

## ***Interactive comment on “Optical thickness matching algorithm applied to the case study of an accidental fire smoke plume over the Paris area with N<sub>2</sub>-Raman lidar” by Xiaoxia Shang et al.***

### **Anonymous Referee #1**

Received and published: 11 October 2018

#### General:

The manuscript reports lidar observations of optical properties of fresh fire smoke. Such observations are rare, if not absent in the literature. Usually, observations of aged smoke after long-range transport are presented in papers.

The paper is, to my opinion, very lengthy (section 3), like a review article on the methodology used. Section 4 is very interesting, but many figures are not needed when focusing on the Paris fire event. Minor revisions are required.

#### Details:

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Abstract, L14-15: I would emphasize that you observed fresh smoke (only a few hours after emission).

L17: The depolarization ratio is not only small when particles are spherical, also when they are very small, as shortly after fire emission events.

P1, L28: I would use key words such as 'young smoke' and 'freshly emitted' in the introduction.

P4, L11, and Table 1: Is the initial signal resolution really 0.75m? Maybe 7.5m is correct!

Section 3, very lengths, nothing new in sections 3.1, 3.2, 3.3, 3.3.1, 3.3.2, 3.3.3. Do we need all this?

P20, L31: CALIOP dust PDR is 30%! CALIOP is measuring at 532 nm, you are measuring at 355nm, and the PDR is then 25%, see the SAMUM and SALTRACE papers of Gross et al. (in Tellus, 2011 and in ACP, 2015). Illingworth is focusing on 355 nm (wavelength of the EarthCARE lidar).

P21: Do we need Figs. 11 and 12 in the paper?

P22: Fig13? Do we need that?

The shorter the paper (and compact) the more interesting and attracting.

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Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2018-260, 2018.

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