

## ***Interactive comment on “9-year spatial and temporal evolution of desert dust aerosols over South-East Asia as revealed by CALIOP” by Emmanouil Proestakis et al.***

### **Anonymous Referee #1**

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Comments to the Author (General comments) In this paper, the spatial and temporal evolution of desert dust aerosols over South-East Asia has been systematically investigated based on CALIPSO since it can provide much information about aerosols. However, I'm interesting to see this paper published before revised as below suggestion. (Specific comments) 1. Page1, Line 1, "Dust aerosols have a significant role on climate through the direct radiative effect of absorption and scattering of solar and thermal terrestrial radiation". I think you should add the reference: ĩAñ Huang J P , Fu Q , Su J , T ang Q , Minnis P , Hu Y , Y i Y , Zhao Q . 2009 . T aklimakan dust aerosol radiative heating derived from CALIPSO observations using the Fu - Liou radiation model with CERES constraints. Atmos Chem Phys , 9: 401 1 –4021 ĩAñ Chen,

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S., J Huang, J. Li, R. Jia, N. Jiang, L. Kang, X. Ma, T. Xie, Comparison of dust emission, transport, and deposition between the Taklimakan Desert and Gobi Desert from 2007 to 2011, 2017, Science China Earth Sciences, 60:1-1, doi:1.01007/s11430-016-9051-0. 2. In the paragraph 1, the semi-effect of dust should be also added. The effect can be seen from the references: ĩAñ Huang J P , Lin B , Minnis P , W ang T , W ang X , Hu Y , Y i Y , A yers J K . 2006a . Satellite - based assessment of possible dust aerosols semi - direct effect on cloud water path over East Asia. Geophys Res Lett , 33:L19802 3. Line10, "airborne mineral dust is considered a significant atmospheric aerosol contributor", should be corrected into ". . .considered as a . . ." 4. Page2, Line29-32," Although passive satellite sensors provide information on the column properties of aerosols with adequate spatial and temporal resolution, they are bound to certain limitations, the major limitation being the lack of information on the three- 30 dimensional distribution (vertical profile) of aerosols in the atmosphere, an important information for the assessment of the aerosols radiative forcing on climate as well as their contribution as IN and CCN (IPCC 2013)." This sentence is too long too understand it means, please rewrite it. 5. Page4, line10 ,I think you should delete this words :“n order to discriminate the detected atmospheric features types into subtypes”, because we have known the goal of the classification algorithm before this sentence. 6. Page4, line 14, the “20x50 grid resolution” should be corrected into “2° x 5°”. 7. Page4, line17, “10x10” need to be corrected. the whole paper should be checked again 8. Page6, line18, since you have said that the daytime minimum and nighttime minimum, what dose the “minimum detectable AOD of 0.005” mean? 9. Page4, Line24, what dose the “SAMUM” mean? Please write the full name. 10. Page4, line51, in this paragraph you introduce the methods of distinguish pure dust and non dust. However, I still don't know the differences of the CALIPSO product of dust and polluted dust with the pure dust and non dust. Since we can directly derive the dust extinction coefficient and profiles from the product, why don't you use it? And what about merits of the method to select the pure dust? What's the differences of the pure dust and dust products directly from CALIPSO L2? 11. Page5,line 30, please check this sentence of “The seasonal zonal

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distribution of the climatological and conditional dust extinction coefficient ( $Mm^{-1}$ ). If it's right to explain it. 12. Page5, line30, I want to know whether the climatological dust extinction coefficient means the aerosol extinction without dust extinction coefficient since you write this sentence "This is accomplished by setting the dust extinction coefficient value of  $0 km^{-1}$ , for observations with non-dust aerosols". And the conditional dust product only has the dust extinction coefficient. 13. Page7, line33, what does the "N. China" mean? 14. Page8, line11, from the figure 3 ,the differences of dust frequency in the four seasons are not clearly, and the minimum in Fig. 3a is not obvious. 15. Page8,line39, please explain the pattern of the dust transport since you said "however, the pattern reverses (Fig. 3i)"

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