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**The role of fractional crystallization and magma mixing in the geochemical and mineralogical evolution of silicate rocks at the Oldoinyo Lengai volcano (northern Tanzania)**



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Over its evolution the Oldoinyo Lengai volcano in northern Tanzania has erupted magmas ranging in composition from nephelinite to phonolite and carbonatite. However, due to limited exposure and relatively fast weathering, the temporal evolution of the volcano is not well understood. Here we present a detailed geochemical, petrological and mineralogical study of 162 samples of the freshest silicate rocks from debris avalanches and from the edifice of the volcano. Bulk geochemical compositions of the volcanic succession, in conjunction with major and trace element compositions of minerals, indicate that (1) (melilite)-combeite-wollastonite-bearing nephelinites were probably generated from garnet-bearing nephelinites via crystal fractionation processes and interaction with carbonatites; (2) the phonolites were predominantly generated from garnet-free nephelinites via fractionation of clinopyroxene, titanite, apatite, perovskite and FeTi-oxides. Preliminary isotopic data show that these evolutionary paths originate from isotopically distinct parental melts. It is interesting to note the presence of (melilite)-combeite-wollastonite-bearing nephelinites in the oldest debris avalanche deposits, which could potentially indicate prior interaction with carbonatite magmas which are no longer preserved in the volcanic edifice.

