

***Interactive comment on* “Evaluation of the hydrological cycle of MATCH driven by NCEP reanalysis data: comparison with GOME water vapor field measurements” by R. Lang and M. G. Lawrence**

Anonymous Referee #3

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The paper shows a comparison between global observations (from GOME) and model results (MATCH) of the total H₂O column and precipitation. In addition to this central comparison also other observations (SSM/I, NVAP) and models (NRA) are included. The presented study is a very important contribution to the understanding of the hydrological cycle and its implementation into atmospheric models. It is appropriate to ACP and should be published after minor corrections.

General comments:

1) The paper could be better structured and possibly also shortened. The reader can get confused by the description of the different input data sets (4 or 5 observational data sets and 2 or 3 model results). This potential problem is further increased by the use of so many acronyms. I suggest the following: a) It should be stated more clearly in the introduction which data sets are used and which ones are actually compared to each other. Maybe a Table including all acronyms would be helpful. b) Much of the information in the individual sections on the different data sets could be omitted. Alternatively, it might be put in an appendix. I also think that the many repetitions in sections 6, 7, and 8 make it exhausting for the reader to identify the main message of the paper. I recommend to shorten these parts.

2) It would be very good to explain more clearly in the introduction what differences between MATCH and NRA exist and which are the expected consequences (at least I was confused here).

3) The comparisons are performed for 1 year and/or three year averages. What was the reason for this selection? How strongly are the finding influenced by ENSO?

Detailed comments:

Abstract: Repetition of 'too low WV residence time' in line 21 and 28 should be avoided.

Page 7920, line 12: It would be nice to add a reference on the details of the implementation of the hydrological cycle in MATCH.

Page 7921, line 14 and other parts of the text. The standard GOME operation ended in Summer 2003. The statement on the period of the GOME data record should include this information.

Page 7922, line 9: Why are SCIAMACHY and OMI not mentioned here?

Page 7924, line 1: There are many more important references on tropospheric observations from GOME from different groups.

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Page 7924, line 2: The GOME channel 3, where the H₂O absorptions are analysed is subject to an improper polarization correction. Can the authors quantify the resulting uncertainties? Especially over clouds the polarization of the observed light can differ significantly from that over clear ground pixels.

Page 7925: It should be already mentioned in section 2.2 that ignoring cloudy observations affects the sampling statistics.

Page 7932, line 3: Please explain 'diagnosed mode'

Page 7937, line 13 and Fig. 6: It seems to me that especially 'along the ITCZ' the error is larger than 5%

Page 7937, line 22 and several parts later in the text: Could the higher values over the Sahel be a result of the strongly increased ground albedo?

Fig. 9, 10: For the difference plots the information on the selected month is missing.

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 7917, 2004.

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