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Comparison between monogenetic cones from the active arc and the back-arc of the Trans-Mexican Volcanic Belt

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Magma generation beneath the Trans-Mexican Volcanic Belt (TMVB) is believed to be related to the complex subduction of the Rivera and Cocos Plates beneath the North-American plate. The volcanic structures prevailing in the TMVB are monogenetic cinder cones concentrated in large volcanic fields. One of the most studied monogenetic fields in Mexico is the Chichinautzin Volcanic Field (CVF) within the volcanic front of the TMVB. However monogenetic cones are also found behind the volcanic front which is the case of the Apan-Tezontepec Volcanic Field (ATVF). Little work has been done on back-arc cones and their relationship to the subducting plate is still unclear. Here, we present pre-eruptive volatile content (H₂O, CO₂, S and Cl) measured in olivine-hosted melt inclusions from two monogenetic cones (San Miguel and Bella Vista) in the ATVF. The analyzed melt inclusions have H₂O content ranging between 0.1 to 2.5 wt.% and CO₂ below detection limit up to 3588 ppm. These data indicate entrapment pressures of 0.1 to 441 MPa representing depth down to 19 km. Although similar in major element, H₂O and CO₂ contents, both cones show variations in their S and Cl concentration. Bella Vista has much lower S (30 to 240 ppm) and a wide variation in Cl content (250-574 ppm), whereas San Miguel has high and restricted S (1060 to 1230 ppm) and Cl content (410 to 480 ppm). The new data are compared with previously analyzed inclusions from two monogenetic cones within the CVF (Pelagatos and Pelado). For similar range in pre-eruptive H₂O and CO₂, the cones within the active Arc show much higher S and Cl (up to 1451 ppm S and 1500 ppm Cl). These variations must be related to the different components (continental, mantle and slab-derived material) contributing to the magma formation beneath the Arc and the Back-Arc.