



## **Mobile observing system for aerosol spatial and vertical distribution mapping using on-road measurements**

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Currently, independent ground-based observations of aerosols are performed globally, some of them grouped in networks, offering capabilities for long-term monitoring of aerosol properties and evaluation of trends. Nevertheless, the aerosol spatial variability and extent of aerosol events cannot be assessed only from point measurements and the potential of deploying instruments for field observations is not sufficiently explored. In this work, the capabilities of a compact mobile system to be easily deployed for field measurements and studies of aerosol variability are investigated. The mobile system described here is an instrumented commercial minivan, equipped with a CIMEL micro-pulse LiDAR, a mobile sunphotometer, a GRIMM mini-WRAS aerosol spectrometer, a GPS system and a meteorological station. The photometer tracks the sun during the vehicle's motion while the micro-LIDAR sounds the atmosphere in the zenith direction. Spatial and vertical variability is studied using column integrated aerosol optical properties (AOD and Ångström Exponent) from mobile photometer, vertical profiles of extinction coefficient and mass concentration from the synergy of remote sensing measurements while variability at ground level is assessed using particle number and mass concentration derived from aerosol spectrometer measurements. This paper describes on-road measurements performed during a regional pollution event in January 2017 in North of France and an event of dust transport observed in July 2017 along the South-North axis of France. Further applications of the described mobile system, such as comparison with other LiDAR systems (ground-based and satellite-based) as well as assessment of forecast model outputs are discussed. The mobile system is the French contribution to ACTRIS Exploratory Mobile Platforms.