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Vesicularity index of juvenile clasts from La Joya maar crater, Yuriria (MGVF): indications of magma fragmentation and timing of water-magma interaction.

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The Joya de Yuriria maar, also known as Yuririapúndaro (Blood Lake in Purépecha, the language of the Tarascan people in central Mexico). It is situated at the southern margin of the intermontane Yuriria lake basin and is one of the 22 phreatomagmatic vents within the ∼40,000 km2 wide Plio-Quaternary Michoacán Guanajuato Volcanic Field that constitutes the central part of the Trans Mexican Volcanic Belt.
Its crater is elongated in a NW-SE direction with a diameter of ∼0.9 km and a height of ∼60 m above the crater lake. It erupted through the northern distal lavas of the Pliocene/Early Quaternary (?) El Capulín and Santiago shield volcanoes. The andesitic lavas (SiO_2= 57.4-60 wt.%) of the Santiago shield are exposed as steep cliffs at the inner walls of the crater and are overlain by a decameter-thick sequence of phreatomagmatic surge and fallout deposits (Mdφ=0.25 to -6.20, $\sigma\varphi$=1.00 to 3.35, mostly leptokurtic and very poorly sorted) with scarce juvenile clasts (0- 37.0 % in -3 phi, basaltic andesitic with SiO_2= 54.4 wt.%). The maar crater shows monotonous nature of deposit which indicates restricted variation in water:magma interaction, which can be inferred from the vesicularity percentage spectrum within the juvenile clasts. About 162 clasts with grain size -3phi to -5 phi were considered to determine the vesicularity (in %). A spectrum of clast vesicularities should be seen, depending on the magma viscosity, eruption rate, and the presence and timing of magma: water interaction.
In case of La Joya the juvenile clasts are highly vesicular and is restricted to 63.03-66.69% indicating that the bubble formation and expansion of rapidly ascending basaltic andesite magma took place much before the water-magma interaction. Detail investigation of types of glass shards and its morphology within finer particles (<62 micrometer) may further confirm the above-mentioned hypothesis. This study provokes to undertake similar investigation on other phreatomagmatic vents, which may help to understand the magma fragmentation associated with such events during the Plio-Quaternary times in MGVF.