

Events of intense aerosol pollution over Paris Area during winter 2016-2017 observed by Raman lidar

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The compact 355 nm Lidar for Automatic Atmospheric Surveys Using Raman Scattering (LAASURS) has been deployed close to the Paris center (Notre Dame Cathedral), for a long period between the end of September 2016 and the end of January 2017. Our main goal was the study of the temporal evolution of aerosol optical properties in both the atmospheric boundary layer and the low free troposphere. Thanks to the system features of the used lidar, a special emphasis has been put on the nocturnal layer, which remains very difficult to sample during winter time due to its low height. From these measurements, two major pollution events stand out. The first one on 1 December 2016 showed a regional extent (about 250 km of diameter centered on Paris). The second one was generalized to the entire Western Europe and occurred on 21 January 2017. In each case, the normative alert threshold value of $80 \mu\text{g.m}^{-3}$ on PM10 (mass concentration of particles with aerodynamic diameter less than $10 \mu\text{m}$) was exceeded (with respect to the directive 2008/50 / EC of 21 May 2008, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:152:0001:0044:en:PDF>). The PM10 background values averaged over Paris Area by AirParif (www.airparif.fr) were $82 \pm 20 \mu\text{g.m}^{-3}$ in December and $79 \pm 11 \mu\text{g.m}^{-3}$ in January, respectively. Both were associated with a very low lidar-derived boundary layer height, close to $400 \pm 100 \text{ m}$. Lidar observations associated with ground-based and spaceborne measurements (i.e. CALIOP path at 0200 UTC on 21 January) will be presented and discussed considering the decadal statistic of winter pollution events over the Paris Area.