

Interactive comment on “Polar organic compounds in rural PM_{2.5} aerosols from K-pusztá, Hungary, during a 2003 summer field campaign: sources and diurnal variations” by A. C. Ion et al.

Anonymous Referee #5

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This paper deals with the measurement, identification and quantification of polar organic compounds in atmospheric aerosols. The polar fraction of the organic aerosol is, in non-urban areas, frequently higher than 50%. However common methods of identification and quantification by GC-MS usually use dichloromethane extraction that only very partially extracts the polar organic fraction. Therefore there is a large dataset relating to a-polar or weakly polar particulate organic compounds, but much less is known about the most polar fraction that is strongly water soluble and that may play an important role at cloud level, in cloud formation and in-cloud reactions. Probably, an important part of this polar organic matter has complex macromolecular, humic-like,

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characteristics and will never be fully characterized as individual chemical structures. However one important fraction of the polar water soluble organic matter has been difficult to measure because of the large number of functional groups containing oxygen, nitrogen, etc, and the incapability of GC columns and GC/MS libraries to elute, separate, detect and identify these multifunctional compounds. It is necessary to take into account that even the so called HULIS (HUMic Like Substances) have been estimated to have average molecular masses lower than 300 uam, which make these Humic type substances of size similar to the usual alkane linear compounds identified and quantified in carbonaceous aerosols by GC/MS.

The utilization of methanol as extraction liquid solvent, together with derivatization by BSTFA, permits the solublization and the inertization of more polar compounds such as poly-alcohols and sugars, which, in this way, can elute through standard GC capillary columns. These compound groups have difficult to identify and quantify because of the presence of multiple peaks in chromatograms. The results obtained and reproduced in this paper are not completely innovative and confirm results obtained previously in other non-urban areas in Europe and elsewhere. However, the separation of sampling between day and night-time permits a new insight into the daily variability pattern of the measured oxygenated carbon compounds and a better evaluation of the sources and processes responsible for the aerosol loading in these species. The measurements also seem to reinforce the occurrence in the environment of oxidation processes of isoprene leading to particulate organic matter, through the detection of compounds such as methyl-tetrols, demonstrated to be formed from isoprene oxidation in laboratory experiments, under acidic conditions. These compounds are then, probably, a good tracer for particulate organic matter production from isoprene degradation in the atmosphere. It would be important to be able to infer about the real contribution of isoprene oxidation processes to the atmospheric organic aerosol loading (is it minor or substantial?).

One of the limitations of these and other proposed organic species as tracers of

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sources and processes of organic aerosol formation is that, in most of the cases (or almost in all cases) they are presented as qualitative indicators only. Almost only with the exception of levoglucosan, the organic species that are indicated as possible good tracers of a formation process, or source, never are given in quantitative terms, as a fraction of the organic carbon or organic matter resulting from that source. This highly limits their usefulness in the quantitative, or semi-quantitative, apportionment of the atmospheric carbonaceous aerosol.

Therefore, taking into account my previous comments, the soundness of the methodology used for sampling, extraction and analysis, the new information obtained related with the daily variability of concentrations and the consequent inference about the usefulness of measured compounds as tracers of secondary organic aerosol formation I recommend the acceptance of this article for publication.

The paper needs some improvement in relation to the figures and text. I agree with most of the comments and suggestions given by Referee 1, concerning the imperfections, limitations and repetitions of the manuscript, namely the repetition of the Abstract in the Conclusions and the difficulty in the reading and interpretation of Figures 3, 5 and 6. However I find useful Figure 1 and don't recommend its removal. As the Referee 1 report is quite detailed in relation to proposed alterations and corrections I feel that no more needs to be added in relation to the reorganization of the manuscript.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 1863, 2005.

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