



The newly discovered, youngest lava flow of the Roman Province (Central Italy): volcanological, geochronological, and petrological data

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The Roman Province (Central Italy) comprises the volcanic districts of Monti Vulsini, Vico, Monti Sabatini, and Colli Albani which together erupted about 900 km³ of ultrapotassic, silica-undersaturated volcanic rocks over a time span from about 800 ka to 36 ka. Volcanic activity has been prevalently explosive characterised by plinian and caldera-forming ignimbrite eruptions.

The youngest activity of the Roman Province was mostly hydromagmatic. Relatively recent effusive activity is rare in the whole Roman Province. Two cases has been documented at Monti Sabatini (134±33 and 93±5 ka), only one at Monti Vulsini (127±2 ka) and at Vico (95 ka) whereas at Colli Albani, despite the 69 ka renewal of magmatic activity no effusive activity younger than 237±11 ka has been reported.

In order to verify whether the absence of effusive activity since 237 ka at Colli Albani Volcanic District (CAVD) represents a volcanological fact or may actually results from a lack of data, we have systematically sampled all the so far undated lava flow deposits which exhibit morphological and stratigraphical young features. This detailed study allowed us to reappraise the Colli Albani products geochronology and petrology and discover the youngest lava flow deposit of the whole Roman Province. The newly discovered lava flow is associated to the Monte Due Torri (MDT) scoria cone located approximately 1 km south of the peri-calderic scoria-cone ring formed at the end of the last explosive cycle of the Tuscolano-Artemisio eruptive phase (366-350 ka). The MDT scoria cone displays a well preserved (i.e. “young-looking”) morphological expression but, in spite of this, it was previously considered to be part of the Monte delle Faete eruptive phase (308-250 ka). On the contrary, age determination of 40±7 ka of the lava flow erupted from the MDT scoria cone evidences that the activity of this strombolian vent was nearly contemporaneous to that of the most recent, explosive phase occurring at the Albano center since 39±1 ka.

The MDT lava flow is vesiculated, highly porphyritic (Cpx+Lc), shows a coarse groundmass made of Cpx+Lc+Spl+Mel+Ne, and it is phono-tephritic in composition with relatively high MgO content. The trace elements concentrations path in MDT lava flow follows the typical Colli Albani path characterized by peaks at Cs, Th, and U and troughs at Ba, Nb, Ta, P, and Ti. Noteworthy, MDT, due to its very low Pb concentration (6 ppm), shows a peculiar Pb trough, among products from the whole Roman Province. Despite its relatively primitive composition (also testified by high Cr concentration, 60 ppm), MDT shows a Nd/Zr ratio higher than Albano primitive products, but similar to the primitive Ernici-Roccamonfina and Campanian provinces products. The 87Sr/86Sr and 143Nd/144Nd values (performed on bulk composition) fall within the range of Roman-type ultrapotassic rocks and are in agreement with the time-dependent 87Sr/86Sr path observed at CAVD. $\delta^{18}O$ values measured in clinopyroxenes are relatively high (7.49 ‰ SMOW), suggesting that magmas feeding the eruption experienced carbonate contamination.