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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Seasonality in the $\Delta^{33}S$ measured in urban aerosols highlights an additional oxidation pathway for atmospheric SO_2" *by* D. Au Yang et al.

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This is an excellent article that provides additional data to the evolving picture of tropospheric sulfate isotope signatures (and the processes that affect them). I would like to see more discussion about the D33S values of the initial SO2 and more justifications / measurements / citations for these assumptions. Iron production in the Quebec / Ontario region of Canada is a high emitter of sulfur dioxide. My first order assumption would be that processing iron from Archean banded iron formations would release SO2 with non mass dependent isotope signatures. SO2 signatures from this region can be transported long distances and may contribute to non mass dependent isotope

signatures significantly downwind (e.g. Boston, MA). It would be useful to understand your reasoning as to why either (1) SO2 emitted from processing iron from banded iron formations will not produce non mass dependent SO2 or (2) this is not a substantial source of SO2 for this region and will not affect the observed isotope signatures. You invoke complex reactions (e.g. SO2 photooxidation and stabilized Criegee intermediates) without constraining the SO2 source signature. A mixing of SO2 from different sources would have different d34S (and likely D33S and D36S) values and may contain seasonality as observed in this study.

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