

Publication

Net CO₂ surface emissions at Bern, Switzerland inferred from ambient observations of CO₂, $\delta(O_2/N_2)$, and ²²²Rn using a customized radon tracer inversion

Journal Article (Originalarbeit in einer wissenschaftlichen Zeitschrift)**ID** 2372426**Author(s)** van der Laan, S; van der Laan-Luijkx, IT; Zimmermann, L; Conen, F; Leuenberger, M**Author(s) at UniBasel** [Conen, Franz](#) ; [Zimmermann, Lukas](#) ;**Year** 2014**Title** Net CO₂ surface emissions at Bern, Switzerland inferred from ambient observations of CO₂, $\delta(O_2/N_2)$, and ²²²Rn using a customized radon tracer inversion**Journal** Journal of geophysical research**Volume** 119**Number** 3**Pages / Article-Number** 1580-1591

The (²²²)Radon tracer method is a powerful tool to estimate local and regional surface emissions of, e.g., greenhouse gases. In this paper we demonstrate that in practice, the method as it is commonly used, produces inaccurate results in case of nonhomogeneously spread emission sources, and we propose a different approach to account for this. We have applied the new methodology to ambient observations of CO₂ and (²²²)Radon to estimate CO₂ surface emissions for the city of Bern, Switzerland. Furthermore, by utilizing combined measurements of CO₂ and (O₂/N₂) we obtain valuable information about the spatial and temporal variability of the main emission sources. Mean net CO₂ emissions based on 2 years of observations are estimated at (11.22.9) kt km⁽⁻²⁾ a⁽⁻¹⁾. Oxidative ratios indicate a significant influence from the regional biosphere in summer/spring and fossil fuel combustion processes in winter/autumn. Our data indicate that the emissions from fossil fuels are, to a large degree, related to the combustion of natural gas which is used for heating purposes.

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