Active and passive remote sensing aerosol observations over the south of Portugal: the case study of the Cumbre Vieja plumes event occurred from 11-13 October 2021

SALGUEIRO, Vanda [(1)]; COSTA, Maria João [(2)]; Guerrero-Rascado, Juan Luis [(3)]; BORTOLI, Daniele [(4)]

[(1)] Earth Remote Sensing Laboratory and Institute of Earth Sciences, University of Évora, Évora, vsalgueiro@uevora.pt

[(2)] Earth Remote Sensing Laboratory and Institute of Earth Sciences, University of Évora, Évora, mjcosta@uevora.pt

[(3)] Andalusian Institute for Earth System Research and App. Phy. Dep., University of Granada, Granada, rascado@ugr.es

[(4)] Earth Remote Sensing Laboratory and Institute of Earth Sciences, University of Évora, Évora, db@uevora.pt

SUMMARY

Aerosols of natural or anthropogenic origin play an important role in the Earth's climate system due to their interaction with radiation and clouds. The interaction depends on aerosol optical and microphysical properties such as aerosol optical depth and particle size distributions among others. For example, volcanos are natural sources of aerosols, and they could release large amounts of gases (e.g., sulphur dioxide) and ashes into the atmosphere, which may impact the temperature at the surface and consequently, over long-term, the climate. Therefore, an appropriate aerosol characterization is fundamental and the remote sensing using active and passive methods allow for that characterization. This work aims at characterizing the Cumbre Vieja volcanic plume aerosols detected over the south of Portugal between 11-13 October 2021 by using measurements from a multi-wavelength Raman lidar and from an AERONET Sun-photometer, both installed in the atmosphere observatory at the University of Évora. Lidar observations allowed to identify a volcanic aerosol layer extending between roughly 2.5 and 5 km above sea level, characterized by low and relatively constant particle depolarization ratios and high backscatter-related Angström exponents, indicating the presence of small spherical particles. The AERONET aerosol optical depth at 500 nm also shows the predominance of fine mode particles during the whole the event.