



Interactive  
Comment

# ***Interactive comment on “WAIS Divide ice core suggests sustained changes in the atmospheric formation pathways of sulfate and nitrate since the 19th century in the extratropical Southern Hemisphere” by E. D. Sofen et al.***

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Dear Jan,

As you requested, I have read this manuscript. This is an important paper that reports very rare data on sulfate and nitrate  $\Delta^{17}O$  in Antarctic ice core spanning the last 2400 years. The sampling and analytical procedures are all well and the data are consistent.

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Possible temporal variation in the values of Delta17O-O3, however, was not properly discussed in this paper. To our best knowledge on past variability of atmospheric ozone, tropospheric ozone during preindustrial ages was around 1/2 to 2/3 of the present and the relative mixing ratio of stratospheric-derived ozone within total tropospheric ozone was much higher than the present. If this was the case, the Delta17O-O3 could be highly different from the present and thus sulfate and nitrate Delta17O. The authors, however, seem to apply the same Delta17-O3 with that obtained for the present to preindustrial. If so, the authors should add discussions to justify this. If not, they should clarify the Delta17O-O3 values of preindustrial tropospheric ozone used in their calculation, together with the theoretical backgrounds. Besides, the graphics (Figs.3-4, especially) is not fine enough and should be improved.

Sincerely, Urumu

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Interactive comment on Atmos. Chem. Phys. Discuss., 13, 23089, 2013.

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