

Review comment on “Climatology in Asian dust activation and transport based on MISR satellite observations and trajectory analysis” (<https://doi.org/10.5194/acp-2018-857>)

General comments:

Yu et al. describe long-range transport of Asian dust with satellite observations and forward trajectories. The MINX tool was used to retrieve dust injection heights at the Gobi and Taklamakan deserts from measurements of the MISR instrument on board the Terra satellite. The obtained heights were consequently used to initiate HYSPLIT forward-trajectories, which were then used to describe the trans-Pacific dust transport and its seasonal and spatial variation. Such long-term data sets are useful for statistical analyses of dust layer heights and dust transport, needed for radiative-transfer calculations and aerosol-cloud interaction studies. This is of high importance, especially for regions with sparse coverage of ground-based observations.

The manuscript is well written and I suggest publication in ACP after clarification of a few points (see specific comments) and some minor technical corrections.

Specific comments:

Concerning the temporal resolution of the MISR observations (crossing of the study region every 6-7 days), I have some questions about the dust events and plume data points: For example for the 2-3 years of analyzed data in the Gobi desert: Let us assume, 3 years, 1095 days. Now we have an observation every 6.5 days, so we have 168 observations. At 2251 dust events, this means 13 dust events per observation. How do you separate those dust events, source regions (intra-desert), and finally injection heights?

Concerning injection heights: You state the method works independently of background aerosol and thin cirrus, but how do you deal with complex multilayer structures of (possibly) optically very dense dust layers?

Concerning background aerosol: Do you consider or observe high-altitude layers of (polluted) dust probably of western origin as described for example in Tanaka et al., 2005 (<https://doi.org/10.1016/j.atmosenv.2005.03.034>), Mikami et al., 2006 (<https://doi.org/10.1016/j.gloplacha.2006.03.001>), and Hofer et al., 2017 (<https://doi.org/10.5194/acp-17-14559-2017>)

Concerning the difference in particle sizes of Gobi and Taklamakan dust: You mention this difference for soil (Sun et al., 2013), and that it probably has implications on the potential far range transport of Gobi dust compared to Taklamakan dust. However, what about the actual mobilization and air-borne dust if coarser particles were mobilized, as you state, at higher winds in Gobi? It could compensate to a certain degree the gravitational settling (for example, Gasteiger et al., 2017 (<https://www.atmos-chem-phys.net/17/297/2017/>)) try to explain the long-range transport (westward, though) of very coarse dust particles).

Technical corrections (minor formatting and typing errors):

Page 2 Line 18: In general, locked space between Fig. and number.

Page 2 Line 20: Tian Shan Mountain -> Tian Shan Mountains or Tian Shan Mountain system

Page 4 Line 27/26: leave “elevation” out or at least write ASL behind the values.

Page 6 Line 8: 15 m (line break) s⁻¹ -> use locked spaces ~ before (and within) units

Page 6 Line 34: p's -> p-values

Page 9 Line 2: "the wettest year in an land surface model ensemble simulation" -> "an" is wrong here, "any" or "a"?

Page 10 Line 34: Yu et al., 2017a, 2017b -> Yu et al. 2017a,b

Page 11 Line 21 : "Geosci. Remote Sensing, IEEE Trans." -> Abbreviation and comma are wrong, use "IEEE Trans. Geosci. Remote Sens."

Page 11 Line 29: add number (16) to volume 8. Furthermore, the doi is only here formatted as a web link, I think this is nowadays standard at ACP, use it everywhere.

Page 12 Line 15: Pages are wrong. The article has a page-like number (L06824), it might need to be stated, I don't know, but it has to be consistent within the References.

Page 12 Line 18: The article has a page-like number (L19802).

Page 12 Line 21/22: The article has a page-like number (D23212).

Page 12 Line 27: doi is wrong, digit missing and with a space. The correct one is 10.1002/2014JD021796. Check capitalization in the title, "East Asian".

Page 12 Line 32: The article has a page-like number (114018)

Page 12 Line 33: Rest of the authors is missing. Huebert, Bates, Russel, etc.

Page 13 Line 3: Here it is not "J. Geophys. Res. Atmos.", it is only "J. Geophys. Res.". Furthermore is the number D20 and the page-like number 9000.

Page 13 Line 4/6: "Kahn, R. a." -> "Kahn, R. A.". Probably this conference contribution is cited better like this (as it is stated on the SPIE homepage): "Proc. SPIE 8177, Remote Sensing of Clouds and the Atmosphere XVI, 81770O (26 October 2011)" plus doi and year, of course. Check the page numbers.

Page 13 Line 8: The article has a page-like number (L03106)

Page 12 Line 21: Why "(April 2006)"?

Page 12 Line 32/33: This reference is insufficient. Do you mean this?

https://eosps.nasa.gov/sites/default/files/atbd/MISR_L3_CMV_ATBD.pdf Add the link and date of last access.

Page 14 Line 4: Journal is missing, it is: "Proc. SPIE 7089, Remote Sensing of Fire: Science and Application, 708909 (27 August 2008)"

Page 14 Line 5: "Kahn, R. a. and Dunst, B. a." -> "Kahn, R. A. and Dunst, B. A."

Page 14 Line 11: Take care of the special characters and capitalization. ACP provides a working bib file: AUTHOR = {Salvador, P. and Alonso-P\erez, S. and Pey, J. and Art\{i}\nano, B. and de Bustos, J. J. and Alastuey, A. and Querol, X.},

Page 14 Line 16/17: Check capitalization. The title is: NOAA's HYSPLIT Atmospheric Transport and Dispersion Modeling System.

Page 14 Line 20: The article has a page-like number (D05207). Again „Atmos.“ is not necessary in the older JGR articles (I think before 2013), maybe even wrong, I am confused. Either you put „Atmos.“ everywhere (each issue D = Atmospheres) or nowhere in these articles.

Page 14 Line 26: "Atmos.?" And in that specific article there are commas for digit grouping (strange, I know): 10,325-10,333. The same is in Huang et al., 2014, but there it is already correct. If you want to leave it out, you have to leave it out there as well.

Page 14 Line 29/30: Journal abbreviation is wrong, it should be "Geochem. Geophys. Geosyst."

Page 15 Line 4/5: "Atmos.?" and the article has a page-like number (D17311)

Page 15 Line 9: "Atmos.?" and the article has a page-like number (D12213).

Page 15 Line 11: "theglobe" -> "the globe".

Page 15 Line 23: "Tsay S. C." needs hyphen "Tsai S.-C." like in Wang et al., 2012b and the article has a page-like number (L08802).

Page 15 Line 27: Why (X)? Maybe (Part A).

Page 15 Line 29: Replace "n/a-n/a". The article has a page-like number (L05811).

Page 15 Line 33: "Atmos.?" and the article has a page-like number (D00H35).

Page 16 Line 1: Why (April 1998)?

Page 16 Line 4: Here "Atmos." would fit.

Page 16 Line 6: (May) probably not needed, pages neither, article number is 15333. Like in Yu et al. 2017a.

Page 16 Line 21: No pages, the article has a page-like number (L07603).

Page 16 Line 23: No pages, the article has a page-like number (L18815).

Page 16 Line 25: No pages, the article has a page-like number (2272).

Page 17 Figure 1: "(%sample maximum)" -> "(% sample maximum)" or "(% of sample maximum)"

Page 17 Figure 2: Add ASL behind elevation values.

Page 18 Figure 4: The subfigures d) e) f) slightly overlap their titles. In general, the figures need a bit a higher dpi for final publication.

Page 24 Figure 11: Caption, 10th, 25th etc. not superscript as in the caption of Fig. 2 and 4. Please be consistent.

Supplement Figure S3: Add ASL behind elevation values. And full stop or colon behind bold figure numbers in general.