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Anatomy of the late Pleistocene Ciomadul volcano (E-Carpathians, eastern-central Europe), a volcano with Potentially Active Magma Storage

S. Harangi[1], B. Kiss[2], R. Lukács[2], A.K. Schmitt[3], I. Seghedi[4], A. Novák[5], K. Molnár[1], B.M. Kis[2], L. Palcsu[6], T. Ntaflos[7],O. Vaselli[8], L. Szarka[9]
[1]MTA-ELTE Volcanology Research Group, Department of Petrology and Geochemistry- ELTE, Budapest, Hungary
[2]MTA-ELTE Volcanology Research Group, n.d., Budapest, Hungary
[3]UCLA, Department of Earth- Planetary and Space Sciences, Los Angeles, USA
[4]Institute of Geodynamics, Romanian Academy, Bucharest, Romania
[5]RCAES- Geodetic and Geophysical Institute, Hungarian Academy of Sciences, Sopron, Hungary
[6]MTA ATOMKI, Hertelendi Laboratory of Environmental Studies, Debrecen, Hungary
[7]University of Vienna, Department of Lithospheric Research, Wien, Austria
[8]University of Florence, Department of Earth Scences, Firenze, Italy
[9]MTA, RCAES- Geodetic and Geophysical Institute of Hungarian Academy of Sciences, Budapest, Hungary

There are a number of long-dormant and seemingly inactive volcanoes in the Earth that could pose a potential threat. The ability of such volcanoes to become reawakened depends primarily on the state of the magmatic plumbing system. Existence of a melt-bearing magma body beneath the volcano and evidence for its prolonged lifetime and intermittent rapid remobilization in the past could mean a potential that the volcano might be active again. Thus, it can be classified as volcano with Potentially Active Magma Storage. We present here an example for such a PAMS volcano from eastern-central Europe. The late Pleistocene dacitic Ciomadul erupted last time 32 ka, but a magnetotelluric survey indicated a low electric resistivity values in the depth interval of 5-25 km, just beneath the volcanic centres. This can be interpreted as implying a partially melted zone, containing about 5-15% melt fraction. This is consistent with the seismic tomography model that indicates a low-velocity zone at the same depth and with CO_2-rich gas emanations having elevated He isotope ratio. A detailed petrologic study revealed that in the past a silicic crystal mush body resided at 7-14 km depth and was rapidly reactivated by major reheating (about 200^{o}C temperature increase) due to the arrival of hot mafic magma. The wide range of U-Th model ages of the studied zircons indicates prolonged existence of the low-temperature silicic crystal mush beneath the volcano. Crystallization of zircons within the crustal magma chamber started >100 ka before the onset of the volcanic activity. The volcanic history suggests that the melt-bearing crystal mush was rapidly remobilized even after a protracted (several 10's of ka) lull in volcanism to trigger successive eruptions in a comparatively short time window.