

Large-Scale, Newly Discovered, Volcanic Debris Avalanche, Donner Pass Region, Sierra Nevada, and its Relation to Underlying Tertiary Volcaniclastic Succession

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Recent geologic mapping by UCSB students disclosed the presence of widespread exposures of a massive debris avalanche in a 30 km² area of the Donner Pass region, approximately 10 km west of Truckee, California. The main foci of the mapping were the peaks and ridges around Mount Lincoln, Mount Disney, and Crow's Nest. The avalanche fills an apparent paleochannel in the underlying, flat-lying, volcaniclastic succession of fluvial and debris flow deposited units. The debris avalanche is poorly sorted, containing a wide variety of volcanic clasts, some as large as 25 m in diameter, lacking coherent internal organization. Clasts include fractured andesite breccia, polyolithic andesite breccia, stratified fluvial blocks, reworked tuff, granite, basaltic andesite flow blocks, and metasedimentary clasts. Mixed within the bulk of the debris avalanche are large subrounded blocks of basaltic-andesite with a distinctive breadcrust texture. We regard these clast types as juvenile rock and evidence of an eruption-related trigger to the avalanche. K-Ar dates from lava flows stratigraphically above and below the debris avalanche give an age range of 13.5/12.9 to 7.4 Ma. The exposed depth of the paleochannel, which trends approximately E-W, varies from 7 m thick on Crow's Nest to 280 m thick on Mount Disney. Clast size increased from NW to SE, suggesting a source 5-15 km to the south that may include Tinker Knob (6 km) or Squaw Peak (12 km). The units underlying the debris avalanche comprise a stratified section of intercalated lapilli tuff and fluvially reworked volcaniclastic rocks. The lithology of volcanically derived units includes these rocks and clasts of metasedimentary rock and granite, the local basement rocks. Paleocurrent directions measured in these units vary, but typically trend N-S at the bottom of the section and NW at the top.