Carbon budget in the Iberian mantle: Insights from Calatrava and Tallante xenoliths

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In this contribution we present elemental and isotopic analyses of carbon (C) carried out on mantle xenoliths from the Calatrava and Tallante volcanic districts (Spain).

The C content of peridotite xenoliths from Calatrava, previously studied by [1], generally range between 1100 and 5500 ppm, with up to 2.9 wt% C in a single sample. The associated isotopic composition ($\delta^{13}C$) of most samples varies between -26.1 to -15.2 ‰, whereas the carbon-rich outlier displays a distincly less negative C isotopic composition (i.e. -6.2‰) that conforms with a typical mantle signature [2].

The C content of xenoliths from Tallante previously studied by [3], [4], varies from 600 to 1000 ppm in anhydrous peridotites, to 1500 ppm in an amphibole bearing peridotite; higher C content of 4000 ppm have been recorded in the felsic vein crosscutting a peridotite composite xenolith previously studied by [5]. The associated isotopic composition ($\delta^{13}C$) varies between -20.1 to -22.4 ‰ in peridotites, whereas the mentioned felsic vein displays the value of -11.9‰.

In both xenolith suites a correlation is observed between the carbon contents and the respective $\delta^{13}C$ values suggesting that analogous fractionation processes affected vast domains of the Iberian lithospheric mantle. Noteworthy, in the Tallante xenolith suite less negative $\delta^{13}C$ values comparable to those of the Calatrava district are never recorded. The less negative isotopic composition recorded by Tallante xenoliths approaches that of the carbonate matrix of the xenolith-bearing volcanoclasic deposit (-9.8‰).

On the whole, the available data suggest that the carbon of the studied xenoliths, host lavas and cabonate volcanoclastic matrices is juvenile, mostly originated deep in the mantle, and influenced by multiple episodes of degassing, that ultimately led to extremely explosive volcanic eruptions.

[1] Bianchini *et al* (2010), *GSL Sp. Pub.* **337**, 107-124. [2] Deines (2002), *Earth Sc. Rev.* **58**, 247-278. [3] Beccaluva *et al* (2004), *Lithos* **75**, 67-87. [4] Bianchini *et al* (2011), *Lithos* **124**, 308-318. [5] Bianchini *et al* (2015), *Lithos* **220-223**, 191-199.