Geophysical Research Abstracts
Vol. 17, EGU2015-14810, 2015
EGU General Assembly 2015

Carbon-isotope investigation in fluid inclusions of ultramafic xenoliths from Hyblean Plateau (Sicily, Italy): a signature influenced by mantle heterogeneity.

Alessandra Correale, Antonio Paonita, Andrea Rizzo, Fausto Grassa, and Mauro Martelli
Istituto Nazionale di Geofisica e Vulcanologia, Palermo, Italy

The understanding of the upper mantle has improved greatly in recent decades thanks to studies of mantle xenoliths and the Hyblean area (Sicily, Italy)) is one of the rare European volcanic regions where mantle xenoliths outcrop. The xenoliths from this area were studied in many aspects but the isotope carbon marker has not been investigated previously. We measured the carbon isotope signature of the mantle source beneath the Hyblean Plateau by studying the CO_2 content entrapped in fluid inclusions from ultramafic xenoliths carried out to surface by some diatreme-related deposits of Miocene age.
The $\delta 13CCO_2$ measured in the present work (ranging between -4‰ and -2‰ was combined with the noble gases results of the same samples from our previous study. In order to investigate the influence of degassing process on the isotope geochemistry of the carbon, we performed quantitative analyses of the magmatic degassing in the case of $\delta 13CCO_2$, He/Ar and Ar/CO_2 ratios and we put in relation the obtained variability. The results highlighted that degassing processes influence sensibly the He/Ar and Ar/CO_2 ratios but not the $\delta 13CCO_2$ that seems controlled mainly by the extent of contamination of the peridotite by sedimentary and organic carbon. Mass-balance calculations evidenced that the Hyblean peridotite source is mainly contaminated by carbonate crustal term, being carbonate and organic matter characterized by a ratio within the range 5:1 and 7:2.
Instead, mixing processes mainly affect the variable compositional CO_2/3He and 3He/4He ratios, ranging between 1.21x109-9x1010 and 7.2-7.6 Ra respectively. More in detail these mixing processes would be triggered by metasomatic intrusions as veins of MORB-type pyroxenitic melts in the peridotite matrix contaminated by crustal fluids probably inherited from a fossil subduction.