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The 'Little' Fish Canyon Tuff in Romania: Rejuvenation of granodioritic crystal mush resulting in homogeneous dacite recorded by the Haramul Mic lava dome (Ciomadul)

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Long-dormant volcanoes (quiescence time is several 100's to 10's thousand years between eruptions) pose a particular hazard, since the long repose time decreases the awareness and there is mostly a lack of monitoring. The Haramul Mic, a pancake-shaped flat dacitic lava dome is part of the Ciomadul Volcanic Complex in eastern-central Europe (Romania) and serves as an excellent example of such volcanoes. The Haramul Mic lava dome is the earliest product of the Young Ciomadul Eruption Period (YCEP), when the activity recrudesced in the area after about 200.000 years quiescence time. Eruption age of the dome determined by (U-Th)/He dating on zircon gave 154 +/- 16 ka that is in agreement with the youngest zircon U-Th outer rim date (142 +/- 18/-16 ka). In the YCEP zircon crystallization dates record typically long, up to 350-400 kyr lifetime of the magmatic plumbing system, in case of Haramul Mic the oldest zircon core is 306 +/- 37 ka old.

The 880.7 m high lava dome covers an area of 1.1 km² and has a volume of ~0.15 km³. It is composed of crystal-rich homogeneous high-K dacite. The average crystal content is 35-40% and consists of plagioclase, amphibole, biotite and accessory zircon, apatite, titanite and Fe-Ti oxides. The groundmass is mainly built up by perlitic glass with some microlites. The dacite includes mafic enclaves having plagioclase and amphibole besides a large amount of biotite crystals, that eventuates K-rich, shoshonitic bulk composition. The dacite contains abundant felsic crystal clots which comprise plagioclase, amphibole, biotite and interstitial vesicular glass.

Amphiboles are relatively homogeneous in chemical composition. They are low-Al hornblendes suggesting 700-800 °C crystallization condition at 200-300 MPa compared with experimental data. Al-in-hornblende geobarometer and amphibole-plagioclase geothermometer calculations give results reproducing these temperature and pressure ranges. Although the Kis-Haram dacite is fairly rich in 25-45 anorthite mol% plagioclase, no negative Eu anomaly can be observed in the bulk rock and the glass. Similarities between Fish Canyon Tuff and Kis-Haram rocks can be strikingly noted regarding the major and trace element contents of mineral phases, glass and bulk rock that all refer to a wet oxidised calc-alkaline magmatic system. The relatively small volume Kis-

Haram lava dome represents a rejuvenated low-temperature granodioritic crystal mush having similar features as the large volume silicic eruption of Fish Canyon Tuff. Their recorded almost similarly long zircon crystallization intervals give an interesting aspect with regard to the thermal evolution of the magmatic system and eruption volumes.

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