

Interactive comment on “Fast sulfur dioxide measurements correlated with cloud concentration nuclei spectra in the marine boundary layer” by D. C. Thornton et al.

Anonymous Referee #2

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General comments:

The authors examine aircraft data with a fast SO₂ instrument and aerosol particle concentrations as well as cloud condensation nuclei concentrations conducted in the marine conditions. The data presented is relevant and potentially important and thus suitable for publication in Atmos. Chem. Phys. However, there are few drawbacks in the current manuscript, which I present in more detail below. In my opinion these problems need to be addressed in detail prior acceptance to ACP.

Specific comments

The authors do not present their results in a coherent way. The text is not easy to follow.

Interactive
Comment

The results are scattered among many sections and they are not well connected at the end.

The authors do not show convincingly that the SO₂ data leads to cloud condensation nuclei formation. This is also indicated by the authors at the end of the conclusions section in which they state that more measurements and modeling are needed. One has to bear in mind that anthropogenic sources can produce both gas-phase SO₂ as well as particles, so the apparent correlation can be also explained by differences in the amount of anthropogenic sources and emissions in the air masses.

Furthermore, the authors do not utilize aerosol number concentrations, which apparently are also measured during the flights, which could help in the data interpretation of gas-phase precursors and relatively large CCN sized aerosol.

What are the implications of the SO₂ fluxes? Is there correlation between the negative SO₂ flux and CCN activity?

I would like to see an intercomparison of the in-situ and remote sensing data. Now this is only mentioned in the text and discussed qualitatively.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 14903, 2011.

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