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Oxygen isotope geochemistry of phenocrysts and matrix glasses at Stromboli: new insights into magma mixing of an open-conduit volcano.

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Stromboli is the northernmost island of the Aeolian volcanic arc, located in the Southern Tyrrhenian Sea, Italy. It is a stratovolcano characterized by an open-conduit system, where the persistent, 'normal' Strombolian activity is sustained by a shallow magmatic reservoir. This system is continuously replenished by mafic magmas which undergo varying degrees of mixing and crystallization prior to eruption. This normal activity typically consists of frequent mild explosions, ejecting black scoriae, lapilli, and ash. This steady state is intermittently punctuated by lava effusions and more energetic eruptive events, referred to as major explosions and paroxysms. While the black scoriae are derived from a shoshonitic, degassed, and highly porphyritic (Hp) magma, stored at depths of approximately 2-4 km, the higher-energy events produce small volumes of light-colored pumice, commonly termed 'golden pumice'. This pumice represents the products of a high-K basaltic, volatile-rich, and low-porphyritic (Lp) magma, rapidly ascended from mantle depths. Preliminary oxygen isotope data for cpx and plg phenocrysts, together with matrix glasses from both Hp and Lp products of Stromboli's 2003 - 2024 activity show variable $d^{18}O$ values, likely resulting from different degrees of magma mixing. The O-isotope composition of mixed magmas shows variations, with Hp phases having lower $d^{18}O$ values than LP ones. Plg and cpx are generally in O-isotope equilibrium, whereas matrix glasses are generally not in equilibrium with crystal phases. The data indicate that Hp and Lp distinctive isotopic signatures are derived from different generations of magmas that mixed in the shallow reservoir prior to eruption. Comparison with Sr-isotope data on plg and cpx phenocrysts suggests that 2003 and 2024 magmas were hybridized through partial melting of pre-existing crystalline material. Evidence for mush disaggregation and remobilization processes, recycling isotopically distinct portions of the magmatic system, are discussed. The O-isotope composition of the recharging deep magma casts for a more pronounced influence of materials from the subducting slab.