



Low-angle slumps in lacustrine environments: the Shoshone (Tecopa basin, California) example

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In lacustrine environments, the presence of seismically-induced slump sheets on gentle slopes seems to be very widespread (Alsop and Marco, 2013; García-Tortosa et al., 2011; Gibert et al., 2005). A low-angle slump is extraordinarily well exposed in middle Pleistocene lacustrine deposits of the Tecopa Basin (California, United States), next to the village of Shoshone. Good lateral continuity of stratigraphical sections allowed a detailed description of the slump sheet and a reliable interpretation taking into account main morphological features, data coming from the facies analysis of the involved beds and on the regional tectonic activity. The slump sheet, ~ 2 m thick, is constituted by four units with different rheological characteristics. This heterogeneous composition is the key controlling factor which produces a large variety of soft-sediment deformational structures of different scale (folds, thrusts, breccias, fluidization structures). An earthquake related to regional faults might cause liquefaction and fluidization, and the initiation of the gravitational movement. When slump translation ceases, at the toe of the slump, then contractional strain propagates upslope and internal deformation occurs in the slump sheet. The top bed of the slump sheet, ~1 m of sands, developed decametric-scale folds while underlying sediments migrates laterally from the synform hinges to the core of the anticlines. Different velocity gradients in the downslope direction generate several superposed layer-parallel shear with two main detachments and many secondary internal ones. This new example in the Tecopa Basin, confirms that slumps are a good record of seismicity in low-angle sedimentary environments.

Alsop, G.I. & Marco, S. (2013): Seismogenic slump folds formed by gravity-driven tectonics down a negligible subaqueous slope. *Tectonophysics*, 605: 48-69.

García-Tortosa, F.J., Alfaro, P., Gibert, L. & Scott, G (2011): Seismically induced slump on an extremely gentle slope (<1°) of the Pleistocene Tecopa paleolake (California). *Geology*, 39: 1055–1058. doi:10.1130/G32218.1

Gibert, L., Sanz de Galdeano, C., Alfaro, P., Scott, G. & López Garrido, A.C. (2005): Seismic-induced slump in Early Pleistocene deltaic deposits of the Baza Basin (SE Spain). *Sedimentary Geology*, 179: 279–294. doi:10.1016/j.sedgeo.2005.06.003.