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Interactive comment on "In situ observations of "cold trap" dehydration in the western tropical Pacific" *by* F. Hasebe et al.

F. Hasebe et al.

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We are very sorry for the recommendation of rejection. We understand that major opposition comes from the uncertainty of the water vapor measurements. As is explained below, we have made appreciable improvement in the water profiles by changing the smoothing procedure and trimming unreliable data. We agree that this is just a case study, but we would appreciate it very much if you could reevaluate the contents of the paper hopefully to agree for acceptance. Revisions on the raised problems are as follows:

The vertical profiles are reexamined by considering the response time for the frost-detecting mirror to maintain the frost. The water vapor mixing ratios are derived from smoothed frost point temperature instead of smoothing instantaneous water vapor mixing ratio along the launching sequence. Due to the nonlinear dependence of the water

mixing ratio on the frostpoint temperature, we now have much reliable results than before. The spurious oscillations in both CFH and SW water measurements have mostly gone in the lower TTL. The SW data above the level that reached the frostpoint temperature below -80C are omitted (4th paragraph of Sect. 4). We believe the revised profiles better illustrate the actual profiles and fit for an examination of the dehydration efficiency in the TTL, although we should still be aware of the limitation of the measurements.

It is extremely difficult to identify the cause of the difference between the observed mixing ratio and the SMR along the trajectories. By introducing a new figure (Fig. 7), we tried to better illustrate the difference at first. Possible moistening by deep convection and cold bias of ECMWF data are discussed in Sect. 4, which helps a little on the identification of the underlying mechanism. We believe that accumulation of observational evidences such as those shown in the present study is quite important to examine the efficiency of dehydration in the TTL and to properly parameterize microphysical processes in dehydration models. It will also serve to confirm if the simplified treatment of dehydration such as that performed by Fueglistaler et al. (2005) could be justified for the purpose of estimating the annual mean and the seasonal and interannual variations of stratospheric water (Sect. 4).

The term 'cold trap dehydration' is no longer used including the title of the paper. They are changed to 'dehydration during horizontal advection' or similar to it.

Appreciating the contribution of Y. Inai on the comparison of air parcels' temperature with brightness temperature of geostationary satellite, he is added as a coauthor.

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