

## ***Interactive comment on “Aerosols in the tropical and subtropical UT/LS: in-situ measurements of submicron particle abundance and volatility” by S. Borrmann et al.***

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Reply-letter to Reviews for the manuscript:

Aerosols in the tropical and subtropical UT/LS: In-situ measurements of submicron particle abundance and volatility, by S. Borrmann, D. Kunkel, R. Weigel, A. Minikin, T. Deshler, J. C. Wilson, J. Curtius, C. M. Volk, C. Homan, A. Ulanovsky, F. Ravegnani, S. Viciani, G. N. Shur, G. V. Belyaev, K. S. Law, and F. Cairo.

General remarks: We prepared a major revision of the manuscript. The main changes are enumerated below and in our reply to the individual reviewers we refer to these items:

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(0.) We very much thank all three referees for their extraordinarily constructive comments, which caused us to very thoroughly revise the manuscript.

(1.) A new section (2.1) is included on the connection between the aerosol measurements and atmospheric dynamics. One additional figure with correlations between submicron particle data and trace gas (CO, N<sub>2</sub>O, O<sub>3</sub>) measurements is added and discussed (Figure 8 of the revised manuscript). For this we included four new co-authors and text/references on their instruments. (2.) In the meantime a number of relevant publications appeared or was submitted and we included 29 new references. (3.) In addition to the parameterization for the tropical profiles we supply now a second parameterization from the Figure 9 (of the revised ms) for the profiles in mid-latitudes. However this parameterization is given in terms of particle number concentrations instead of mixing ratios because of lack of adequate temperature data for several flights. (4.) In order to demonstrate the particle concentration maximum is indeed a maximum with decreases below and above we integrated the data from the DLR Falcon-20 into Figure 6 for altitude levels below 350 K.

Response to the Referee N. Larsen:

Comment “page 21400 line 27 and page 24601 line 23-24”; The QBO: We added a paragraph in the new section 2.1 on the QBO phases of the three campaigns.

Comment “page 24604 line 5 and line 18”: The Khaykin et al paper is referenced now.

Comment “page 24606, line 25, page 24607, line 10-13, page 24608, line 4-5”: From the COPAS data size distributions cannot be inferred except for nucleation events, where n<sub>6</sub> exceeds n<sub>10</sub> or n<sub>14</sub>. Unfortunately the IR channel of MAS was not working during SCOUT-AMMA. And a coarse look at the size distributions in the balloon data did not reveal any striking differences. The “tracks” for “r>0.15”, “r>0.25”, “r>0.50” etc. in Terry Deshler’s plot trace each other quite well. Also more detailed analyses in terms of counting statistics are needed in order to be able to really isolate significant differences. This is an interesting suggestion though.

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