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Maar Evolution and Magma-Country Rock Interaction at the Colli Albani Volcanic District, Central Italy.

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The evaluation of expected eruptive scenarios and possible evolution of maar-forming events at the ultra-potassic, Quaternary Colli Albani Volcanic District (CAVD) provides implications for volcanic hazard assessment in the densely populated area near Rome. The eruptive successions from monogenetic and poligenetic maars at the CAVD hold record of pre- and syn-eruptive interactions between high-K, low-silica, magmas (trachybasalt to K-foidite), and carbonate-silicoclastic to subvolcanic wall-rocks. Our data set includes stratigraphy, grain-size, componentry, ash morphoscopy and petro-chemical features of the Albano and Prata Porci eruption products, along with textural analysis of cored scoria clasts. During the activity of the monogenetic Prata Porci maar and the three evolutionary stages of the Albano multiple maar, respectively $5.2x10^7$, $3.1x10^8$, $2.6x10^8$ and $1.9x10^8$ m^3 of magma (DRE) were erupted. These study cases show repeated transitions between magmatic (i.e, strombolian fall-out) and hydromagmatic (wet and dry pyroclastic surges) activity styles, the magmatic one being significantly prevailing in terms of erupted magma volumes. Of note, evidence of phreatic explosions, a common precursor of explosive volcanic activity, is only found at the base of the Prata Porci eruptive succession. Different extents of explosive magma-water interaction were controlled by the different structural settings, Albano being located along a caldera rim and Prata Porci in a peripheral area of CAVD. In the Prata Porci case, shifts in the depth of lithic entrainment paralleled eruptive style changes, while this relationship is not clearly observed concomitant to the

Albano repeated eruptive style changes. Component and grain size distributions consistently indicate that sedimentary lithic clasts, derived from deeper levels, underwent prolonged fragmentation and transportation processes relatively to volcanic clasts derived from shallower environments. Textural evidence from cored juvenile clasts and analytical modelling of melt-solid heat transfer indicate that the interacting substrate in the Prata Porci case was at low, uniform temperature ($\sim$100 $^{\circ}$C) as compared to the highly variable temperatures (up to 700-800 $^{\circ}$C) inferred for the geothermal system beneath Albano.