

Estimating emissions and lifetime of SO₂ from space: A case study of the Kilauea Volcano

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Satellite observations of atmospheric trace gases have revolutionized our insights regarding the location and amount of various pollutants. In addition, it has been demonstrated recently that atmospheric lifetimes can be derived by analyzing the downwind decay of point sources.

Here we present an analysis of the downwind evolution of the SO₂ plume from the Kilauea volcano (Hawaii) in 2008. Both the SO₂-patterns observed from space (GOME-2) and the wind fields according to ECMWF stay rather stable over several months, making this an ideal case for lifetime determination. Using a relatively simple mathematical analysis, an e-folding lifetime of SO₂ and the total release of SO₂ can be estimated simultaneously on the basis of monthly mean SO₂ maps and wind fields.