Morphology and development of lava tumuli from monogenetic basaltic volcanic field, Baharyia Depression, Western Desert, Egypt

EZZ EL DIN ABDEL HAKIM KHALAF
AND MOHAMED SALEH HAMMED

Cairo University-Faculty of Science-Geology Department
Giza - Egypt

The lava tumuli from the monogenetic basaltic volcanic fields, Baharyia Depression is reported for the first time. The studied volcanic fields are associated with compound flows near the vents that are characterised by a tube network, sky lights, ephemeral vents and turnuli. During discontinuous activity discrete, channel-fed aa flow units in near-vent position often form fan-shaped flow fields that resemble vents effused by spatter-fed or clastogenic lava. These flows resulted from (a) reconsrimtion of fountain-generated spatter around vents by syn-depositional agglutination and coalescence, and (b) syn-eruptive collapse of rapidly grown spatter and scoria. Numerous tumuli and break-outs of lava formed in the fan-shaped flow fields. In the studied lava shields three types of tumuli have been identified: (I) lava-coated tumuli, (2) upper-slope tumuli in near-source regions, and (3) flow lobe tumuli in the distal areas (in all studied areas). The widespread flow-lobe tumuli in the studied fields confirm the general agreement of low lava-supply rates. Flow-lobe turnuli areinterpreted to have been supplied with magma from tubes that originate in overflow from and through flank fissures connected with the lava lake of shield volcanoes.

The major tumuli on the fan complex show distinct dilation fractures.The fracture surfaces provide good exposure of the crust and three distinct zones are recognized: an upper zone showing columnar jointing, a middle zone consisting of planar fracture surfaces and a basal zone with distinctive banded planar fracture surfaces showing evidence of both brittle and ductile formation.Using these data a model is proposed for tumulus growth. Field analysis of the fan complex shows how it was fed by a branching tube system, leading to flow thickening, formation of tumuli and numerous pressure-ridges.

Keywords: volcanic fields; tumuli morphotypes; Baharyia Depression; dilation