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Atmospheric Chemistry and Physics Discussions

Interactive comment on "$H_2{}^{16}O$ and HDO measurements with IASI/MetOp" *by* H. Herbin et al.

Anonymous Referee #2

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The remote sensing of water isotopologues from space represents a very important advance in our ability to monitor the atmospheric branch of the Earth's hydrological cycle. This paper describes early efforts to use data from IASI/MetOp and is therefore an important contribution. I am certain that our ability to work with this data will improve with time, but this paper represents an important step along the way. I will focus on two main issues in these remarks.

First, I'd appreciate a few more sentences comparing the IASI measurements and algorithms to those from TES. There are very few measurements like these being made currently, and some discussion of the similarities and differences would be gratefully appreciated by the community of users who are not specialists in remote sensing. Appropriate comparisons should be made in terms of the spectral resolution, field of view, pixel footprint, global coverage, vertical resolution, and retrieval algorithms. This

is not necessarily calling for a detailed intercomparison, just a quick reference to the main similarities and differences between the two sets of measurements.

Second, the case study of Typhoon Krisa is interesting, but I'd like to see it become more developed. I would suggest that the study, in its current form, does not represent a 'detailed' study but is instead a preliminary study that simply illustrates our ability to remotely sense water isotopologues from space. A little more work would make the case study much more relevant (and enticing) for the meteorological community.

The authors need to provide some additional context about water isotopologues in typhoons - there is already a modest literature on the subject from Gedzelman and Lawrence, and some of these references would be helpful. Typhoons actually are an excellent test-bed for these kinds of measurements because of the intense isotopic depletion associated with them. Please take a couple of sentences to explain this.

In Figure 5, do the authors really need to show the column-integrated water in molecules per square centimeter? This is a nonstandard unit at least in the meteorological literature. Something like mm would be more appropriate for comparison with other studies. The authors mention that they remove all cloudy spectra above and around the typhoon's eye. I'd be interested in seeing some of the lesser quality data - can we be sure that there's nothing interesting (from the point of view of typhoon dynamics) in these other parts of the data set?

Figure 6 kind of disturbs me, since the dD values span all the way from 0 to -300 per mil! I see a lot of structure in Fig. 5, but Fig 6 reminds me of noise. Would there be more structure here if they just plotted the data above, say, 4x10ˆ23 molecules/cmˆ2? Fig. 5 suggests a nice inverse relationship between water concentration around the typhoon eye and the dD values, but this doesn't show up in Fig 6. The discussion of the Rayleigh distillation lines is in accordance with current interpretations, but I am not sure that they are entirely relevant for typhoons. The authors do mention the importance of 'mixing' processes, but I'd like them to dig deeper into the typhoon literature (just a

bit - take a look at the Gedzelman and Lawrence papers) and see if they can come up with a more satisfying explanation. The current discussion is largely disconnected from the larger literature on the hydrological cycle of tropical cyclones. Making those connections would render the paper much more interesting and relevant for the broader community of atmospheric scientists interested in using this kind of data.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 9267, 2009.