Atmos. Meas. Tech. Discuss., 2, C36–C38, 2009
www.atmos-meas-tech-discuss.net/2/C36/2009/

Atmospheric Measurement Techniques Discussions

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 #1

Received and published: 16 April 2009

Summary:

The study contains many valuable informations on the use of astronomical spectra for long-term monitoring of atmospheric composition. Thus I recommend a publication after some minor corrections and extensions.

1) Trend calculation:

The discussion of the retrieved trend of water vapour column in Section 5 is too short. I know that the trend analysis is not the main topic of the article but the article would be better if the authors provide some more details. The retrieved trend is about -10 percent per decade which is quite unexpected since other studies derived a positive

trend of 4% per decade in Europe (e.g., Morland et al., Atmos. Chem. Phys. Discuss., 9, 7239-7271, 2009).

Looking at Figure 7, the negative trend might be mainly introduced by the high summer values in 1994 and 1995. Are the 3 extreme values reliable? Why is the sampling of the series so poor? Trend calculation should be performed for an integer number of years since water vapour has a strong annual oscillation with a variable phase. Further it is recommended to derive in addition "seasonal trends" (e.g., Morland et al., Atmos. Chem. Phys. Discuss., 9, 7239-7271, 2009). Before refinement of the raw data analysis, the trend analysis should be extended and improved in order to understand if the errors/uncertainties arise from the trend analysis or from the raw data analysis.

The authors mention that they like to validate their time series with correlative data from other instruments. This might be too work-intensive for the present study. However the authors should screen other trend studies of water vapour column and write one paragraph about these studies.

2) Minor suggestions:

p.1077, l.2 theme instead of thema l.6 terrestrial gases and aerosols. l.9 ...atmospheric water vapor from IR astronomical spectra l.14 "involvement in stratospheric ozone equilibrium in the troposphere" What does it mean?

p.1078, l.5 Using Global Positioning System (GPS) and its signal time delay due to the atmosphere l.15 ... building the spectrum of the water vapor absorption cross-section ... (in the begin, I wondered how you build a cross-section) l. 19 similar to line 15

p. 1080,l.3 ...cross-section is in Sect. 6.

p.1081, l.15 I cannot understand why the increased path length is the main reason for DOAS? I think the main advantage is the "relative measurement" which you mention later. I would delete 'because' in line 15 and would make two separate sentences.

l.21 cyclic fit procedures ? Maybe you give more informations about this central point

of your data analysis. Or can you give a reference?

p. 1082 l.6 line-of-sight column of water vapor equation 1 you should write somewhere that sigma is the water vapor cross-section

p.1083 line 13 please provide the trends also in "percent per decade" l.18 I don't understand '5\nu range' (However since saturation seems to be a problem, this would be a further argument for calculation of seasonal trends.)

p.1085, l.4 A virtual observatory ... p.1093 ...triplet at 592.5 nm.

Interactive comment on Atmos. Meas. Tech. Discuss., 2, 1075, 2009.