

1 **Trace elements and Sr-Nd-Pb isotopes of K-rich, shoshonitic, and calc-alkaline**
2 **magmatism of the Western Mediterranean Region and their relationships with**
3 **metasomatised mantle xenoliths from Tallante, South-Eastern Spain.**

4 by

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13 High-MgO ultrapotassic rocks are found in four different areas of the Western Mediterranean
14 basin associated in space and time with shoshonitic and calc-alkaline rocks. They represent different
15 magmatic events at the active continental plate margin from Oligocene to Pleistocene. These rocks
16 are found within the Western Alps (Northern Italy), in Corsica (France), in Murcia-Almeria (South-
17 Eastern Spain), and in Southern Tuscany (Central Italy). Ultrapotassic terms are mostly
18 lamprophyres, but olivine latitic lavas with a clear lamproitic affinity are also found. Lamproite-like
19 rocks range from slightly silica under-saturated to silica over-saturated, and they are characterised
20 by low Al₂O₃, CaO, and Na₂O contents. They are plagioclase-free rocks, but K-feldspar is abundant
21 beside other K-bearing phases. Shoshonitic and calc-alkaline rocks are invariably space associated
22 to lamproites, but they might either preceded or follow them. High-Mg ultrapotassic rocks are
23 characterised by strong enrichment of incompatible elements, which prevent further enrichment due
24 to shallow level crustal contamination. K₂O and incompatible element contents decrease passing
25 from high-Mg ultrapotassic to high-Mg shoshonitic and calc-alkaline rocks suggesting that K and
26 incompatible trace elements enrichments are a primary characteristic. Ultrapotassic to calc-alkaline
27 rocks from Western Mediterranean regions, in spite of their different age of emplacement, are
28 characterised by similar incompatible trace elements distribution. Depletion of High Field Strength
29 elements with respect to Large Ion Lithophile elements is observed. Positive spikes at Th, U, and
30 Pb, with negative spikes at Ba, Nb, Ta, Sr, P, and Ti, are common characteristics of ultrapotassic
31 (lamproitic) to high-K calc-alkaline rocks. Ultrapotassic rocks are extremely enriched in radiogenic
32 Sr and unradiogenic Nd with respect to the associated shoshonitic and calc-alkaline rocks. Different
33 isotopic values are distinctive of the different magmatic provinces irrespective of magmatic
34 affinities. ⁸⁷Sr/⁸⁶Sr_i ranges between 0.71645 and 0.71759 for Western Alps lamproites, between
35 0.71226 and 0.71230 for Corsica lamproite, between 0.71642 and 0.72259 for Murcia-Almeria
36 lamproites, and between 0.71578 and 0.71672 for Tuscany lamproites. Radiogenic Sr decreases

37 along with K_2O through shoshonitic to calc-alkaline rocks. Conversely $^{143}Nd/^{144}Nd_i$ values increase
38 with decreasing K_2O , with the highest value of 0.51243 found for the one samples from Murcia-
39 Almeria. Contrasting trends are observed among initial values of lead isotopes, but all falling well
40 within the field of upper crustal rocks. Different trends of $^{207}Pb/^{204}Pb_i$ and $^{208}Pb/^{204}Pb_i$ vs.
41 $^{206}Pb/^{204}Pb_i$ for samples from the different provinces are observed. Several evidences indicate that
42 most of the magmas of the different provinces have been generated in a depleted upper mantle (i.e.,
43 lithospheric) modified by metasomatism, but an asthenospheric component is also recognised in
44 Corsica. At least two different subduction-related metasomatic agents re-fertilised the depleted
45 original upper mantle source. Carbonate-free siliciclastic sediments and carbonate-rich sediments
46 have been recycled within the upper mantle through subduction and partial melting. Assuming that
47 metasomatic component is concentrated in a vein network. In South-Eastern Spain calc-alkaline
48 magmatism preceded lamproitic ones, and might be generated by partial melting of mantle wedge
49 metasomatised by fluids from oceanic slab prior to collision. Lamproitic magmas followed after
50 melt-dominated metasomatic agents invaded the lithospheric upper mantle domain.

51 This hypothesis have been tested studying directly veined peridotitic xenoliths from the Cabezo
52 Negro de Tallante volcano, a within plate volcanic episode occurring in the Cartagena area after a
53 four million years time gap with the older orogenic-type magmas of the Murcia-Almeria provinces.
54 The samples reveal the occurrence of a two step metasomatic enrichment. A first metasomatic
55 domain has been recognised to have widely affected the peridotitic mineralogy, whereas a second
56 and younger metasomatic domain has been confined in the veins. The latter metasomatic event has
57 been produced by silica-rich potassic melt from the partial melting of recycled sediments.