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Atmospheric Measurement Techniques Discussions

Interactive comment on "High precision dual-inlet IRMS measurements of the stable isotopes of CO_2 and the N_2O/CO_2 ratio from polar ice core samples" *by* T. K. Bauska et al.

Anonymous Referee #2

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Review of "High precision dual-inlet IRMS measurements of the stable isotopes of CO2 and the N2O/CO2 ratio from polar ice core samples" by Bauska et al. AMTD, 7, 6529-6564, 2014

General: The manuscript describes an improved dual-inlet IRMS method for carbon stable isotopes on CO2 combined with N2O/CO2 ratios in polar ice cores. The paper is well structured and well written. Despite the fact that the method is not new the improvement in accuracy and precision in both the carbon isotope analysis and the N2O/CO2 ratios determination strongly supports its publication, in particular in view of the still sparsely available carbon stable isotope measurements on polar ice cores.

There are a couple of points that should be improved before publication that includes:

1) The reproducibility is estimated to be 0.02 ‰ for d13C-CO2 cannot directly be compared to the uncertainty given in other publication listed in the manuscript since the authors do not include effects like the gravitational enrichment, thermal diffusion or bubble enclosure on d13C-CO2 in their estimate. Therefore, their statement should be adapted slightly.

2) There are only a few publications that used the same principle to determine N2O via the N2O/CO2 ratio. Therefore, it would be adequate to list them, but in particular Leuenberger and Siegenthaler, Nature 1992.

3) The discussion of the oxygen stable isotopes of water is rather lengthy and not convincing since the general message is that, even after combining the presented data with previous published data of Siegenthaler et al., 1988, the relationship between the measured oxygen isotope difference of CO2 and surrounding H2O with temperature is unconstrained. However, I agree with their statement that additional data, in particular at sites with very cold temperatures are required but in addition a thorough history of temperature exposure of the ice samples.

Detailed comments: P6537, l.14: attacbed →attached

P6539, l. 14: . . .it does suggest that. . .

P6541, l. 13: add Leuenberger and Siegenthaler, Nature 1992

P6542, l. 23: . . .spaced 20 cm apart . . ..

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 6529, 2014.