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Interactive comment on “Comparison of IASI water vapor retrieval with H₂O-Raman lidar in the frame of the Mediterranean HyMeX and ChArMEx programs” by P. Chazette et al.

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Please find a point-by-point discussion and answer of the issues raised by the reviewers. To facilitate the work of reviewers and the editor, the reviewer's comments and suggestions are preceding each reply in blue. The authors are grateful to referees for their constructive remarks.

Referee #1

Some details about the comparison of the profiles are missing. Is the comparison done at the IASI L2 pressure level grid?

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Yes. We have added a sentence to be clearer: “Note that vertical values for both rIASI and rIidar are used at the IASI-L2 pressure level grid.”

Have the lidar derived water vapour profiles been smoothed prior to the comparison?

Yes. We have added a sentence to be clearer: “The lidar profiles were smoothed for the comparison so that the vertical resolution used for this study is ~ 41 m.”

When comparing with ECMWF, why are the 9 closest model grid points being averaged instead of, for example, using bilinear interpolation based on the 4 closest points (given the high spatial variation of water vapour)?

When checking the standard deviation computed on the 9 ECMWF grid it appears very low for all the studied atmospheric situations. So, we have chosen to consider the mean value in showing the standard deviation. We agree that when it is dispersed, it is preferable to use a multiple-linear interpolation. In our case, the results are very close.

The comparison shows the good correlation between the IASI and WALI water vapour profiles above 2 km, but also highlights the disability of the IASI retrievals to capture strong vertical gradients. The conclusion, rightly, mentions the higher spectral resolution offered by the future IASI-NG instrument as an important way to improve the vertical resolution of the water vapour retrievals. Additionally, the synergetic use of microwave measurements is capable of improving the water vapour retrievals, especially in the PBL. An upcoming version (6) of the operational IASI Level 2 processor with synergistic use of AMSU and MHS data was announced at the International TOVS Study Conference earlier this year. It was reported to contain substantial improvements of the profiles when compared with ECMWF analysis, in particular in the lower levels and for the water vapour profiles. It would be interesting to characterize to what degree these improvements can also be observed when comparing with high vertical resolution reference profiles such as the ones presented in this paper.

It is a good remark and we have added this point in the conclusion: “Moreover, the

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synergetic use of microwave measurements is capable of improving the water vapor retrievals, especially in the PBL. An upcoming version (6) of the operational IASI Level 2 processor with synergistic use of the Advanced Microwave Sounding Unit (AMSU) and the Microwave Humidity Sounder (MHS) data is scheduled. It was reported to contain substantial improvements of the profiles when compared with ECMWF analysis, in particular in the lower levels and for the entire water vapor profiles.” In another way, we are in contact with EUMETSAT to performed similar study with the new products in development. Hence, we have added the sentence: “The approach presented in this study can be applied to the next generation of IASI operational water vapor products.”

Please also note the supplement to this comment:

<http://www.atmos-chem-phys-discuss.net/14/C5580/2014/acpd-14-C5580-2014-supplement.pdf>

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 14071, 2014.

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