



## Direct light DOAS measurements in volcanic plumes

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Within the scope of the “Network for Observation of Volcanic and Atmospheric Change” (NOVAC), sulphur dioxide (SO<sub>2</sub>) emissions are being measured at 25 volcanoes worldwide. Next to SO<sub>2</sub>, inorganic halogen compounds are also being investigated, giving insight into the chemistry occurring in volcanic plumes as ambient air is mixed in. The applied instruments are passive Differential Optical Absorption Spectroscopy (DOAS) devices, which use scattered sunlight as a light source to measure the characteristic absorption of the different trace gases in volcanic plumes.

Through a newly implemented sun tracking algorithm, these instruments can now also be applied for direct light measurements by looking directly into the sun and measuring unscattered sun light. This novel technique can be applied when the plume is located between the sun and the instrument. By measuring a direct light spectrum and a scattered light spectrum in rapid succession, information about the radiative transfer within the plume can be derived. Furthermore, the high light intensity of direct light improves the detection limit, which becomes important when measuring gases with low optical densities such as halogen oxides.

The functionality of the instrument will be explained and first direct light measurement results will be presented.