Particle size distribution retrieval from measurements of industrial flare using an elastic lidar

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Abstract: The emission of pollutants in megacities and industrial areas can have strong impacts on climate and health. In recent years, there has been a growing concern about air emissions containing nanometric particles whose presence, together with volatile organic compounds, nitrogen oxides, and others, can result in the formation of a series of gaseous pollutants and aerosol. More accurate measurements of the concentration and size distribution of soot are important not only from an environmental point of view, but also to human health. The objective of this study was to determine the particle size distribution in the chimney of a refinery in Cubatao. For this, it used an approach based on inversion methods traditionally used to calculate parameters of atmospheric aerosols, the context of aerosols of industrial flares. The results were consistent with the scientific literature, it is possible to determine some parameters of size distribution of particles from an industrial torch flame using a system handling three wavelengths with an acceptable level of mismatch. A study by the Angstrom exponent was carried out in order to validate the inversion algorithm developed in this work. The results of this study showed that corroborate experimental data with the theoretical curves and thus the algorithm can be used as a tool for measuring atmospheric emissions from industrial torches. The development of this project will be an important step, not only from a technological point of view, but also rather as a resource to address emission problems that may arise in the future, among the measures aimed at controlling climate change.

Keywords: soot; elastic lidar; industrial emissions; inversion problem.

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