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Il Pianeta Dinamico: sviluppi e prospettive a 100 anni da Wegener

Congresso congiunto SIMP-AIV-SoGeI-SGI

Firenze, 2-4 Settembre 2015

ABTRACT BOOK

Edited by

Cesare B., Giordano G., Monaco C., Vaselli O., Avanzinelli R., Bonazzi P., Cappelletti P., Carosi R., Cidu R., Cioni R., Cosentino D., Frondini F., Princivalle F., Viccaro M.

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Structural and chemical variations in phlogopites from lamproitic rocks of the Western Mediterranean Region

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Keywords: Mica, phlogopite, lamproite.

Micas from mafic ultrapotassic rocks with lamproitic affinity from various localities of the Western Mediterranean region have been studied through SCXRD, EMPA and SIMS; in order to reduce the number of unknown variables and uncertainties in the interpretation of data, Mössbauer techniques, when feasible, were also applied.

Lamproitic samples from Val D'Albard, (Western Alps), Sisco (Corsica), Montecatini Val di Cecina and Orciatico (Southern Tuscany) and Torre Alfina (Northern Latium) were analysed.

The studied crystals show distinctive chemical and structural features; they all belong to the phlogopite-annite solid solution and crystallize in the 1*M* polytype, except for micas from Torre Alfina, where both 1*M* and $2M_1$ polytypes have been found. They have variable but generally high F and Ti, with Mg/(Mg+Fe) ranging from ~0.5 to ~0.9; $2M_1$ crystals from Torre Alfina radically differ in chemical composition, showing high contents of Ti and Fe as well as of Al in both tetrahedra and octahedra, leading to distinctive structural distortions, especially in tetrahedral sites. SIMS data indicate that these micas are generally dehydrogenated with OH contents ranging from ~0.2 apfu for Orciatico and Torre Alfina to ~1.4 for Val d'Albard crystals; this feature is as well testified by structural considerations regarding the length of *c* parameter: the shorter the *c* parameter, the higher the loss of hydrogen and/or F→OH substitution (Cruciani & Zanazzi, 1994). Chemical and structural data suggest that the entry of high charge cations in the structure, especially Ti and Fe^{3+}, is mainly balanced via an *oxy* mechanism. However, a component of $M^{3,4+}$-Tschermak substitution, especially regarding the incorporation of ^{VI}Al has to be taken into account. Our data confirm that Ti preferentially partitions into the M2 site. Ti appears indeed to be well related to the bond-length distortions in M2, as well as to other structural parameters suggesting the presence of high-charge cations in M2 (Cruciani & Zanazzi, 1994). Different Ti, as well as different K/Al and F contents are distinctive features; their variation has been mainly related by Foley (1989; 1990) in his experimental studies to different fluid compositions and, especially, to different f_{H2O} with a lower control exerted by pressure and temperature.

Cruciani G. & Zanazzi P.F. 1994. Cation partitioning and substitution mechanisms in 1*M* phlogopite; a crystal chemical study. Am. Mineral., 79, 289-301.

Foley S.F. 1989. Experimental constraints on phlogopite chemistry in lamproites: 1. The effect of water activity and oxygen fugacity. Eur. J. Mineral., 1, 411-426.

Foley S.F. 1990. Experimental constraints on phlogopite chemistry in lamproites: 2. Effect of pressure-temperature variations. Eur. J. Min., 2, 327-342.

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