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Measurements of SO2 from Popocatépetl volcano: corrections and error characterization of an ultra-violet camera

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The UV camera is a technique for remote sensing of volcanic emissions using scattered solar radiation in the atmosphere as a light source. The method is based on measuring an image of the ultra-violet absorption of SO2 in a narrow wavelength window of 300-320 nm, using interference bandpass filters and a CCD 2-D detector sensitive in this region. The images captured with the camera require a correction for different optical and environmental effects. In the contribution we present an SO2 camera system based on a Quantum Scientific Imaging (QSI) UV camara with automatic filterwheel, and describe how the main instrumental properties of the optical system can be characterized. Dark current, vignetting and filter characterization represent the instrumental part of a proper image correction, which is fairly constant and independent of the ambient conditions. However, other effects like "flattening" and the simplification of the radiative transfer dependance on environmental conditions need to be corrected as well to reduce the errors in the results. In this contribution we will focus on the different gradient (flattening) of the sky and the distance from which the measurements are taken (light dilution). Images of volcanic SO2 plumes from the active Popocatépetl volcano in Mexico are presented, showing persistent passive degassing. The measurment are taken from the Altzomoni Atmospheric Observatory (19.12N, -98.65W, 3,985 m.a.s.l.), which forms part of the RUOA (www.ruoa.unam.mx) and NDACC (https://www2.acom.ucar.edu/irwg) networks. It is located north of the crater at 11 km distance. The data to calculate SO2 slant column densities (molec/cm2 or ppm*m) were recorded with the QSI UV camera and processed using Python scripts.