

## ***Interactive comment on “Atmospheric mixing ratios of methyl ethyl ketone (2-butanone) in tropical, boreal, temperate and marine environments” by A. M. Yañez-Serrano et al.***

**A. M. Yañez-Serrano et al.**

ayanezserrano@yahoo.es

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We acknowledge the work and time provided by this reviewer as all comments truly made the manuscript more consistent and clearer.

1. Comment: It would be interesting to know detection limits and uncertainties for the different instruments. Response: We have added a bracket with LOD and uncertainty next to each site description when available.

2. Comment: Could you add some comments on seasonal variation of MEK? For example, you mention on lines 275-279 and in discussion that MEK levels were significantly lower at SMEAR-Estonia, but there you were measuring only in October, which

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is clearly not a high growing season anymore at this site. How was the seasonal variation at the sites where you were measuring for longer period? Response: Most of the sites only have measurements for the periods stated in the manuscript. However, there are some seasonal measurements for ATTO, TT34 and T2. For ATTO there is a paper published commenting on MEK seasonal variation which we have added to the text (Yañez Serrano et al., 2015). For TT34 we were able to have a look at the seasonal change in the mixing ratio raw data to report an approximate seasonal variation. For T2, we already comment about the possible difference in source and sink among seasons when commenting figure 7. Change in manuscript: Line 269: (Holzinger et al., 2005; Karl et al., 2005a). For a seasonal analysis, Yañez-Serrano et al., 2015 reported 0.43 ppb of MEK for the dry season and 0.13 ppb of MEK for the wet season at 38m. Curiously, at 24m, MEK mixing ratios for the wet season were 0.38 ppb, very close to the measured values for this study. Possible differences in temperature and solar radiation among years may be the cause for this variation.”; line 274: “In terms of seasonal variation, MEK mixing ratios were observed to be higher during the dry season (~0.6 ppb) and lower during the wet season (~0.2 ppb) (data not shown).”; and line 278: “This difference among boreal forests, with growing season ending in October, and broad-leafed tropical (ATTO) and temperate (O3HP) forests could be partly related to the temperature dependence of MEK emissions apparently common among all biogenic sites.”

3. Comment: Lines 293-297: You state that MEK did not show any covariance with butane and therefore it cannot be related to butane. However, I was wondering, if there is a constant local source or anthropogenic butane emissions are long range transported, then MEK would be produced during the day and lost on surfaces during the night while at the same time butane is not going on surfaces. Then you would not detect any covariance. Maybe you could mention the mixing ratio of butane and it is so low that butane cannot be the main source. Response: We acknowledge that interesting point raised by the referee and changed the text accordingly as follows below. Change in the manuscript: Line 292: “All samples contained n-butane, which

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was of anthropogenic origin with an average mixing ratio of  $0.071 \pm 0.09$  (much lower mixing ratios than MEK), indicating there is no significant source of n-butane nearby.”

4. Comment: Line 340: change 200 ppt to 0.2 ppb Response: We have changed it to 0.2 ppb.

5. Comment: Lines 365-367: Acetone is regarded as biogenic origin. It has also direct anthropogenic sources and it is produced from the reactions of anthropogenic VOCs also. Response: We have modified the text to account for extra sources. Change in the manuscript: Line 365 “. . .site. Using this method, we compare similar compounds to MEK, as this information could indicate some similarities, but this comparison does not necessarily claim links between the various com-pounds. Acetone, acetaldehyde, monoterpenes, isoprene, isoprene oxidation products and methanol are regarded as being of biogenic origin particularly in forested areas (Kesselmeier and Staudt, 1999; Laothawornkitkul et al., 2009). Nevertheless, acetone, acetaldehyde and methanol may have additional sources.”

6. Comment: Lines 418-420: Something missing from this sentence? Response: We do not think there is anything missing from this sentence, we are reporting that butanal can fragment on m/z 73, thus influencing the MEK signal, but the manufacturer of the machine has reported to most account for m/z 57.

7. Comment: Lines 516-518: Is determination coefficient same as correlation coefficient? Response: The determination coefficient is the same as the correlation coefficient  $r^2$ . We just wanted to make sure it was not confused with the pearson coefficient  $r$ . For consistency, we will modify all determination coefficient with correlation coefficient ( $r^2$ ).

8. Comment: Figure 6. Use ppb as a unit also here. Response: We have modified the figure to ppb.

9. Comment: Table 3: No mean noon mixing ratios are shown and colour codes for the

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sites are missing. Response: This is right; we have removed it from table label.

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