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Comparison between Sulfur Dioxide estimates using COSPEC and MODIS images

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The purpose of this work is to show the synergy of both remote sensing methods in order to utilize information derived from these two techniques for continuous volcano monitoring. Particularly, this paper aims at (1) showing the advantages and disadvantages of both techniques individually and (2) Comparing both sources of measurements and (3) coupling the dynamics showed by COSPEC measurements and static satellite image (MODIS) information. For this end, we use as a case of study the emissions of Popocatépetl volcano between November 2006 and February 2007. During this period, Popocatépetl volcano showed a phase of increased activity, and COSPEC measurement campaigns were made. A few days the dates and times of acquisition of MODIS images coincide with the COSPEC measurements.

In the case to make a comparison of both techniques some considerations must be made in such a way that seeks to reproduce the conditions that used a method and the other. In the case of COSPEC is to be understood that measurements are carried out in transects of the plume. On the other hand, we must consider the vehicle that transports the COSPEC, which in this case was terrain, Δt takes a while to cross the plume from side to side and you need to consider that the plume is moving at all times measuring the effect of the prevailing wind at the height where it is located. On the other hand, a satellite image provides instant volcanic plume. It also has information of the whole event in a given time. The resolution of each pixel is one square kilometer while for COSPEC the resolution is a few hundred meters.

Results showed that the SO_2 estimates data could be comparable in magnitude but should take into account gaps and drawbacks for both methods such as the time spent in making the measurement COSPEC and the route used to transect the plume. While for MODIS, it should be taken into account the image resolution that limits the ability to measure relatively small areas of SO_2 concentration. This could be one of the consequences that makes measurements of SO_2 by MODIS images present an overestimation.