



SO₂ camera measurements at Lastarria volcano and Lascar volcano in Chile

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The SO₂ camera is a remote-sensing technique that measures volcanic SO₂ emissions via the strong SO₂ absorption structures in the UV using scattered solar radiation as a light source. The 2D-imagery (usually recorded with a frame rate of up to 1 Hz) allows new insights into degassing processes of volcanoes. Besides the large advantage of high frequency sampling the spatial resolution allows to investigate SO₂ emissions from individual fumaroles and not only the total SO₂ emission flux of a volcano, which is often dominated by the volcanic plume. Here we present SO₂ camera measurements that were made during the CCVG workshop in Chile in November 2014. Measurements were performed at Lastarria volcano, a 5700 m high stratovolcano and Lascar volcano, a 5600 m high stratovolcano both in northern Chile on 21 – 22 November, 2014 and on 26 – 27 November, 2014, respectively. At both volcanoes measurements were conducted from a distance of roughly 6-7 km under close to ideal conditions (low solar zenith angle, a very dry and cloudless atmosphere and an only slightly condensed plume). However, determination of absolute SO₂ emission rates proves challenging as part of the volcanic plume hovered close to the ground. The volcanic plume therefore is in front of the mountain in our camera images. An SO₂ camera system consisting of a UV sensitive CCD and two UV band-pass filters (centered at 315 nm and 330 nm) was used. The two band-pass filters are installed in a rotating wheel and images are taken with both filter sequentially. The instrument used a CCD with 1024 x 1024 pixels and an imaging area of 13.3 mm x 13.3 mm. In combination with the focal length of 32 mm this results in a field-of-view of 25° x 25°. The calibration of the instrument was performed with help of a DOAS instrument that is co-aligned with the SO₂ camera. We will present images and SO₂ emission rates from both volcanoes. At Lastarria gases are emitted from three different fumarole fields and we will attempt to investigate the degassing behavior of the individual fumaroles. Lascar volcano only had a very weak plume originating from the active central crater with maximum SO₂ column densities of only up to 5×10^{17} [molecules/cm²] during our measurements. These low SO₂ column densities in combination with the almost ideal measurements conditions will be used to assess the detection limit of our current SO₂ camera system.