Sr isotope evidence of carbonate origin in calc-silicate xenoliths of Monte Ulmus peralkaline pyroclastic unit (Miocene, SW Sardinia, Italy)

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The Monte Ulmus unit is a peralkaline pyroclastic rhyolite [1] placed in the upper part of the Miocene calk-alkaline volcanic succession in SW Sardinia. This unit crops out largely in the islands of Santo Antioco and San Pietro, and in a lesser extension in the south sector of Sulcis mainland area (SW Sardinia). It ranges in thicknes from some meter to some dozen of meters, and it is a welded pyroclastic unit that presents a pink-brown vitrophiric basal sector, some meters thick (sometimes, underlyed by a black vitrophyre), with eutaxitic characters, and the main body of the unit is a rheomorphic body, with large flow folds and linear scours formed by segregation of elongated gas pockets, as long as several meters, in the direction of flow. The lower part of the unit (i.e, mainly concentrated in the vitrophiric level) contains a relative large amount of mm to cm-sized calc-silicate xenoliths, with unbroken idiomorfic minerals (i.e. Ca-garnet). Most of carbonatic outcrops in Sulcis correspond to Lower Cambrian thick units around Miocene, and Cretaceous rocks are restricted to southern Santo Antioco island. This suggests that xenoliths are the product of pyrometamorphism of previous carbonate levels, and most of the reaction may occur during or after placement of the pyroclastic unit. Therefore, xenoliths can provide evidence of initial thermal state of the pyroclastic deposit, as well as the idea of the deep of the magmatic chamber top. Sr content in Monte Ulmus is low (<25 $\mu g \cdot g^{-1}$) and therefore most of the isotopic signature is expected to be provided by carbonate rocks. The isotopic ratio $^{87}Sr/^{86}Sr$ in the xenolites ($\overline{x}$=0.709140) and the different carbonate rocks of the Cambrian ($\overline{x}$=0.709024) and Cretaceous ($\overline{x}$=0.707482) were measured, finding that the isotopic signature of the xenoliths corresponds to the Cambrian rocks.

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