Mantle end-members (DM, EMI, EMII, HIMU and PM) – Geochronological interpretation

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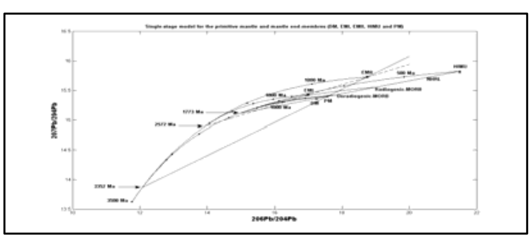
The mantle components (DM, EMI, EMII and HIMU) are treated in diagram ($^{207}Pb/^{204}Pb$ vs. $^{206}Pb/^{204}Pb$) in ordre to predict their relationships with the primitive mantle (PM). Calculations assuming isotopic ratio U/Pb as time-dependent according to the fundamental equation of radioactivity have shown that the age provided by the northern hemisphere reference line (NHRL), including radiogenic- and unradiogenic-MORB (R-MORB, U-MORB), is similar to the age provided by a geochron, including primitive lead in Canyon Diablo Troilite (CDT) and common lead in R-MORB and U-MORB corrected from in-situ decay. Moreover, concordance between these two slope-ages suggestes that the primitive lead in CDT and the common lead in R-MORB and U-MORB are conformable with the growth curve of the PM evolved in a single-stage model. On the other hand, the components DM and HIMU that plot on the NHRL are expected to be related to the PM by a mantle isochron, indicating an age of 1778 Ma. The available isotopic data on xenoliths exhibits trends between EMII with the PM for mantle xenoliths and between EMI with EMII for crustal xenoliths. Accepted as true isochrons, these trends imply that the EMII is related to the PM by a mantle isochron, indicating an age of 3352 Ma. Whereas, the EMI is related to the EMII by a mantle isochron, provinding an age of 2572 Ma. Corresponding radiogenic systems of components PM, EMI and EMII are found compatible with isotopic lead in volcanic lavas or intrusive granites from old cratons testifying of their involvement in crustal growth. Overall of EMII with continentally derived sediments support these points of view. We suggest that the recycling models of crustal and altered oceanic materials in mantle sources for generating EMI- and EMII-like melts have to be revised.



Mica as a recorder of pegmatite evolution: The Fregeneda-Almendra pegmatite field (Spain and Portugal)

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In the Fregeneda-Almendra area (FA), (Central-Iberian-Zone, Spain and Portugal), many pegmatite bodies occur. They mainly intruded pre-Ordovician metasediments of the schist-metagraywacke complex, showing a zonal distribution from barren to enrichment in Li, F, Sn, Rb, Nb>Ta, B, P and Be, with an increase in the evolution degree as the distance to the Lumbrales leucogranite increases, northwards. Five types of evolved pegmatites have been characterized: petalite-rich, spodumene-rich, lepidolite-spodumene-rich, lepidolite-rich and cassiterite-rich pegmatites, plus six types of barren and intermediate pegmatitic bodies.

Representative micas from the different pegmatite types, as well as from the close leucogranite were analysed for major and trace elements by EMPA, ICP-MS and AA techniques. All these micas belong to the muscovite-lepidolite series. Micas from the different pegmatite types show well defined evolutionary trends. In the lepidolite-rich dykes the incorporation of Li is mainly controlled by the combination of the $Li_3Al_{-1}[Y]_{-2}$ and the Si_2LiAl_{-3} exchange vectors, where [Y] represents vacancies in octahedral positions. In the lepidolite-free pegmatites, mica compositional variations can be described by the combination of the $Al_4Si_{-3}[Y]_{-1}$ and $(Fe\pm Mg\pm Mn)_3Al_{-2}[Y]_{-1}$ substitutions.

Micas from the lepidolite-bearing pegmatites are the richest in Li, Rb, Cs, Be, Ta and Nb, and the poorest in Ba; followed by the spodumene-bearing and the petalite-bearing dikes. Micas from the intermediate pegmatites show intermediate values for these elements but the highest for Sn and Zn. Micas from the leucogranites and barren pegmatites are the richest in Ba and the poorest in the other elements.

Compositional variations in micas from the FA field are controlled by petrological factors and bulk-rock compositon rather than crystal-chemical constraints. Therefore, micas may be a helpful tool to understand the petrogenesis of pegmatitic rocks.