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Atmospheric Chemistry and Physics Discussions

Interactive comment on "On the origin of subvisible cirrus clouds in the tropical upper troposphere" *by* M. Reverdy et al.

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Following remarks from the two Reviewers, the following major changes have been made to the manuscript:

We now conclude that the inclusion of HNO3 in NAT-like crystals is not a significant formation process for SVC.

We have restructured Sect. 5.2, which discusses the importance of local increases in aerosol concentration for SVC formation. This section is now divided into Sect. 5.2.1 which discusses the specific importance of eruptions, Sect. 5.2.2 which discusses the importance of the Asian Tropopause Aerosol Layer, and Sect. 5.2.3 which discusses the specific importance of biomass burning and now presents carbon monoxyde obser-

vations from MLS. The discussion about the importance of eruptions has been rewritten and new eruptions have been considered. We now make a clear distinction between eruptions that affected the TTL and those that did not. We now confront time series of SO2 (from OMI), of CO (from MLS), of UTLS scattering ratio (from CALIOP) with time series of SVC in three bands of latitude to better identify any potential correlation between SVC formation and local increases in aerosol concentration. Since these figures now hopefully describe the various eruptions in more details, Table 4 in the original manuscript has been removed and has been replaced by a Table that describes the various eruptions considered in the study.

Fig. 12, 13, 14 and 15 of the original manuscript have been removed. They have been replaced with new Fig. 12 (time series of column-integrated SO2, of UTLS backscatter and of SVC cloud fraction between June 2006 and December 2008), new Fig. 13 (time series of SVC cloud fraction in the Monsoon Area) and new Fig. 14 (time series of CO). Following appropriate remarks from both Reviewers, our analysis of the intersection of back-trajectories initiated at points of SVC detection with convective systems as documented through geostationary satellite imagery has been revised and considerably expanded. Instead of considering only a single season (JJA) of a single year (2006) over a single area (Africa), we now consider JJA and DJF for all years (2006-2008) over the entire Tropical band. To do this, we switched to the MERG brightness temperature dataset that combines measurements from five geostationary satellites. As a consequence, results of this analysis are now presented in the new table 5 that describes them across both seasons and all regions. Our analysis now considers back-trajectories going back 15 days in time. Relevant Figures (previously 16-18, now 15-17) have been updated to reflect the new results, as were the conclusion and abstract.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 14875, 2012.

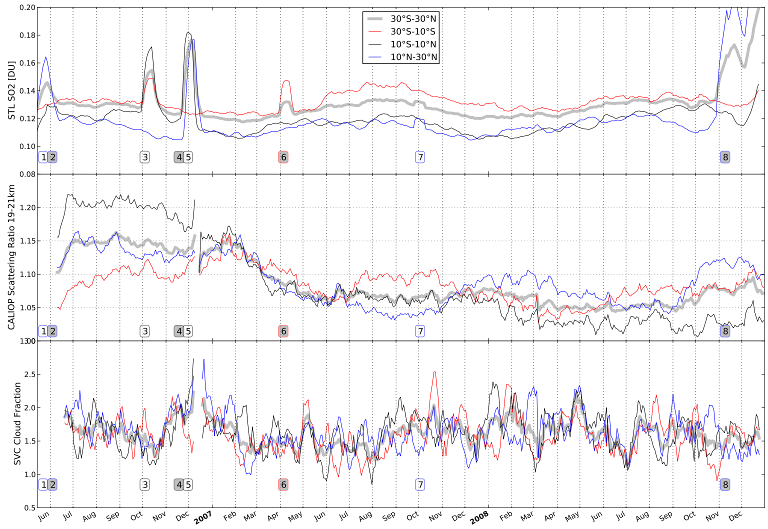

30°S-30°N
30°S-10°S
10°S-10°N
10°N-30°N
STL SO2 [DU]
CALIOP Scattering Ratio 19-21km
SVC Cloud Fraction
2007
2008

Fig. 1.

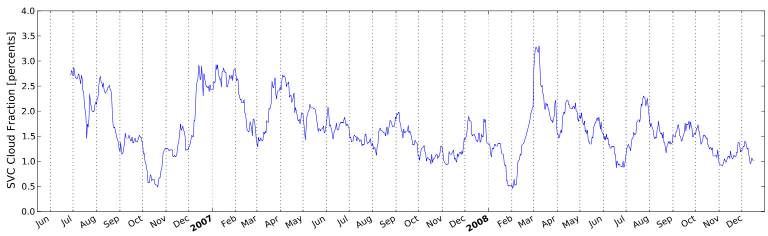
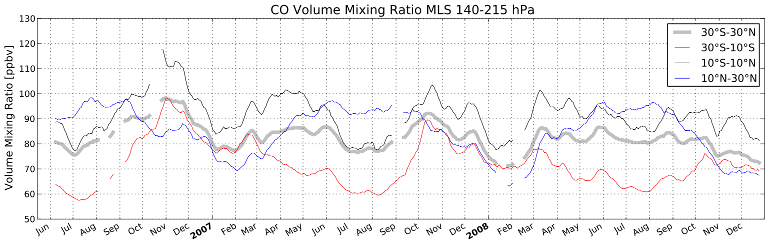
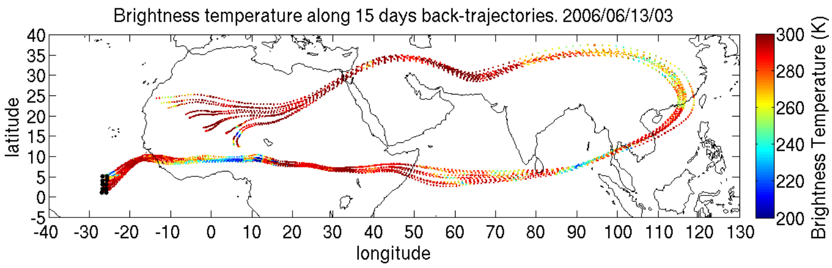

SVC Cloud Fraction [percents]
2007
2008

Fig. 2.



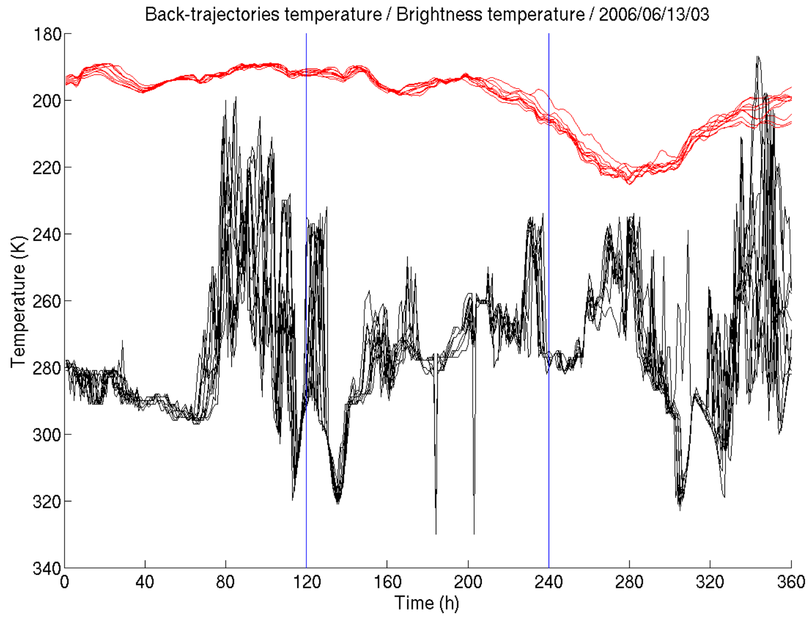
CO Volume Mixing Ratio MLS 140-215 hPa
Volume Mixing Ratio [ppbv]
30°S-30°N
30°S-10°S
10°S-10°N
10°N-30°N
2007
2008

Fig. 3.



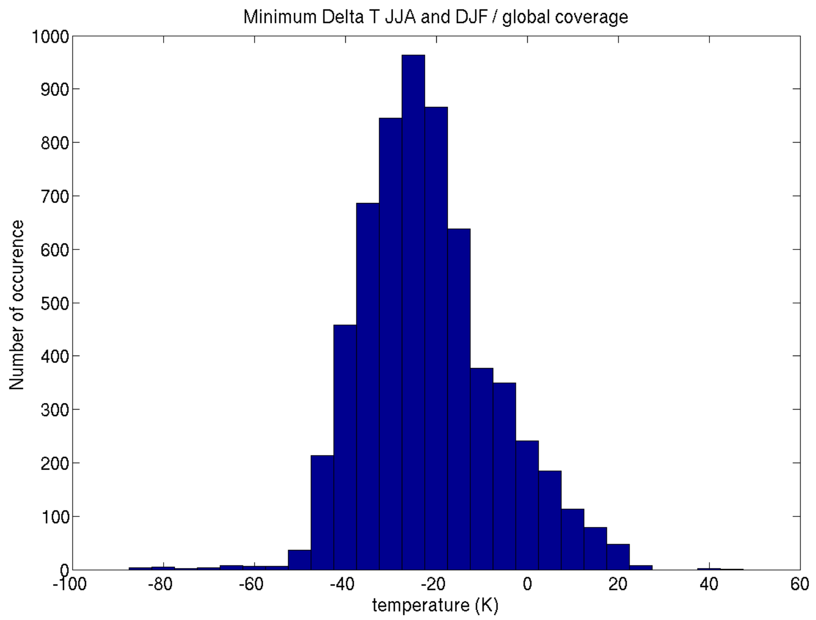
Brightness temperature along 15 days back-trajectories. 2006/06/13/03
latitude
longitude
Brightness Temperature (K)

Fig. 4.



Back-trajectories temperature / Brightness temperature / 2006/06/13/03
Temperature (K)
Time (h)
180
200
220
240
260
280
300
320
340
0
40
80
120
160
200
240
280
320
360

Fig. 5.



Minimum Delta T JJA and DJF / global coverage
Number of occurence
temperature (K)
1000
900
800
700
600
500
400
300
200
100
0
-100
-80
-60
-40
-20
0
20
40
60

Fig. 6.