

## ***Interactive comment on “Hydration of the lower stratosphere by ice crystal geysers over land convective systems” by S. Khaykin et al.***

**S. Khaykin et al.**

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The authors thank the reviewer for his constructive remarks.

1) Although the argument of the paper is indeed not very complex, we feel that for interpreting the observed features correctly, it is necessary to comprehensively describe the experiment, the observations and the analytical approach used. A reader should be aware of every important detail, so that there would not be unaddressed questions and the conclusions would be well substantiated.

2) We understand that these estimates may seem too high. However the estimates of vertical velocities in the 50-80 m/s range are fully consistent with the calculation of recent cloud resolving model simulations mentioned and referenced in the paper. After all, these are just estimates. The 126 m/s for the layer at 20.3 km on 5 August has been

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removed, since this layer is very unlikely to have an overshooting origin. A discussion of this case has been added.

3) The labels in Figure 1 have been fixed.

4) Mention of dips in the ozone profile indeed refers to the Figure 5. The paragraph has been modified to make it clearer. The Figure 5 has also been modified to show that the dips are actually not so small. In fact, the tropospheric air fraction in the mixed layer can be estimated by assuming no chemical ozone production (which is very unlikely) and solving the following equation:  $X_t A + X_s(1-A) = X_m$ , where A is the tropospheric air fraction, X - the ozone mixing ration and subscripts t, s and m refer to 'tropospheric', 'stratospheric' and 'mixed' respectively. Solution of the above equation shows that the mixed layer at 16.2 km on 23 August is composed of 1/5 of tropospheric air and 4/5 of stratospheric air.

5) The conclusions have been modified

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