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Seismically-induced soft-sediment deformation structures in Upper Triassic deep-water carbonates (Central Sicily)

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We describe soft-sediment deformation structures into the Upper Triassic cherty limestone outcropping in the Pizzo Lupo section (Central Sicily, Italy), pertaining to the deep-water palaeodomain of the Southern Tethyan margin.

In the study section, mainly consisting of thin-bedded mudstone/marl alternations with bedded chert intercalations, some lithofacies have been separated on the basis of the abundance of the calcium carbonate/clay content and the overall textural features.

The deformational structures, displaying different deformational styles as folded and faulted beds, disturbed layers, clastic dikes, and slumps occur mainly in the deformed horizons that involve marl-dominated lithofacies. Small-scale water-escape structures involve beds with nodular fabric. Synsedimentary faults affect the mud-limestone dominated lithofacies, which are characterized by fault-rotating blocks producing lateral thinning. These bodies appear to have moved coherently along an overall planar surface.

We relate these soft-sediment deformations to slump sheets, associated with down-slope sliding of sedimentary masses. The deformation mechanism and driving force for these soft-sediment deformations are due essentially to gravitational instability and dewatering.

Detailing, rotational (slump) and translational (glide) slides and water-escape are the main processes causing the distinguished deformational styles.

The synsedimentary extensional tectonics that affected the Upper Triassic pelagic deposits was the triggering process responsible for the instability of the seafloor inducing loss of coherence of the unconsolidated sediments on the sea bottom, developing a large number of gravity-driven slides.

The analysis of both of these SSDSs and their relationships with the structural scenario allow us to hypothesise that they are seismically-induced.