

## ***Interactive comment on “MUSICA MetOp/IASI {H<sub>2</sub>O, $\delta$ D} pair retrieval simulations for validating tropospheric moisture pathways in atmospheric models” by Matthias Schneider et al.***

### **Anonymous Referee #1**

Received and published: 18 November 2016

Schneider et al have developed a forward-model based approach to predicting the averaging kernels from a model's state, required in applying instrument operators for comparing modeled H<sub>2</sub>O-dD pairs to those from the MUSICA retrievals. This is a novel approach and is a nice advance beyond previous statistical-based approaches. The paper provides detailed diagnosis of the retrieval simulator performance, and I have no major technical concerns. I recommend publication as-is, subject to the following minor issues.

P2L26: suggest saying ‘nudged to meteorology or forced by prescribed ocean temperatures’

P3L16: throughout, please replace ‘exemplary’ with something else such as “case-

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study” or “example”

P6L7: here and elsewhere, suggest replacing ‘transport’ with ‘transfer’

P9L9: for example, replace “exemplary tropical ocean situation” with “tropical ocean case”

P9L10: replace “(compare Figs. 1 and 4)” with “(seen by comparing Figs. 1 & 2)”

P9L30: throughout, replace “well capture” or similar phrases with, in this case, “Our simulations capture the actual sensitivity of the remote sensing system reasonably well”

P11L3: Insert ‘The’ before ‘Best sensitivity’

P11L29: Omit “interesting”

P13L19: Can omit the “Such principle demonstration” sentence.

P14L5: In this section, please provide a few referenced sentences on interpretation of H2O-dD pairs with Rayleigh curves

P15L6: omit ‘:’ in ‘measured: data’

P17L20: Suggest omitting the phrase “In the meantime these complexities are well-understood, but’ and begin the sentence with ‘In order to. . .’

P17L29: similar to ‘well capture’, please rephrase to omit ‘well identifies’

P18L3: change ‘example’ to ‘examples’

P18: In section 6 (or even in the introduction), please consider a paragraph situating your approach in the context of other retrieval simulator efforts, namely for cloud simulators in general (e.g. Bodas-Salcedo, 2011, BAMS for COSP) and in the potential for your approach to be applied for other trace gases, extending, for example the statistical approach of Worden et al. (2013, AMT) for CO and O3. Your approach for H2O-dD pairs I think is relevant to the latter and it is worth making that point.

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P27: Suggest replacing second sentence in figure caption with 'The legends indicate the six...'

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