

## ***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***

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Replies to General comments

1- Description of the absolute method

To be added in chapter 4 p. 1081 | 17 after " had to be developed for Elodie."

"We call here our analysis an absolute method compared to the DOAS one because we compensate water vapor signature in the observed spectra adding a negative absorption (i.e. equivalent to an emission) at intensity levels instead of doing it at differential intensity levels,

$(I_{\text{observed}}) \times \exp(+\tau(\text{H}_2\text{O})) = I_0$  where  $I_{\text{observed}}$  is the intensity (in counts) of the spectrum observed,  $I_0$  is the spectrum calculated without water vapor signature and  $+\tau(\text{H}_2\text{O})$  is the calculated water vapor optical thickness in the observed spectrum.

2- Conversion of  $I$  into  $\tau$  is already included in previous point 1

3- Chapter 4 first 2 paras from p1081 | 4 to p1081 | 20 is moved to a new chapter 2 called "Overview of the spectral Analysis". The rest of the chapter stays as it is.

4 Quantitative results for validation: see specific comments 5

Replies to Specific comments

1 The para 3 of the introduction is about astrophysical telescopes only. to be added after p1077 line 16 ... to retrieve water vapor on site "for astrophysical observations"

2 To be added in the introduction,

p 1076 line 20 ... (Moultaka et al., 2004). Note that the Sophie spectrograph replaced the Elodie Spectrograph in July 2005 but the Sophie archive was not open when we started this work.

p 1076 | 21 ... in the Elodie Archive (the ELODIE archive presently contains 34992 spectra, among which 18 000 were public when we started this work)

p1084 in the conclusion line 25 ... and pressure and to extend this analysis to the full Elodie Archive and to the Sophie Archive.

p 1078 , line 13 ... to be available with regular updates to the scientific community. changed to

... to be available on-line at Tellodie web service (2009) with regular updates (the Elodie full Archive, the Sophie Archive, etc...) to the scientific community.

3

A negative trend of  $-0.44 \pm 0.24 \times 10^{22} \text{ molecule cm}^{-2}$  per 10

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years is obtained after removing the sine fit.

is replaced by

A negative slope of  $-0.44 \pm 0.24 \times 10^{22}$  molecule  $\text{cm}^{-2}$  per 10 years is obtained after removing the sine fit, indicating a not significant trend because it is larger than two times its error.

Same in caption of fig 7

4 The first point for the discussion concerns the improvement of the building of water vapor cross-section, and its effect on error budget. Then, because most of the atmospheric parameters are not known, the retrieval process can be made using climatological atmospheric variability.

is replaced by

The first point for the discussion concerns the improvement of the building of water vapor cross-section, and its effect on error budget. The variations of the air temperature and pressure, and the wind direction with the altitude affects the spectrum of the water vapor absorption cross-section. Then the retrieval process could be improved, decreasing errors in calculations. But because most of the atmospheric parameters are not known, the retrieval process should be made using climatological atmospheric variability profiles. This is not done presently in our analysis.

5 p1084 line 5

The calibration of the lidar gives by few percent better agreement with our measurements than with radiosondes, but we need more co-located and simultaneous observations for validation.

is replaced by

The calibration procedure uses the variance between radiosonde profile and lidar profiles between 2 and 8 km calibrated with our total column values on available days of

lidar observation. This variance varies from 0.4 at 2 km to nearly 1 at 5 km, decreasing to 0.6 at 8 km is due to the natural time variability of atmospheric water vapor. The decrease of this variance by few percent observed when using Elodie water vapor data gives information on the validity of our measurements, but we need more co-located and simultaneous observations for better validation.

6

A pipeline has its own input and output parameters, is replaced by

A pipeline has its own local and fixed input and output parameters,

7 Table2 Delta -> Step

8 agreed

Replies to Technical corrections: all agreed

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