

Interactive comment on “Reconstruction of Northern Hemisphere 1950–2010 atmospheric non-methane hydrocarbons” by D. Helmig et al.

Anonymous Referee #3

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The work performed by Helmig et al. presents a clear atmospheric history of NMHC (C2–C5) of the Northern Hemisphere reconstructed from HEEM firn air. The reconstructed atmospheric history of NMHC in this study is compared with direct atmospheric measurements and seems in good agreement. Even the seasonality of the studied NMHCs are reconstructed and seems in good agreement with direct atmospheric measurements. Although this article is quite long, it is well written. I think it should be published in ACP, since it will be a nice contribution to the study of NMHC. I still have some minor comments as listed below.

1. Page 12997 line 8: dewpoint of -30°C seems rather high to me, please verify
2. Page 12998 line 2: The auteur has used an isotopic ratio mass spectrometer for the

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analyses of ^{14}C . Unfortunately these data are not presented in this work. Furthermore, could ^{13}C also be measured with this instrument? If so, this might be a welcome contribution to source (anthropogenic) identification.

3. Page 13000 line 19 to 21: “Further, several points were rejected because mole fractions results deviated from the seasonal cycle behaviour...”. Is this a valid reason?
4. Page 13001 line 3: “non-sinusoidal cycle”. What do the authors mean by this term and is a sinusoidal cycle not expected for a seasonal cycle?
5. Page 13003 line 8 : “these 6 NMHC suggests similar histories and likely common emission sources of these gases”, page 13007 line 9 “ethane peaking significantly earlier” and page 13020 lines 3 to 8 “Ethane emissions are to a larger degree associated with natural gas..”. The sources of the various NMHCs described in this study are already known in literature and I find the line of reasoning in this study therefore unnecessary.
6. Page 13008 line 24: “not statistically significant” . What kind of statistical method has been used here?
7. Page 1305 line 24 : “seen” should be seen
8. Page 13019 line 26 to page 13020 line 3: “There is a correlation seen...” I find this part confusing while the authors have only compared ethane to CO and not the other NMHC directly to CO.

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