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Atmospheric Measurement Techniques Discussions

Interactive comment on "Characterization and application of artificial light sources for nighttime aerosol optical depth retrievals using the VIIRS Day/Night Band" *by* Jianglong Zhang et al.

Anonymous Referee #2

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General comments:

The paper " Characterization and application of artificial light sources for nighttime aerosol optical depth retrievals using the VIIRS Day/Night Band" deals with opportunities to detect and characterize aerosol at night by measuring visible radiance from city lights in VIIRS Day-Night band. The topic meets the aim and scopes of the journal. The general structure of the paper is good.

The figures and its captions are of good quality.

The motivation and background are well reasoned in the introduction. It lists many relevant related papers. The presented research introduces novel concepts to use

the relatively new DNB channel on VIIRS to use visible radiance during the night for aerosol characterization. This, if successful, could close the nighttime gap of aerosol observations by satellite-based retrievals.

Section 2.2 describes the theoretical approach. The aerosol optical depth retrieval is based on a comparison of spatial standard deviation under a cloud and aerosol-free conditions to the measured spatial standard deviation. For practical results, the authors describe filtering and data selection processes in a sufficient way.

The result section shows that this approach has some skill, but also still major limitations. The authors discuss this in the concluding chapter and give suggestions for follow-up research.

I recommend minor revisions for the points specified in the next section.

Specific comments

Line 172: I can't find the full list of the cities in an attachment.

Line 305: "On each night and for each light source, the averaged radiance, its standard deviation.": What is here a light source? Can't be one individual DNB pixel. Is it a city (e.g. all green pixels in Fig.3b for Iowa City?

Line 305: Define lunar fraction.

Fig.11 and Equation 5: How can the transmission correction factor k as defined in Eq.5 be bigger than 1, as shown in Fig.11?

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