

Interactive comment on “Seasonal variations of stable carbon isotopic ratios and biogenic tracer compounds of water-soluble organic aerosols in a deciduous forest” by Y. Miyazaki et al.

Anonymous Referee #4

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This is a very interesting article providing new insights in the variation of stable carbon isotopes of water soluble organic aerosol over a year in deciduous forest in Northern Japan during 2009–2010. It also discusses the seasonal variation in the concentration of water soluble organic aerosols and biogenic tracer compounds. Using positive matrix factorization, the authors showed the importance of both biogenic primary and secondary organic aerosols during the growing season. This study is well in the scope of ACP and is worth publication after some corrections that will improve the manuscript.

General:

Include some references in the first paragraph of the introduction

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Page 30777 (lines 12-16): the paragraph “The stable carbon isotopic ratio ($\delta^{13}\text{C}$) is a powerful tool for source determination based on the distinctive signals of different aerosol carbon fractions. The most common carbon isotopic application for aerosol is for total carbon (TC) (e.g., Cachier et al., 1986; Turekian et al., 2003). In contrast, very few studies have used the $\delta^{13}\text{C}$ of WSOC for source apportionment (Fisseha et al., 2009; Kirillova et al., 2010).” Should be under the introduction not in experimental part

Page 30777, line 21-22: a short description on how the extracted WSOC was concentrated to 40ml would be useful because this process can potentially affect the stable carbon isotope ratio of water soluble organic carbon.

Are there any blank measurements? If yes, please provide blank values.

Page 30779, line 5-9: the value reported on Kirillova et al., 2010 is for commercial cis-pinonic acid and sucrose. Therefore, it should not be used as a reference for the stable isotopic composition of a tracer compound. The discussion on the stable isotopic composition of the water soluble compounds also gave me an impression that the authors are making an assumption that there is no difference in the $\delta^{13}\text{C}$ of primary and secondary organic aerosols. Although I am aware of the scarcity of data in this subject, it should be addressed to encourage future work.

Some anthropogenic sources also have a $\delta^{13}\text{C}$ value similar to C3 plants (Widory et al., 2004). Therefore, it would be very helpful to included some discussion why the authors believe the $\delta^{13}\text{C}$ value of the WSOC during the growing season is an indicative of precursor molecule from C3 plant and not influenced by the anthropogenic sources

Technical:

In the title, replace “Isotopic ratios” with either “isotopic composition” or “isotope ratio”

Reference: Widory, D., Roy, S., Le Moullec, Y., Goupil, G., Cocherie, A., Guerrot C. (2004). The origin of atmospheric particles in Paris: a view through carbon and lead isotopes. Atmospheric Environment, 38, 953-961.

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