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Assessment of traffic emission factors from the synergy between in situ and lidar measurements

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Like many cities in the world, Paris is exposed to atmospheric traffic related pollution, which is a major health issue and has become an important research topic in atmospheric chemistry and climate change. In addition to surface network, intensive measurement campaigns allow addressing specific questions. The LIdar pour la Surveillance de l'AIR (LISAIR) campaign was dedicated to the combined study of pollutants variability and dynamics. It took place on the City Hall Place of Paris in May 2005. In situ-measurements of pollutants included gas phase and particulate phase compounds. A home-made LIDAR system has also been operated on specific days allowing the determination of the planetary boundary layer (PBL) top height and its diurnal variability. In Paris, CO is largely dominated by traffic emissions and presents a typical diurnal cycle, with decreasing values during the night and two daily maxima attributed to enhanced emissions during the rush hours. Variability of the PBL height has to be taken into account for emission factor estimations. Compounds showing similar diurnal cycles as CO during the LISAIR campaign were selected as being mainly influenced by traffic emissions. Emission factors (EF) of these selected pollutants could be estimated by using the synergy between lidar and in situ measurements for compounds of chemical lifetimes higher than the dynamic lifetime of the convective cells in the urban PBL. For days with a low horizontal wind speed it was possible to assess the emission factors when both the traffic was well established and the PBL top height remained constant. We will present EF determined for selected aerosol and pollutant

gases and discuss these values by comparing them with the emission register.