

## ***Interactive comment on “Neutral temperature and atmospheric water vapour retrieval from spectral fitting of auroral and airglow emissions” by Joshua M. Chadney and Daniel K. Whiter***

### **Anonymous Referee #2**

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The manuscript ‘Neutral temperature and atmospheric water vapour retrieval from spectral fitting of auroral and airglow emissions’ introduce new spectral fitting method which combined with temperature retrieval process allow to estimate some of the atmospheric quantities. The authors use HiTIES measurements of OH, o+ and N2 during aurora to retrieve neutral temperature and water vapour. The method is validated using Monte Carlo simulations. The paper is quite well written and provide important tool for upper atmospheric studies. The subject is well suited to Geoscientific Instrumentation, Methods and Data Systems. I advice the manuscript for publication after my concerns have been answered.

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The major problem for me is lack of retrieved parameters and their validation against other methods or measurements. I think it should be included in manuscript in order to show how well the method performs and what are the advantages.

Other comments: 1. It would be good to add short Description/justification of Monte Carlo method as well as the convergence assessment. Why did you use 50 000 synthetic spectra in Fig. 6-7 and 10000 in Fig 9 and 10? 2. The standard deviation in Fig 8 does not increases slightly with PWV but doubles. What is the reason behind it? 3. What is the reason behind the overestimation of means PWV values? 4. The abstract is too short, it should maybe advertise the result a bit more 5. Section 2 should be joined with section 3. 6. Conclusions are more like Discussion and conclusions. Some parts of the conclusion are simply results analysis and method description (example, Sec. 7: line 7-14.) 7. Line 22 ‘..past studies of OH temperatures have not been able to obtain measurements..’ - add reference

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