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Development of optical remote sensing instruments for volcanological applications: - results from the EU-project DORSIVA

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Volcanic gas emission significantly contributes to the global budget of several atmospheric gases and has a strong local and regional effect on environment and health. Measurements of volcanic gas emissions yield vital information on magmatic conditions and processes and provide valuable data for volcanic hazard assessment and risk mitigation. However, a few years ago the available instrumentation for volcanic gas emission monitoring was based on outdated technology and provided data with low accuracy and time resolution at a relatively high cost. Spectroscopic methods allow remote non-invasive quantitative multi-component observations. Building on recent advances in passive remote sensing techniques, there is a strong potential for new concepts for measurements of volcanic gas emissions.

The aim of the DORSIVA project, started in 2002, is to develop robust and reliable optical remote sensing instruments and measurement strategies for surveillance of volcanic gas emissions, with high time resolution and affordable cost, and to test and demonstrate their use in field experiments at different volcanoes.

In this paper the DORSIVA project is presented, as well as some major achievements obtained during the 2 first years of work. Several different systems have been devel-

oped. All instruments are based on absorption spectroscopy (UV and IR) and use two different sources of radiation: scattered or direct Sunlight. Also two principally different measurement strategies have been developed: active measurements from mobile platforms, and automatic long-term measurements using static remotely located systems. In flux measurements knowledge of the wind speed at plume height is necessary. Thus various methods to model or measure the wind speed have also been investigated.

The instrument concepts and measurement strategies has been tested in a validation campaign in Spain in 2004 and been applied in numerous field campaigns at volcanoes all over the world