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# Long-term degassing (1993-2001) of trace elements at an active basaltic volcano: Masaya (Nicaragua)

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Volcanic emissions are an important source of volatile elements injected as gases and aerosols into the atmosphere. The last eruptive cycle of Masaya volcano started in 1993 and since ever the main crater, Santiago, has been continuously degassing. In order to better understand its environmental impact, the volatility of several trace elements during degassing processes is evaluated by chemical analyses of gas and aerosols samples collected in the years 2000 and 2001. Trace element enrichment factors (EF) in Masaya volcanic gases are calculated relative to Be. This classification of volatility shows that many trace elements, among which U, Zn, Rb, Cu, Sb, Cs, Pb, As, Cd, Tl, Bi, and Te by order of increasing volatility, are highly enriched in Masaya gases. On the other hand, HFSE and REE are poorly volatile. The REE patterns normalized to the lava of the 2000 eruption are fractionated and show a LREE enrichment over HREE. Chemical and image analysis of aerosol trapped on filters obtained by SEM suggest that the metals are mostly transported in Masaya's plume as chlorides. Volatile trace element contribution to the atmosphere can be estimated from the trace element to $SO_2$ mass ratios and the total $SO_2$fluxes emitted since the beginning of the actual eruptive cycle. They range from 500 kg for the least volatile REE up to 18000 tons for Cu since 1993, making Masaya an important source of metal pollution on the regional scale.