DISSEMINATED CRYSTAL MUSH FRAGMENTS IN THE CIOMADUL DACITE (SE CARPATHIANS, ROMANIA)

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The Ciomadul dacite, product of the latest (30–100 ka) volcanic eruptions in the Carpathian-Pannonian region, Eastern-Central Europe, is a crystal-rich rock with ubiquitous plagioclases and amphiboles. Combined, fine-scale textural and geochemical investigations indicate a complex origin of these minerals, formed partly in a low temperature dioritic-granodioritic crystal mush body, partly in a higher temperature hybrid magma. In addition, biotite, titanite, apatite, zircon, K-feldspar and quartz occur in various amounts in the dacites as well as crystal clots composed by these minerals. Most of these crystals are resorbed and are interpreted as antecrysts derived from a remobilised crystal mush body.

The nature of the crystal mush was investigated through the detailed analysis of the crystal clots. Their texture resembles plutonic rocks, such as microdiorites and granodiorites, however, they contain interstitial glasses. The glass could represent evolved melt between the mineral phases in the crystal mush body rather than originated by melting of the crystal phases. Thermobarometric calculations performed using the composition of coexisting plagioclases and amphiboles yield 2–3 kbar pressure and 700–730 °C temperature, which is close to the granitic solidus. In certain crystal clots, plagioclases show strongly resorbed margin with sieved texture and an overgrowth zone with distinct composition (e.g., higher FeO content resembling the plagioclase microphenocrysts in the host rock). The coexisting amphiboles here are strongly opacitized and often have a coarse-grained clinopyroxene corona. These features suggest a heating process presumably due to intrusion of hot mafic magma into the near-solidus magma body. This is consistent with the thermometric calculations for the amphibole-plagioclase pairs found in the host rock that resulted in a temperature range of 820–860 °C, significantly higher than the values got for the crystal clots.

In summary, the Ciomadul dacite contains vast amount of low-temperature, disseminated crystal mush fragments (up to 50 vol% of the "phenocrysts"), which are interpreted as a pre-existing near-solidus magma body at about 8–10 km depth. This was reheated and remobilised by intrusion of hot mafic magmas. This process could lead to the rejuvenation of the magmatic system and an eruption phase, possibly after a long repose time.

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