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Measurements of CO₂, its stable isotopes, O₂/N₂, and ²²²Rn at Bern, Switzerland

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Abstract. A one-year time series of atmospheric CO₂ measurements from Bern, Switzerland, is presented. O₂/N₂ and Ar/N₂ ratios as well as stable carbon and oxygen isotopes of CO₂ and δ²⁹N₂, δ³⁴O₂ and δ³⁶Ar were measured periodically during a one year period. Additionally, the ²²²Rn activity was measured during three months in the winter 2004. Using the correlation from short-term fluctuations of CO₂ and ²²²Rn we estimated a mean CO₂ flux density between February 2004 and April 2004 in the region of Bern of 95±39 tC km⁻²month⁻¹. The continuous observations of carbon dioxide and associated tracers shed light on diurnal and seasonal patterns of the carbon cycle in an urban atmosphere. There is considerable variance in nighttime δ¹³C and δ¹⁸O of source CO₂ throughout the year, however, with generally lower values in winter compared to summertime. The O₂:CO₂ oxidation ratio during the nighttime build-up of CO₂ varies between -0.96 and -1.69 mol O₂/mol CO₂. Furthermore, Ar/N₂ measurements showed that artifacts like thermal fractionation at the air intake are relevant for high precision measurements of atmospheric O₂.

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Citation: Sturm, P., Leuenberger, M., Valentino, F. L., Lehmann, B., and Ihly, B.: Measurements of CO₂, its stable isotopes, O₂/N₂, and ²²²Rn at Bern, Switzerland, Atmos. Chem. Phys., 6, 1991-2004, 2006. ▣ [Bibtex](#) ▣ [EndNote](#) ▣ [Reference Manager](#)



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