Giant Debris Avalanches From Popocatepetl Volcano, Mexico

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Collapse of strato-volcanoes and the ensuing debris avalanche deposits (DAD) pose major hazards to nearby populations. We have been studying DAD associated with volcanoes in the Tram Mexican Volcanic Belt, in south-central Mexico. PopocatepetI, 60 km from the largest city in the world, is the current focus of our studies. Field work around the volcano has revealed the presence of at least three DAD from Late Quaternary collapse of the edifice. They are separated by volcaniclastic deposits and well-developed soil horizons. At the proximal side, typical hummocky topography is developed; more distally, the tops of the deposits have been eroded, and glacio-fluvial sediments cover the deposits. Internal structures are similar for all deposits, exhibiting typical jigsaw-fit textures.

The existence of a DAD was first recognized by Robin and Boudal (1987), who estimated a volume of 30 km^3, a surface area of 300 km^2, and a runout distance of 30 km. Our studies indicate that the DADs traveled at least as far as Huehuetlan el Chico, a distance of more than 70 km; volumes and areas are at least 100 km^3 and 1000 km^2 respectively. In addition, our discovery of more than one DAD indicates that Popocatepetl collapsed several times during its recent geologic evolution. This is in accord with studies at other Mexican volcanoes (Colima, Orizaba). Multiple collapse of strato-volcanoes appears to be a common phenomenon; possible collapse of Popocatepetl in the future should be considered,