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Interactive comment on "Trajectory mapping of middle atmospheric water vapor by a mini network of NDACC instruments" *by* M. Lainer et al.

Anonymous Referee #2

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This paper takes twice daily upper stratosphere/lower mesosphere water vapor measurements from 5 northern hemisohere sites and by using a forward and backward trajectory analysis attempts to recreate NH maps. These are compared to Aura MLS measurements as a validation of the technique. In effect, one is using frequent sampling with a trajectory analysis to map time into space to fill the large spatial data gaps that exist among the 5 stations. The study is motivated in part to investigate whether ground based H2O measurements can be used to produce globally mapped H2O distributions in a future scenario where there may be no regular satellite monitoring of upper atmospheric water vapor as will be the case when instruments such as Aura MLS, Odin SMR, and ACE-FTS cease to operate.

For the most part, the study appears to be properly executed and shows the some

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success ie good comparisons with MLS is achieved with this approach. Certainly, it shows how well the northern hemisphere is covered in a synoptic, trajectory mapped sense from these five sites.

I have one question and one suggestion to the authors. It appears that all these ground based microwave sensors use MLS climatoloies as an apriori. What is the climatology used? Is it some kind of a seasonal average, mission average, or? There is the issue that at some level we could be comparing MLS data to itself depending on how sensitive the results are to the apriori. Also given that the vertical resolution is on the order of 10–15 km, one might want to smooth the MLS (typ <6 km) with the GB averaging kernel.

The authors discuss potential sources of uncertainties such as wind errors, chemistry, and removal from condensed phases (e.g. mesospheric clouds). A simple assessment of such errors could be done by taking MLS measurements near the 5 sites and advecting those profiles through the analysis performed and comparing the mapped fields to MLS. The histogram plots should provide an estimate of error and limitation of the trajectory analysis.

Minor

Page 12788 line 1 change on NetCDF to in NetCDF page 12792 line 10 change come up with came up page 12795 line 3 it appears to me that the data gap is south of the vortex.

Table 2 agree within

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Interactive comment on Atmos. Chem. Phys. Discuss., 15, 12777, 2015.

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