

# **SPECTACULAR SOFT SEDIMENT DEFORMATION IN EOCENE LANDSLIDE KLIPPEN: SINGLE OR MULTI-STAGE SLIP HISTORY? SAWTOOTH MOUNTAINS, WESTERN NEW MEXICO**

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The Sawtooth Mountains are the erosional remnants of large-scale Eocene mass movement deposits. The landslides occurred in volcanoclastic sandstones and conglomerates of Eocene lower Spears Group, deposited on the sedimentary apron of a stratovolcano. Two subhorizontal faults bound the bases of two slide sheets. The lower, poorly exposed, fault overlies fine-grained lowest Spears siltstones above Baca Formation. The sheet above it displays spectacular soft-sediment folds and granular faults and is bounded above by a fault with 15-60 cm of cataclasite and ultracataclasite. Conglomerates above are mostly subhorizontal but become vertically dipping and east-facing in the east. The purpose of this study is to constrain the rate, direction, and the number of slip events that formed these composite landslide deposits, using geologic mapping, cliff-face mapping, structural and petrographic analyses.

Sparse clastic injections, and fault rock samples that show mainly randomly oriented grains, minor clay, and locally foliated ultracataclasite, suggest rapid transport. Sparse striations in the eastern parts of the study area are scattered from N to ESE and compatible with northward slip down the sedimentary apron or ESE slip from a Laramide reverse fault (Dobbins, 2016). Many new kinematic data (striations and from Reidel shear orientations) also cluster in N and ESE directions, with much scatter. Overturned fold hinges also exhibited scatter in both attitude and vergence, showing clustering only locally. Sparse evidence for multiple movements was observed, including folding of the upper detachment, clasts of fault rock mixed into basal hanging wall, clasts of cataclasite within cataclasite, and E-trending striations cross-cutting N-trending ones. We interpret that transport to the north, down the sedimentary apron, was followed by transport to the ESE from the Laramide reverse fault. Future research will focus on understanding the relationship between these landslide deposits and similar deposits in the neighboring Datil and Gallinas Mountains.

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