New insights into the evolution of the Finero Mafic Complex

A. LANGONE[1*], M.R. RENNA[2], M. TIEPOLO[1], A. ZANETTI[1], M. MAZZUCCHELLI[3] AND T. GIOVANARDI[3]

[1] CNR-IGG-Pavia, Pavia, Italy, langone crystal.unipv.it
[2] Dip. di Fisica e Sc. della Terra, Univ. di Messina, Italy
[3] Dip. Sc. Chimiche e Geologiche, Univ. di Modena e Reggio Emilia

The Finero Complex outcrops as an antiform in the northern sector of the Ivrea-Verbano Zone (Southern Alps). The antiform core is constituted by a mantle unit surrounded by a cumulitic sequence, i.e. the Finero Mafic Complex (FMC) [1,2]. The complex is divided in three units: a) the Layered Internal Zone (LIZ), in tectonic contact with the mantle unit; b) the Amphibole Peridotite (Amph-Pd); c) the External Gabbro. Owing to the lack of a detailed petrochemical characterisation of the FMC, we performed new major and trace element (LA-ICPMS) analyses on representative samples from the LIZ and Amph-Pd. The LIZ mainly consists of Grt-hornblendites and Hbl-gabbros, with minor anorthosites and pyroxenites. The Amph-Pd is mostly made up of Amph-bearing harburgites and dunites (Ol: Fo_{87-82}), with recrystallisation fronts along which the peridotites become modally-dominated by Amph. The Al_2O_3 content is up to 11 and 18 wt% in Cpx and Amph, respectively: it increases from the peridotites (Amph-Pd) through gabbros to the hornblendites and pyroxenites (LIZ). In the garnet-free pyroxenites and hornblendites from LIZ, Amph and Cpx have slightly LREE-depleted patterns with flat HREE (at 2 CI in Cpx) and marked positive Eu, Sr, Pb and U anomalies. Similar features are shown by the Cpx and Amph from the associated gabbros, they differ in having HREE-depleted patterns, thereby indicating chemical equilibration with garnet. Cpx and Amph from the Amph-Pd have variable LREE-enriched spoon-shaped patterns, with nearly flat HREE-pattern and positive Eu, Sr and U anomalies. The LREE gradient can be explained by interaction with percolating LREE-enriched melts, dominated by ion exchange processes. Amph-enriched peridotites, which contain the highest LREE contents are a proxy for the composition of the percolating melts. The new data suggest that the LIZ and Amph-Pd units may have crystallised from melts of cognate origin with a clear crustal component. However, the recrystallisation of the Amph-Pd cannot be explained by a closed-system evolution, pointing to significant changes in the composition of the uprising mantle melts.

[1]Rivalenti *et al*..(1984) Tsch.Min.Petr.Mitt.**33**,77-99, [2] Siena&Coltorti(1989)N.Jb.Miner.Mh.**6**,255-274

Syn to post-eruptive crystallization of phenocrysts in pahoehoe "cicirara" lavas from Mount Etna volcano (Italy)

G. LANZAFAME[1*], S. MOLLO[2], G. IEZZI[3], C. FERLITO[1] AND G. VENTURA[2]

[1]Università di Catania, Dipartimento di Scienze Biologiche, Geologiche e Ambientali, Corso Italia 57, I-95129 Catania, Italy. (*correspondence: gabriele.lanzafame@gmail.com, cferlito@unict.it)
[2]Istituto Nazionale di Geofisica e Vulcanologia, Via di Vigna Murata 605, I-00143 Roma, Italy (mollo@ingv.it, guido.ventura@ingv.it)
[3]Dipartimento INGEO – Ingegneria e Geologia, Università G. d'Annunzio, Via Dei Vestini 30, I-66013 Chieti, Italy (g.iezzi@unich.it)

At Mount Etna volcano (Italy) lavas with large plagioclase phenocrysts (PI > 40 vol.%) have been erupted during historical and pre-historical periods. If phenocrysts had crystallized inside a magma chamber or within the feeding system, viscosity would not have allowed the magma to reach the surface or at most would have produced volcanic domes. Instead, these plagioclase rich lavas, named locally as "cicirara", present wonderful pahoehoe morphologies with ribbons ropy structures and pressure ridges, which are definitively incongruous with an intratelluric growth of the phenocrysts. We have studied the mineral compositional variations and textural features, i.e., size frequency and crystal size of the one of the most basic cicirara lava. Our findings underline that only a small amount (10–15 vol.%) of crystals equilibrated at 12 km of depth, whereas most of the phenocrysts have grown at the surface and that emplacement of low-viscosity pahoehoe lavas is therefore driven by the low degree of undercooling associated with a rapid rise to the surface of poorly degassed magmas. In these conditions the growth of the phenocrysts occur mainly after the eruption when the lava is emplaced, thus reconciling the apparent paradox of pahoehoe morphology and high PI.

DOI:10.1180/minmag.2013.077.5.12