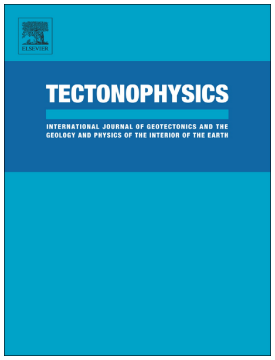

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Mechanical interaction between volcanic systems in Libya

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Abstract

The spatial distributions of monogenetic volcanoes, primarily volcanic craters, within the four principal volcanic provinces of Libya are examined and presented on a volcano-density map. Six main volcanic clusters have been identified, referred to as volcanic systems. Remarkably, the Al Haruj (AHVP) and Nuqay (NVP) volcanic provinces have double-peak volcano-density distributions, while Gharyan (GVP) and As Sawda (SVP) volcanic provinces have single-peak volcano-density distributions. We interpret each volcano-density peak as corresponding to a separate volcanic system, so that there is a total of six systems in these four provinces. There was an overlap in volcanic activity in these provinces with at least three simultaneously active. We propose that each of the 6 volcanic systems was/is supplied with magma from a large sill-like reservoir – similar in lateral dimensions to the systems/clusters themselves. Numerical results show zones of high tensile and shear stresses between the reservoirs that coincide roughly with the main swarms of extension (dykes and volcanic fissures) and shear (faults) fractures in the areas. The most recent volcanic eruptions in Libya fall within the modelled high-stress concentration zones, primarily eruptions in the volcano Waw an Namus and the Holocene Al Mashaqaq lava flow. There are no known eruptions in Libya in historical time, but some or all the volcanic systems may have had one or more