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Interactive comment on “Chemical characterization and stable carbon isotopic composition of particulate polycyclic aromatic hydrocarbons issued from combustion of 10 Mediterranean woods” by A. Guillon et al.

Anonymous Referee #1

Received and published: 11 October 2012

The paper looks into diagnostic concentration ratios and compound specific stable carbon isotope composition of PAHs in source aerosol arisen during controlled combustion of nine wood species and coal from the Mediterranean Basin. By analyzing the measured $d^{13}C$ of ten PAHs together with literature data, the authors can differentiate wood combustion from other particulate matter sources such as vehicular exhaust.

The subject is very topical; the use of isotope ratio measurements in biomass burning source aerosol in order to find isotopic signatures of markers originating from the combustion of different plants was recently described by Sang et al. (2011/EST – this

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paper should be cited in the introduction). These isotopic signatures can be further employed in analyses of ambient samples to track back sources of the measured aerosol. Therefore the paper is suitable to be published in the journal.

Unfortunately the paper contains some weak points as well as wrong statements which need to be corrected before it should be published.

Specific comments

Page20635Lines1to3: Is this combustion facility described in detail in a former paper, which should be cited here?

Page20637Line1: The authors claim on Page20644Lines1and2 that they used softer extraction conditions than those employed for the standard certification. The reason for this choice should be shortly described here.

Page20637Line13: Information on the internal standard mixture and its preparation is needed.

Page20642Lines11to27, Page20643 and Page20644 Lines1to6: Method validation for determining PAH concentration is extensively described in this work. There is on the other hand no explanation of investigating possible isotopic fractionation of the measured PAHs along the complex procedure of pre-preparation (extraction/concentration) of the samples followed by two chromatographic separations. Description of 'validation of analytical protocol applied on natural particles for the determination of $^{13}\text{C}/^{12}\text{C}$ ' by using SRM 2975 is not existing in the Supplement S1. Moreover, the repeatability and reproducibility of the compound specific isotopic measurements of PAHs by GC-IRMS were tested by using a standard mixture of non-aromatic compounds only.

Pages20651and20652: Wrong statements about ^{13}C depletion must be corrected considering the definition of delta: 'negativer' values mean ^{13}C depletion, 'positiver' show on the contrary ^{13}C enrichment (651lines 12 and 17 twice, 652 line 2)

Page20651Lines7and8. The errors presented in Table 7 seem to arise only from the
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three isotopic measurements of each individual PAHs, neglecting other error sources such as instrument errors. The authors should present instead the results of an error propagation analysis. If considering the reproducibility of standard isotopic measurements of 0.5‰ (line 20643), the differentiation among investigated wood species is not anymore so clear. In this case, the conclusions should be reformulated. More emphasis should be put on the fact that the isotopic composition of most PAHs is independent of the burning type.

Other comments:

- Sections 3.2.3 and 3.3 (see above) should be completely reformulated. Information is given sometimes twice. The authors should follow a structure: what is known from literature, own results and how these results relate to the former ones.
- Sentences should be reformulated as well, since they are vague or very difficult to understand (for instance lines 25 to 27 on page 20645 + lines 1-2 on page 20646, lines 4 to 7 on page 20646, lines 25 to 28 on page 20646, or lines 5 to 8 on page 20638). The mixed information in paragraph on lines 7 to 14 on page 20645 is to be better sorted.
- Revise 'by gas chromatography coupled with a mass spectrometer' with either 'by gas chromatography / mass spectrometry' or 'by a gas chromatograph coupled to a mass spectrometer' (l 8 p 20632, l 20 and l 23 p 20638).
- Revise 'whatever...type, species' with 'regardless of' or something similar (l 25 p 20646, l 12 p 20647, l 19 p 20649, l 24 p 20650, l 16 p 20651 and l 22 p 20653, Supplement line 29).
- Revise 'GC...MS analysis' with 'GC...MS', this means 'mass spectrometry' is enough, 'analysis' is not needed.
- Information on Line 9 on Page 20650 is given only for IP/IP+BghiP and not for IP/IP+BghiP AND BghiP/IP as stated on line 5. This needs to be revised.

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Editorial revisions:

Page20633Line19: consider revising 'and contributed' with 'thus contributing'.

Page20633Line10: consider revising 'the variety' with 'a variety'.

Page20633Line26: consider revising 'by the only application' with 'by only applying'.

Page20633Lines8,14,16 and Page20634Line10: consider revising 'and/or' with 'and'.

Page20634Line15: remove 'large'

Page20635Lines11 and 18: revise 'during' with 'for'.

Page20635Lines19: revise 'sampling time 77 min' with 'sampling time of 77 min'.

Page20635Line20: consider revising 'field blanks' with 'filter blanks'.

Page20636Line5: consider revising 'Validation on standard' with 'Validation using standard'.

Page20639Line2: revise 'programmed from 60' with 'programmed to increase from 60'.

Page20640Line3: remove 'mode'.

Page20643Lines22 and 25: revise 'A' with 'S' in description of figures and tables. Also supplement lines44 and 64.

Page20644Line18: insert after 'OC' 'data'.

Page20645Line1: revise 'from' with 'within'.

Page20645Line6: revise 'when the wood was cut in twigs' with 'for the combustion of wood twigs' or something similar.

Page20646Line12: revise '12.9 and' with '12.9 to'.

Change format of Table 2, so that Pyrene d10 is in the same line with Pyrene for instance.

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Revise 'Fine et al. |(2001, 2002) (USA)' in Table 6 with 'Fine et al. (2001, 2002) (USA)' (same column).

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