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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.

Anonymous Referee #1

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General comments. The paper contributes to the validation of the water vapour mixing ratio profile from EUMETSAT's operational IASI Level 2 product (version 5) by comparing these profiles with time and space coincident high vertical resolution profiles obtained from a H₂O-Raman ground based lidar stationed at Menorca during the HyMeX and ChArMEx experiments. A total of 30 collocations with excellent time and space agreement were obtained for the validation of the water vapour profiles at 0.3 to 7 km altitude. These collocations provide information about fine scale vertical structures and are a valuable supplement to the global ECMWF analysis fields, which were the main reference used for the validation of the operational IASI L2 water vapour profiles. The

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comparison shows that the IASI profiles are of good quality, but, as expected, are not able to reproduce the fine scale vertical structures due to the limited vertical resolution of IASI. Furthermore, the aerosol vertical profiles and the air mass origins are analysed. The paper is well written and the results are relevant.

Specific comments. Some details about the comparison of the profiles are missing. Is the comparison done at the IASI L2 pressure level grid? Have the lidar derived water vapour profiles been smoothed prior to the comparison? 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)? 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 characterise 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.

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