Atmos. Chem. Phys. Discuss., 12, C5985–C5986, 2012
www.atmos-chem-phys-discuss.net/12/C5985/2012/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Stable water isotopologue ratios in fog and cloud droplets are not size-dependent" *by* J. K. Spiegel et al.

Anonymous Referee #2

Received and published: 21 August 2012

The manuscript proves very convincingly that fractionation of isotopologues of water does not occur in a specific type of clouds. Very unusually, already the title all the manuscripts conveys the final conclusion of the work. While the statement in the title is well founded by the work presented in the manuscript, it might be deceiving since it does not refer to the restrictive limitations which are described inside the text (e.g. that only a specific type of warm clouds is investigated). Thus the title in itself seems to be an unquestionable axiom, which is not quite true. I suggest that the authors think it over and perhaps come out with an alternative and less explicit title. The rationale behind the work is very clearly presented, starting from the importance of the question through early model efforts and experimental works to the definition of the main objectives. Although models and experiments unanimously suggest that fractionation is unlikely, there are some speculations about real-cloud processes that might cause

fractionation of water isotopologues. Thus the experimental confirmation of the results of this very important field is highly invaluable. However, the detailed description of the entire structure of the manuscript is totally unnecessary in the final paragraph of the introduction.

The experimental setup of the work is very well founded and presented in the manuscript. The main conclusions of the manuscript are robust, including those regarding potential sampling artifacts in times of cloud dissolution. Although the work was done on a specific type of warm cloud (fog), the results suggest that physical processes in (warm) clouds do not lead to measurable fractionation of isotopologues. This is reassuring for the representatives of other fields who are relying on stable isotope measurements.

Specific comments:

The long sampling times may not be ideal for testing any potential cause of fractionation described in the introduction (e.g. different values in different locations in the cloud). Even if there are any such effects, they are likely averaged out during the sampling.

There are significant differences in isotope abundances over the clouds' lifetime: I presume that such changes do not happen all at once. They start in different region of the clouds, temporarily affect different droplet sizes, etc. It is likely that much better temporal and spatial resolution would be needed to better understand the causes of these variations which are detailed in another manuscript.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 12663, 2012.