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Statistical analysis of eruptive vent distribution from post-subduction monogenetic fields in Baja California, Mexico

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Volcanism in Baja California (BC, Mexico) was active from the end of the subduction of the Farallon plate (12.5Ma) until recently (< 1Ma). Most of this volcanism formed twelve volcanic fields, seven of them being monogenetic, delineating a ∼600-km-long array parallel to the Gulf of California. Previous studies on these fields have focused on the compositional diversity of magmatic products. Although geochemistry and ages of few lava flows are constrained, only two studies investigated the spatial distribution of the eruptive vents of San Borja. Within a monogenetic volcanic field, cone alignments and linear arrays are considered to reflect the geometry of feeder dikes formed either parallel to the maximum principal stress ($\sigma 1$) in the lithosphere or using pre-existing crustal fractures. These intrinsic local structures will be compared with the shape of the field, which could reflect the shape of the source at depth. Using satellite imagery to define the location of eruptive centres on four monogenetic volcanic fields from central Baja California (Jaraguay, San Borja, Santa Clara, and San Ignacio), we completed statistical analyses of their spatial distribution. Using commercially available GIS software, spatial density analysis, and statistical scripts, each volcanic field was analysed for the number and density of vents, clustering, vent spacing and alignment azimuths. Our preliminary results reveal that vent densities are within the range of 0.001 to 0.2 vents / 100 km^2. Eruptive vents are generally clustered, with density higher than 0.1 vents/100 km^2. A common elongation direction trends N135° to N152° in most clusters and fields. We thus propose a NW-SE direction as the preferred orientation of the maximum principal stress ($\sigma 1$), direction that needs to be confirmed by azimuths of the vents alignments. Using a combination of different computational methods, this study allows to quantify the influence of tectonic stresses at the deep and shallow level within the lithosphere, thus in controlling the localization of post-subduction monogenetic volcanism since the Late Miocene in central Baja California.