



Particle size distribution and PM10 of volcanic ashes in Guadeloupe during the major eruption of Soufrière Hills in February 2010

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On the 11 February 2010, fifteen minutes after midday, an explosive eruption of Soufriere Hills volcano sent tephra over the neighbour Caribbean islands. The volcanic ashes benefit from the vertical wind distribution of the moment to reach Guadeloupe island and cover it ground near 5 hours after the ash venting. Since the first ashes arrival over the town of Pointe-a-Pitre (located at 80 km at the South East of Soufriere hills volcano) to the end of the event, we measured the mean particle concentrations and particle size distributions every twenty minutes. Measurements were performed at a building roof of the town using an optical particles counter Lighthouse IAQ 3016 mainly used in indoor air quality studies and which provides up to 6 particle size channels of simultaneous counting with aerodynamic diameters classes ranging from 0.3 to >10 μm .

The airborne particulate matter mass concentration, with equivalent aerodynamic diameters less than 10 μm (PM10) were measured by the local air quality network Gwad'air, in the vicinity of the site used to study this ash fall..

The maximum concentration of small particles with diameter lesser than 1 μm (D0.3-1) was observed one hour before the larger particles. This result may imply a difference in shape and density between particles D0.3-1 and particles D1-10 (1 < diameter < 10), producing a difference in the dry deposition velocity.

The mean hourly mass concentration of PM10 has reached a maximum value of 271 $\mu\text{g}/\text{m}^3$ eleven hours after the major eruption which followed a partial dome collapse in the crater.

We found a poor correlation between the PM10 values and the mass concentration calculated from the mean particle concentrations of particles D0.3-1+ D1-10. This result is probably related to the large variability in the density distribution of the particles.

Moreover, we observed a variation over time in the shape and the composition of the collected volcanic ashes which impacts on the exposed population, especially their health (Cadelis et al., 2013).