



Chlorine isotopic composition of volcanic gases and rocks at Mount Etna (Italy) and inferences on the local mantle source

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In this work we present the first dataset of chlorine isotopic composition available at Mount Etna (Italy), and at our knowledge in the Mediterranean active volcanisms. We have investigated lavas erupted during 2008-2011 and gases discharged in the same period from an High-Temperature fumarole (HT), located on the Voragine Crater rim, and from plume gases discharged from North East and Central Craters. Most of the samples have displayed an homogeneous composition of volcanogenic chlorine, which varies in a narrow range $\delta^{37}\text{Cl} \sim 0 \pm 0.7$. Only HT gases sampled in 2009 have been clearly affected by secondary processes, responsible of a partial removal of chlorine and of a isotopic fractionation that leads to a ^{37}Cl enrichment in the residual gaseous HCl. This effect also affects, even if at a lower extent, plume gases from North East Crater, which appreciably differ from the typical signature displayed by the Central Craters and by the rocks. While post-magmatic processes, in particular conditions, are able to modify chlorine isotopic composition, $\delta^{37}\text{Cl}$ seems to be not affected by magma degassing at least for residual fractions ≥ 0.3 in the melt, or any effect is within our data variability. Finally, $\delta^{37}\text{Cl}$ and Cl/K ratios of magmatic chlorine have allowed to constrain the Etnean source to be compatible with a Depleted Mantle contaminated by significant fractions of altered oceanic crust, thus showing HIMU-like features.