Intercomparison between ground-and space-based measurements of SO2 at Popocatepetl volcano casts light into the several meteorological, instrumental and systematic biases of remote sensing.

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Popocatepetl has been continuously degassing copious amount of sulfur dioxide into the high troposphere of Mexico. Since the reawakening of the volcano in 1994, the cumulated SO_2 emissions have exceeded the SO_2 mass produced by the Pinatubo eruption in 1991, the largest episodic release of volcanic SO_2 on-record. The volcano is equipped with a permanent network of scanning mini-DOAS that provide an estimation of the SO_2 emission rate every five minutes, during daytime. Traverses with COSPEC and mobile mini-DOAS spectrometers, and, more recently, UV camera measurements, are also conducted regularly. The permanent, large, and high altitude SO_2 plume is also an ideal target for satellite-based measurements. We used ASTER and OMI, the two most effective satellites for measuring passive degassing, to reconstruct long term space-based databases of SO_2 emission rates. During the last, still ongoing, high degassing period, the SO_2 plume could often be tracked as far as Florida or the Bahamas Islands. Comparing the datasets of SO_2 emission rates from the different techniques brings into light some significant discrepancies, which must reflect some systematic methodological errors. We carefully investigated the potential causes to these discrepancies and propose explanations and solutions to reduce the methodological issues.