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Dominica: transcrustal magmatic system and eruptive halogen budgets

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Dominica island experienced the largest explosive eruptions (ignimbrites) of the Lesser Antilles arc. The recent revised chronostratigraphy of the Morne Trois Pitons – Micotrin eruptive activity evidenced a series of plinian eruptions that occurred between 18 ka and 9 ka BP. Here we focus on these recent eruptions in order to determine the magma storage conditions at depth and volatile degassing budget. Volatile concentrations (H₂O, CO₂) in melt inclusions indicate storage conditions of 200 MPa (~6-8 km deep) and 860-880  C in agreement with experimental constraints from phase-equilibrium data. The magmas were thus stored shallower than those involved during the ignimbritic eruptions (~16 km deep). Magma composition and halogen ratios suggest a common magma origin for all eruptions of Morne Trois Pitons Micotrin volcano in the last 60 kyrs. In addition, for the first time, a complete degassing budget including H₂O, CO₂, SO₂, F, Cl, and Br has been established for all these explosive eruptions. The estimation of their eruptive fluxes towards the atmosphere supports the potential important role of halogen elements in the modification of atmosphere chemistry. Br degassing budget was the same order of magnitude as S whereas F and Cl budgets were 1 and 2 orders of magnitude higher than these two species.