub> fluctuations. Is there a change in wind direction that would maybe bring in more pollution and more depleted d18O? I would fine this type of analysis very interesting, and i think it would greatly strengthen the paper.

Page 6515, lines 6-7: d18O of vapor has also been found recently to have a strong influence, but that's not mentioned anywhere in the paper.

Technical corrections: 6508 Line 22: MS has already been defined.

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