کارگاه های آموزشی مرکز اطلاعات علمی جهاد دانشگاهی

کارگاه آنلاین آشنایی با پایگاه های اطلاعات علمی
بین المللی و
ترفند های جستجو

کارگاه آنلاین
روش تحقیق و مقاله نویسی علوم انسانی

کارگاه آنلاین
پرپوزال نویسی و پایان نامه نویسی

University of Tabriz

Journal of Civil and Environmental Engineering
Volume 47 (2017), Issue 1 (Spring), 21-33.

EXTENDED ABSTRACT

Initial Assessment of Cloud and Aerosol Discrimination over the Eastern Regions of Iran Using CALIOP Satellite Data

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Received: 12 March 2016**; Accepted:** 08 October 2016

Keywords:
Cloud, Aerosol, East Part of Iran, CAD, CALIOP

1. Introduction

Clouds and aerosols discrimination and also its monitoring always is a big part of human concerns including the modeling of climate systems. Issues related to air pollution and aerosols are one of the major problems of the environment for the residents of the world and the Middle East in recent years. Specific geographical and political conditions which are prevailed in the Middle East, being neighbored with dry and desert countries, also being located in the dust belt path (Liu, Vaughan et al. 2009), increases the necessity of monitoring and discrimination of clouds and aerosols for countries in this region, especially Iran. Aerosols are clearly and explicitly can have an impact on global emission rate and significantly limits the human's understanding of climate systems and its potential for global climate change which is caused by the absorption, scattering and of course in the sunlight passes through the atmosphere features to the Earth's surface.

2. Methodology

The mean extinction coefficient and its relative uncertainty, shows the importance of the quality flags that are built into the profile products during the interpreting the CALIPSO data. Vertical profiles of mean extinction coefficient and relative uncertainty were generated from the CALIPSO level two profile products. In order to estimate the amount of aerosols, particles extinction and its uncertainty using the quality flags of relevant CALIOP Level 2 data product, for the purpose of reveal the quality of the results has been used in the process of discrimination (Liu, Omar et al. 2005, Liu, Vaughan et al. 2009). Fig. 1 shows the mean extinction coefficient (Fig. 1a and c) and extinction coefficient relative uncertainty (Fig. 1b and d) profiles for the unscreened and screened cases over Iran on August 8, 2009 and July 28, 2013.

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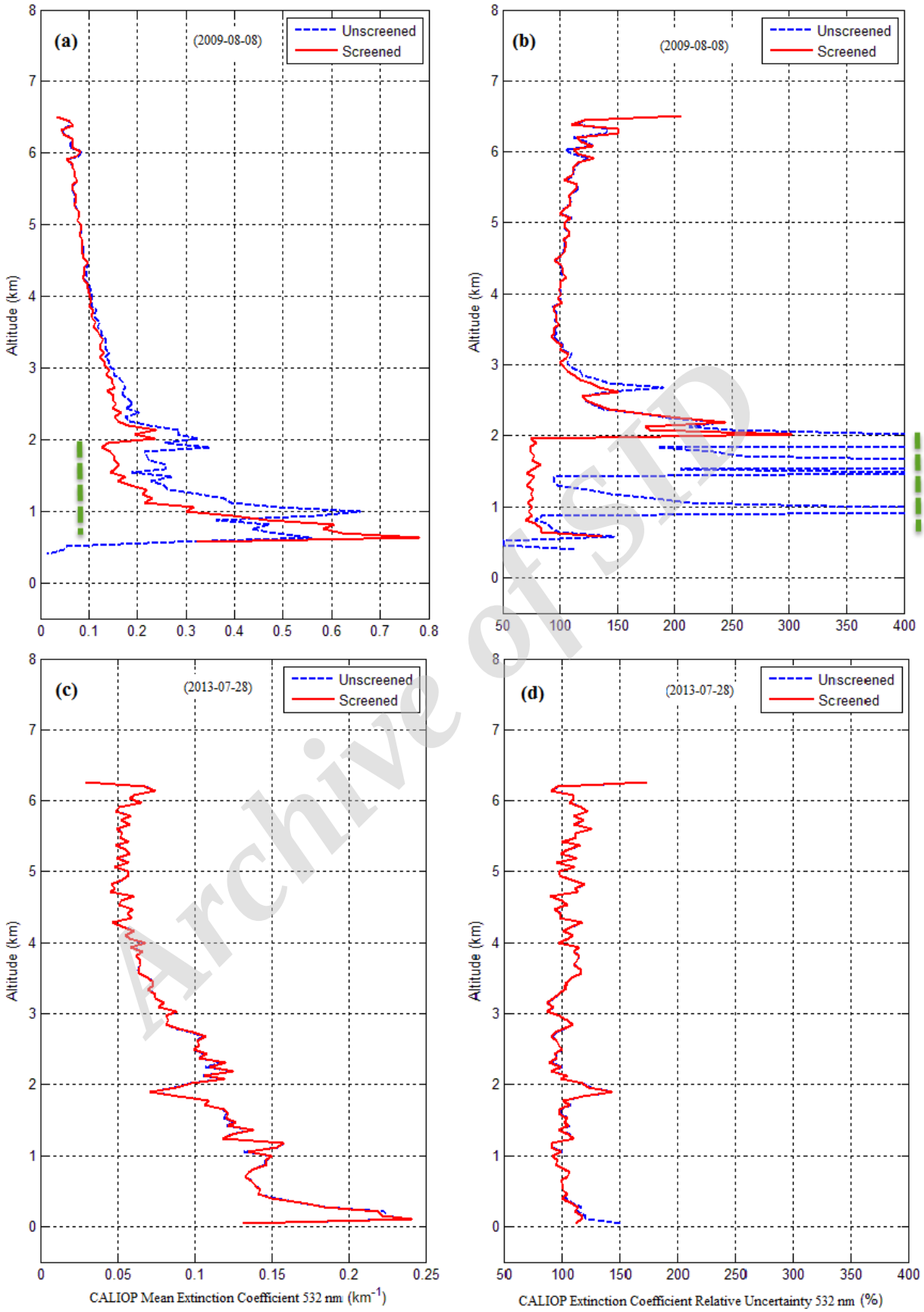

Fig. 1. (a and c) The mean extinction coefficient as a function of altitude and (bandd) the relative extinction coefficient uncertainty in percent for the unscreened and screened cases over Iran on August 8, 2009 and July 28, 2013.

3. Results and discussion

Classification and discrimination of particles programming code in IDL and MATLAB on the CALIOP 5.0 km VFM carried out with respect to the data resolution which are mentioned in Trebbin (2013) and Vaughan et al (2005) investigations. The aerosol discrimination algorithm distinguishes cloud scenes from aerosol scenes by interpreting of the individual bits and the group of bits, which is provided in PC-SCI-503 CALIPSO data products catalog. Meanwhile, the cloud-phase sub-algorithm used the interpretation of the feature-type bits as well as the cloud top and bottom temperatures. The results of the feature classification on August 8, 2009 and July 28, 2013 over the eastern part of Iran is provided in Table 1.

Table 1. The results of the features classification on August 8, 2009 and July 28, 2013 over the eastern part of Iran.

Total No	08-08-2009	07-28-2013
Clear Air	29.75%	31.15%
Cloud	4.80%	4.20%
Aerosol	46.15%	48.00%
Surface	4.21%	5.44%
Subsurface	13.61%	11.17%
No Signal	1.47%	0.04%

4. Conclusions

This paper presents a preliminary assessment of the CALIOP data to discriminate the clouds, aerosols and particulates for two critical days of 2009 and 2013. The results of the initial assessment through vertical profiles of the mean extinction coefficients and its uncertainties, features discriminations (clouds and aerosols) and classification using CALIOP 5 km VFM data products related to eastern regions of Iran for August 8, 2009 and July 28, 2013 were discussed. In general, cloud and aerosol discrimination algorithm performance was appropriate and the results indicate high rates of the success. Various scenarios in conjunction with the misclassification of the cloud and aerosol discrimination algorithm were investigated.

As a result, it was found that the most common type of aerosol layers included the dust and smoke were misclassified, which are misclassified with less frequency. The mean attenuated backscatter and mean attenuated total color ratio of this layer type are both relatively large, which is similar to what would be expected for cloud at the same altitude. This feature can be occasionally misclassified as a cloud. However, smoke layers are misclassified as cloud less frequently than dust layers are. Although the total amounts of these features are included very small percentage of the total data layers. Overall, the results show that the rate of aerosol subtype for the August 8, 2009, more than July 28, 2013, which confirm the results of the extinction coefficient and its uncertainties profiles and comparison of the relative humidity, temperature, and their inversion.

5. References

Liu, Z., A. Omar, Y. Hu, M. Vaughan, D. Winker, L. Poole and T. Kovacs (2005). CALIOP algorithm theoretical basis document, part 3: Scene classification algorithms. NASA-CNES document PC-SCI-203.

Liu, Z., M. Vaughan, D. Winker, C. Kittaka, B. Getzewich, R. Kuehn, A. Omar, K. Powell, C. Trepte and C. Hostetler (2009). "The CALIPSO lidar cloud and aerosol discrimination: Version 2 algorithm and initial assessment of performance." Journal of Atmospheric and Oceanic Technology 26(7): 1198-1213.

Trebbin, N. (2013). Cloud Statistics from Calipso Lidar Data for the Performance Assessment of a Methane Space Lidar, Technische Universität München.

Vaughan, M., D. M. Winker and K. Powell (2005). "CALIOP algorithm theoretical basis document, part 2: Feature detection and layer properties algorithms." Rep. PC-SCI 202: 87.

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