

## ***Interactive comment on “Water vapor total column measurements using the Elodie Archive at Observatoire de Haute Provence from 1994 to 2004” by A. Sarkissian and J. Slusser***

### **Anonymous Referee #2**

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### **General Comments:**

The paper describes an interesting new approach for the retrieval of water vapour from astronomical observations which could result in a new water vapour data set useful for atmospheric and climate studies.

However, the way how this is achieved is not clearly explained in the paper. More details should be given on the retrieval method, especially:

- In section 4 it is mentioned, that some kind of ‘absolute method’ is used, what does this mean? Does it mean that a forward model is used to simulate the

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measured spectra? Please explain.

- How are the measured spectra converted into optical thickness? Without this information it is not possible to understand how quantitative results are obtained.

I suggest to insert a dedicated section on the retrieval method before the section on cross sections, such that the reader knows what the cross sections are needed for.

Furthermore, the quality of the results can not be judged from the paper, because no comparison with independent data has been performed. In Section 5 some validation activities are mentioned, but no quantitative results are given,

Overall, the paper fits well within the scope of AMT but requires some revision (considering especially the points mentioned above) before it may be published.

### Specific Comments:

1. p. 1077, line 15ff:

‘Common techniques to retrieve water vapor on site have always been without telescope dependent instruments, for instance: surface humidity sensors or precipitable water vapor sensor...’

This only applies to in-situ measurements. There are of course remote sensing techniques which use a telescope. In fact, later on page 1078 some of them are mentioned. The section on p. 1077 is somehow in contradiction to this later paragraph.

2. p. 1078, line 11ff:

‘The existing network of these instruments, developed at the end of the last century for long term studies, will probably not grow to include more sites. The water vapor measurement presented here would continue to be available with regular updates to the scientific community.’

- As I understand, the Elodie data set is limited to the time interval 1994 to 2004. Why should it be more useful for long-term studies than the existing network of ground-based instruments (even if this will not grow, which can not be said at the moment)? What is meant with ‘regular updates’? If it is planned to apply the retrieval method to other astronomical data sets, this should be mentioned here.
3. p. 1083, line 10ff:  
A simple sine fit with only one frequency may not be sufficient for a trend analysis. Generation of anomalies by subtracting average monthly data should be considered, as well as autocorrelations. It should be noted that the derived trend is not significant (in a statistical sense), because it is not larger than two times its error.
  4. p. 1083, line 14ff:  
It is unclear what is meant with this paragraph. The first sentence seems to aim at the non-linearity correction which is discussed later, but what is meant with ‘the improvement of the building of water vapor cross-section’? The meaning of the second sentence is absolutely unclear. Does it mean that climatological quantities are used to estimate unknown atmospheric parameters? If yes, which ones and which climatology?
  5. p. 1084, line 2ff:  
The paragraph about validation is unclear. There seems to be a mix-up between the terms ‘validation’ (which is a comparison with independent data) and ‘calibration’ (which is the procedure to convert measurement data to physical quantities). How are lidar profiles calibrated with water vapour column data, what is the role of radio sondes and which quantities have been compared? Some quantitative validation results should be given (see also general comments).
  6. p. 1085, Appendix A:  
The difference between a workflow and a pipeline is unclear. On line 7 it is stated

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that ‘The simplest workflow ... is a series of tasks, usually called a pipeline.’. In the next sentences it is stated ‘A pipeline has its own input and output parameters, .... This is the main difference from the workflow.’ Now, is a pipeline a special form of workflow or something different?

7. p. 1090, Table 2:  
Please explain the term  $\Delta$ .
8. p. 1093, Fig. 3:  
Please mark the water vapour triplets in the spectrum (e.g. by a circle or an arrow); they are difficult to identify.

### Technical Corrections:

1. Please harmonise spelling w.r.t. American or British English. Especially, write either ‘water vapour’ or ‘water vapor’ in the paper.
2. p. 1077, line 4:  
Earths  $\rightarrow$  Earth’s
3. p. 1077, line 6:  
Terrestrial  $\rightarrow$  terrestrial
4. p. 1083, line 2:  
Results of spectral  $\rightarrow$  Results of the spectral
5. p. 1083, line 12:  
removing sine  $\rightarrow$  removing the sine
6. p. 1083, line 20:  
depending of  $\rightarrow$  depending on

7. p. 1085, line 4:  
A the virtual observatory is comprised of workflow → The virtual observatory is  
comprised of a workflow
8. p. 1083 and Table 1:  
theoretical → theoretical
9. p. 1091, Fig. 1 caption:  
Remove brackets around citations.
10. p. 1094, Fig. 4 caption:  
minimizing residual → minimizing the residual

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