

Evidence for an active, transcrustal magma system in the last 60 ka and eruptive degassing budget (H₂O, CO₂, S, F, Cl, Br): The case of Dominica

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The Morne Trois Pitons-Micotrin volcanic complex on the island of Dominica (Lesser Antilles) emitted a series of plinian eruptions between 18 ka and 9 ka BP.

We studied it to constrain magma storage conditions and volatile degassing balances, by comparison with the three previous ignimbritic eruptions (~60-24 ka BP). Volatile concentrations in glass inclusions and mineral-melt thermobarometry indicate storage at ≤ 200 MPa (~6-8 km) and 860-880°C. The magmas feeding these plinian eruptions were stored at a shallower depth than those that older ignimbritic eruptions from the same volcanic complex (~16 km). Close magma composition and similar halogen ratios, however, suggest a common source for the magmas feeding both the plinian and the ignimbritic eruptions. The large eruptive fluxes of F, Cl and Br to the atmosphere (up to $1.4-2.8 \times 10^{-1}$ Mt/km³, $1.5-4.0$ Mt/km³ and $2-4 \times 10^{-2}$ Mt/km³, respectively), estimated by the petrological method, support the potentially important role of volcanic halogens in modifying the chemistry of the atmosphere. The behaviour of S, potentially partitioned in a fluid phase, prevents here the calculation of an eruptive outgassing budget.

Mots-Clés : Transcrustal magma system, eruptive degassing, halogens, Dominica, Lesser Antilles arc

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