Geophysical Research Abstracts, Vol. 9, 08975, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-08975

Geochemical features of minerals and glasses in intraplate and suprasubduction lithospheric mantle

Coltorti M.(1), Bonadiman C.(1), Faccini B.(1)
(1) Department of Earth Sciences, Ferrara University

A comparison between petrographic and geochemical features of minerals and glasses from xenoliths hosted in intraplate alkaline and orogenic calc-alkaline s.l. basalts are presented. Clinopyroxenes and amphiboles are the main repositories for incompatible trace elements in the mantle, thus providing invaluable clues on the nature of the metasomatizing agents affecting the lithospheric mantle. Their use is however limited by their presence and by their crystallographic constrains. In this respect, glasses produced by reactions with metasomatic fluids represent a very useful tool, but they are less commonly found, especially in suprasubduction environments. Several study cases where subduction and intraplate signature can be recognized are presented and various diagrams using minerals and glasses put forward aiming at defining the nature of the metasomatizing agents and their geotectonic settings. At comparable SiO2, subduction-related glasses (S-Gl) are characterized by lower alkalies contents than glasses from intraplate-settings (I-Gl). As a consequence the former tend to be more SiO2-saturated. S-Gl has Na2O content similar to I-Gl from carbonatite-metasomatized intraplate xenoliths, but these latter present consistently higher CaO abundance. S-Gl have the lowest Nb and Ta contents and, excluding carbonatite-metasomatized I-Gl, they present also lower Rb, Ba, Zr, Ti and HREE contents than alkali-silicate I-Gl. In several cases S-Gl bear some analogies with adakite magmas. Subduction-related amphibole (S-Amph) can also be discriminated from intraplate amphibole (I-Amph) on the basis of Nb, Zr and Ti contents. Nb, irrespective of textural position, is particularly usefull; its content varying of one order of magnitude between the two geotectonic settings. The same elements can be used to distinguish between subduction-related clinopyroxenes (S-Cpx) and intraplate clinopyroxene (I-Cpx), although the very low concentration of Nb in the former suggest to handle this element with some caution. S-Cpx plot in two distinct fields, probably in relation to

the variably depleted nature of the protolith which is affected by the metasomatizing agent. The proposed discrimination diagrams for mantle minerals and glasses can be applied in those areas where both subduction- and intraplate-related fluids may have affected the mantle lithosphere, particularly in those areas where both calc-alkaline s.l. and alkaline magmas characterize the magmatic evolution on the surface. In the Mediterranean area, as well as in many other part of the world, intraplate alkaline magmatism follows, in a time span of about 5-15Ma, the calc-alkaline s.l. magmatism. In this short interval the two mantle sources can be preserved and recognized. The role that accessory phase, such as rutile, is playing during melting or dehydratation of the slab and the recycling of this phase into the mantle as possible Nb- and Ti-rich reservoirs is also addressed. If this is the case the physical and chemical relationships between subducted slab and intraplate magmatism can be tentatively put forward.