

THE ADEN CRATER LAVA FLOWS, DONA ANA CO., NEW MEXICO

R.A. De Hon and R.A. Earl
Department of Geography
Texas State University

Aden Crater lava field, encompassing 75 km² in south central New Mexico, offers excellent examples of relatively young (18.2–17.5 ka), low viscosity basalt flows associated with an Icelandic-type shield cone. The cone consists of an upper channeled flow facies (map unit ch) that passes down slope into a lobate flow facies (unit lo). The outer flanks are characterized by a scabby facies (map unit sc) consisting of intercalated thin pahoehoe flows. The bulk of the lava field consists of flows, in various stages of inflation, extending southward and eastward from the cone. These distal flows consist of many inflation plateaus (units if₁₋₃) characterized by thick flows; steep flow margins; and flat, level upper surfaces.

The current re-examination of the flows at Aden recognizes four types of pits: inflation pits on inflated flows; collapse pits on thin flows; rootless shield cones (unit rs); and blocky rimmed depressions (unit br). Collapse pits occur on the upper flanks of the cone and result from removal of still liquid lava from beneath a thin lava crust. The result is a minor depression lined by broken lava crustal fragments. Rootless shield cones, 3–10 meters in diameter, are formed by local tumuli on the flow surface that lift the semi-hardened crust in to a positive relief dome rising 2–4 meter above the surrounding flow. Lava channels radiate away from the domes. Blocky rimmed depressions are the largest of the pits on the flanks of the cone. These large pits are unique in that they are irregularly shaped in plan-view, and they are surrounded by a raise rim of blocky basalt. The pits are floored by flow material that is broken by large open fractures. Blocky rim material over-lies both floor material and floor fractures. Radial lava channels extend away from the pits. Previously interpreted as explosion pits based on the presence of blocky raised rims, these irregularly shaped pits are reassessed as collapsed lava-rise tumuli that failed to form inflation plateau. The lava margins lacked strength to retain the internal fluid lava. Collapsing inflation plateaus spilled lava to the surface as the plateau surface deflated. The blocky raised rims are remnants of plateau margins surrounding the deflated interior. The four types of pits are a continuum of forms produced by similar processes governed by changing flow rheology.

