



## **An analytical inversion method including uncertainties and examples for its application with volcanic SO<sub>2</sub> and HFC-152a**

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The analytical inversion method presented by Seibert (2000) has been improved by allowing an a-priori for the unknown sources, a Bayesian formulation considering uncertainties for the prior and the observations, and an iterative algorithm for removing negative emission values. It is used with source-receptor relationships calculated by the forward or backward mode of the Lagrangian particle dispersion model FLEXPART. The method and two applications are presented. The first one is a reconstruction of the vertical emission profile of SO<sub>2</sub> for the eruption of the volcano Jebel-al-Tair on 30 September 2007. Not only is the maximum of the injection around the tropopause located well, also secondary maxima below are clearly reconstructed. The second application is a global inversion of time-dependent emissions of HFC-152a. Several hotspots of emissions not contained in the EDGAR a priori data are found by the inversion.

**Acknowledgements:** We thank all the data providers for this work. The first author acknowledges support by FWF P17924 and the EC-FP6 NoE Accent.