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Monitoring SO_2 and NO_2 emission rates from anthropogenic sources in Tenerife by mini-DOAS measurements in mobile-terrestrial position

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SO_2 is an atmospheric polullant of great concern and is used as the indicator for the larger group of gaseous sulfur oxides (SO_x). In other hands, the cities are exposed to NO_2 concentrations that often exceed the established air quality standards. In this study we measured SO_2 and NO_2 emission rates from two thermoelectric power plants and one refinery in Tenerife, Canary Islands, using a remote sensing technique in mobile-terrestrial position by means of a mini-DOAS (miniaturized Differential Optical Absorption Spectroscopy) instrument. The two instruments operating, in the UV and the visible wavelength region respectively, were used to calculate the vertical columns of SO_2 and NO_2 (ppm·m) above the measurement route. A total of 1500 measurements were performed in a cross-section of the plumes from the respective industrial areas during seven months, from June to December 2017. To calculate the flux of each pollutant we used the wind speed data from the nearest meteorological station to each power plant and the refinery. The average SO_2 and NO_2 fluxes were 250 $\pm$ 80 kg·h^{-1} and 103 $\pm$ 40 kg·h^{-1}for the thermoelectric power plant located in the southern part of Tenerife (municipality of Granadilla). For the thermoelectric power plant located in the municipality of Candelaria, the emission rates obtained were 126 $\pm$ 25 kg·h^{-1} and 28 $\pm$ 9 kg·h^{-1} respectively. The highest emission rates are measured in Granadilla due to the largest production of electricity on the island of Tenerife. With respect to the emissions of the refinery located in the capital of the island (Santa Cruz de Tenerife), during all the period of study, the detected concentrations were mostly under the limit of detection, but sometimes reached fluxes values up to 112 $\pm$ 21 kg·h^{-1} for SO_2 and 32 $\pm$ 12 kg·h^{-1} for NO_2. Such a low results in the refinery are explained because nowadays is not fully working; the emission estimated is related just to the maintenance of the fuels stored in its tanks.