



Lidar measurements of volcanic aerosol over Mindelo during the volcanic eruption at Las Palmas in autumn 2021

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From 19 September to 13 December 2021, a volcanic eruption took place at Las Palmas, Canary Islands. Thereby, fine ash and volatiles, like SO₂, were emitted and transported over hundreds to thousand kilometers away from the island [1]. At the same time, continuous lidar observations with the multiwavelength-Raman-polarization lidar PollyXT were performed at the Ocean Science Center Mindelo (16.878°N, 24.995°W), Cabo Verde, in the frame of the JATAC-campaign 2021/2022. During autumn, typical aerosol conditions over Mindelo, as detected by the lidar, are a clean marine boundary layer up to approx. 1 km and a Saharan dust layer (up to 6 km) above. In the boundary layer, an extinction coefficient of less than 200 Mm⁻¹ and a lidar ratio smaller than 40 sr is typically observed while a lidar ratio between 40 and 60 sr and a depolarization ratio between 20 and 30 % is typically found for the Saharan dust properties. Instead, during the time of the volcanic eruption, a strongly polluted planetary boundary layer (PBL) was observed beginning 23 of September, whereby the extinction coefficient and the lidar ratio increased up to 800 Mm⁻¹ and 60 to 80 sr, respectively. On specific days, the aerosol optical depth, determined by an AERONET sun photometer, was as high as 1.0 (at 500 nm). Due to the small depolarization ratio around 0 % in the PBL and Hysplit trajectories indicating air masses coming from Canary Islands, the observed pollution over Mindelo can be attributed to sulfates emitted by the volcanic eruption at Las Palmas. No indications for volcanic ash over Mindelo were found, neither in the PBL nor in the lofted layer (mainly Saharan dust). This is furthermore supported by Hysplit trajectories, which show that air masses in higher altitudes come from the African continent and not from the Canary Islands. The potential of Aeolus to capture the volcanic plume on its way to Cabo Verde will also be assessed using the aerosol spin-off products (L2A) of the most recently available baseline.

References

[1] Carracedo, J. C., Troll, V. R., Day, J. M., Geiger, H., Aulinas, M., Soler, V., ... & Albert, H. (2022). The 2021 eruption of the Cumbre Vieja Volcanic Ridge on La Palma, Canary Islands. *Geology Today*, 38(3), 94-107.

