

Atmos. Chem. Phys. Discuss., referee comment RC2
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Comment on acp-2022-166

Anonymous Referee #2

Referee comment on "Sulfuric acid in the Amazon basin: measurements and evaluation of existing sulfuric acid proxies" by Deanna C. Myers et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2022-166-RC2>, 2022

General comments

The manuscript presents the first measurements of gas-phase sulphuric acid in the Amazon region during two campaigns in the wet and dry seasons. Descriptive statistics of the measured concentrations of H₂SO₄ and OH are given. Detailed comparisons of several H₂SO₄ proxies widely used in the literature are presented and recommendations given on the best proxy versions to be used in Amazon region.

As suggested by Referee #1, I also would recommend adding tests of the predictions from Proxy 4 using the measured OH instead of Global radiation (with coefficients of Proxy 4 fitted according to the data used in this study). This way the authors could discuss how much including the measured night-time OH oxidation of SO₂ would improve the proxy concentrations.

The manuscript fits well in the scope of *Atmos. Chem. Phys.*, and I recommend publishing it after considering the minor comments and technical corrections listed below.

Minor comments and technical corrections

Lines 105-107: What is the reason of the slight changes in the particle size range measured by the SMPS?

Table 1: Typo in Proxy 3, the exponent of [SO₂] should be 0.62 (not -0.62)

Line 142: Median of H₂SO₄ concentration during IOP 2 is given in the text as $2.56 \cdot 10^5 \text{ cm}^{-3}$, whereas in Table 2 it is $2.59 \cdot 10^5 \text{ cm}^{-3}$. Please check which one is correct.

Lines 160-162: This is unclear sentence, what are the median values reported at the end of this sentence?

Line 186: Explain more clearly, what do you mean with "36% of the total H₂SO₄ was measured at night"? Do you mean that the level of night-time concentrations was 36% of the daytime concentrations or what?

Line 245: In the particle number size-distributions measurements by SMPS, is the sample air dried, and therefore taking the RH into account in the proxies would be more representative of the actual sink term? This information could be added to Section 2.2.2 where the SMPS measurements are described.