



Quantification of carbon dioxide emissions of Ciomadul, the youngest volcano of the Carpathian-Pannonian Region (Eastern-Central Europe)

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In our study we provide the first high resolution CO₂ flux data in the youngest volcanic region of the Eastern-Central Europe, Carpathian-Pannonian Region and estimate the CO₂ emission of the seemingly inactive Ciomadul volcanic complex. Our estimate includes data from focused emissions and diffuse CO₂ emissions from soil. The CO₂ fluxes of focused emissions range between 277 and 8172 g d⁻¹, corresponding to a CO₂ output into the atmosphere between 0.1 and 2.98 tons per year. The investigated areas for diffuse soil gas emissions were characterized by wide range of CO₂ flux values, at Apor Baths, ranging from 1.7 to 82000 g m⁻² d⁻¹, while at Lăzăreşti ranging between 1.43 and 38000 g m⁻² d⁻¹. The highest CO₂ focused gas fluxes at Ciomadul were found at the periphery of the youngest volcanic complex, which could be explained either by tectonic control across the brittle older volcanoes or by degassing from a deeper crustal zone resulting in CO₂ flux at the periphery of the supposed melt-bearing magma body beneath Ciomadul. The estimate of the total CO₂ output in the area is 8700 t y⁻¹, and it is consistent with other volcanoes with similar age in Italy and USA. Taking into account the isotopic composition of the gases that indicate magmatic component, the CO₂ emissions yield further support that Ciomadul may be considered a dormant volcano or PAMS (volcanoes with potentially active magma storage) rather than inactive and emphasize that CO₂ output of such volcanic systems has to be accounted in the estimation of the global volcanic CO₂ budget.