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## Open volcanic systems: evidence for deep gas loss

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Previous studies of Vulcanian eruptive products have shown that the respective volcanic conduits were filled for the most part with low-porosity magma prior to eruption. Comparison with the theoretical porosity distribution expected from closed-system degassing suggests that gas loss must have taken place at great depth within the magmatic column. At such high pressures, however, porosities are low enough to rule out traditional gas loss mechanisms. We tested if channelling, an outgassing mechanism based on bubble connection due to high crystal content proposed to occur in mushy magma reservoirs, could also happen in volcanic conduits. We reanalysed phenocryst, microlite, and porosity data from recent eruptions of Merapi volcano, Indonesia, Soufrière Hills volcano, Montserrat, and Tungurahua volcano, Ecuador. Overall, these magmas had crystal contents high enough for outgassing to occur by channelling. Gases could be channelled out of the magma columns at various levels during ascent to yield mostly gas-depleted magma columns prior to explosive behaviour. Such outgassing by channelling has thus the capacity to influence eruptive style. Depending on the phenocryst content, microlite growth during ascent can either foster, or impede gas escape by channelling. Considering the pervasive occurrence of microlites and ensuing high crystal contents in volcanic conduits, the high likelihood of channelling implies that other outgassing mechanisms might not be as dominant as previously envisioned.