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3D architecture of fossil submarine slides in the Eocene Sobrarbe deltaic complex (Ainsa, Spanish Pyrenees)

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On continental margins, major submarine sediment reworkings are triggered by slope instabilities. Such phenomena are observed in the Eocene Sobrarbe deltaic complex, which represents the last marine infill of the Ainsa Basin (Spanish Pyrenees). Sliding occurred during sedimentation and transferred significant amounts of sediment into the distal parts of the basin. Bedding in the unit is disrupted by numerous submarine gravitational slide scars. Most of the scars are marked by an angular unconformity between underlying *in situ* layers, which were cut by the slide, and an overlying deposit that fills the depression. Upslope lateral continuity of sediments indicates that deposition was continuous.

Accurate 3D positions of all slide scars were determined using high-precision topographic data. The accurate geometries of scar surfaces were identified and restored into a 3D topographic model using the EarthVision software. Six main fossil submarine slides are described in terms of geometry, infill rate, sediment nature and soft deformation, and spatial relationships with other slides.

The distribution of the scars observed in this complex collapse structure indicates that the successive sliding surfaces occupied more and more distal positions. Most surfaces appear to have developed within the infill of previous surfaces, suggesting that slide formation was induced by the occurrence of pre-existing slides. It is likely that this was related to high sedimentation rates in depressions created by slides, which can be about 10 times higher than in the overall Sobrarbe deltaic complex. As a consequence compaction was probably lower in depressions, creating excess pore fluid pressures that were able to trigger sedimentary sliding.

Although these results from the studied part of the Sobrarbe deltaic complex may be of local value, comparison of sedimentary observations and stratigraphic relationships from this complex with present-day slided areas should be mutually beneficial.