

Interactive comment on “Retrieval of atmospheric optical parameters from ground-based sun-photometer measurements for Zanjan, Iran” by A. Bayat et al.

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The authors would like to express their gratitude to the referee for valuable comments and questions. We have tried to answer all the questions and apply all the comments into the manuscript.

All the changes have been addressed by the page number, P, the column (C1 for left and C2 for right), and the line number, L.

Question. The manuscript reports results of Cimel sun photometer measurements of aerosol optical depth and column water vapor in Zanjan, Northwestern
C2005

Iran. The subject of the manuscript is appropriate to AMT but I am not sure that the paper is suitable for the Special Issue on Tropospheric Profiling. The paper contains some significant original material that is not available in the AERONET database. The results presented in the paper are interesting. The methodology of calculating the aerosol and water vapor parameters is based on well established procedures. However, critical information about the data quality assurance is missing.

This work has been presented in "8th International Symposium on Tropospheric Profiling, ISTP 2009" conference. There was a suggestion by the organizing committee of the conference to publish the works presented in there in an especial issue of AMT. This is the reason that the authors submitted this work for publication in that issue of AMT. We also tried to add all the missing information to the manuscript as it will come in the following.

Answer to the questions and comments:

Question 1. Calibration of a Cimel instrument is crucial for the quality of data. Basically, the calibration components of the instruments should calibrate once a year. The authors do not provide information about when and how they arranged the calibration procedures.

The SPM was not registered in the AERONET for the mentioned period of data recording. Therefore the factory calibration has been used during the first year of the measurements and Langley plots have been used to calibrate the instrument for the rest of the time period. The required data for plotting the Langley plots was recorded when the SPM had been installed on Dinava mountains (34.1° N, 50.7° E) at elevation of 3070 m above m.s.l. Dinava isolated from most local sources of aerosols and provides a very stable aerosol and irradiance regime in the mornings. These have been discussed in P2C1L18-L28, in the current version of the manuscript.

Question 2. The authors mention that the city of Zanjan has good weather condi-

tions for sun photometer measurements. However, even for those good weather conditions the deployment of an automatic instrument poses a problem of cloud screening. The automatic Cimel sun photometer acquires data regardless of sky conditions. Unfortunately, the authors say nothing about the procedure of cloud screening the acquired data.

In this version of the manuscript we used the standard cloud-screening algorithm that has been introduced by Smirnov et al. 2000. AERONET also is using the same algorithm for this purpose. These are discussed in P2C2L23-L24.

Applying the algorithm, Figures 2, 3, 4, 5, 6 and Table 2 have changed in this version. Figure 1 that is added to the manuscript depicts a comparison between the number of raw and cloud screened data for the whole data set.

Question 3. According to Eq. 2 of the paper, ozone (and possible nitrogen dioxide) absorption is not accounted for while calculating the aerosol optical depth. This introduces a bias in the retrieved optical depth that is particularly important for low aerosol loadings.

Thank you very much for this comment. In the current version the ozone optical depths are subtracted from the measured optical depths to retrieve more exact AODs. The comment has been applied to Eq. 2 and discussed in P2C2L15-L19. Applying the ozone effects, Figures 5, 6 and Table 2 have changed in this version.

Since NO_2 has a very small effect on the atmospheric optical depth it does not take in account in the calculations. The comment has been discussed in P2C2L20-L21.

Interactive comment on Atmos. Meas. Tech. Discuss., 3, 2633, 2010.