



## **The record of seismic events in the lacustrine deposits: the recognition of seismites in the Pleistocene lacustrine deposits of the Sant'Arcangelo Basin (Southern Italy)**

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Seismites have been reported from all sedimentary environments but the record of seismic events seems to be well preserved only in the lacustrine deposits. Deformed beds related with seismic liquefaction and fluidization processes have been used in sedimentologic and palaeoseismic studies to evaluate Magnitude and time of recurrence of moderate- to high-energy earthquakes in a certain area or basin. Nevertheless, the recognition of soft-sediment deformation structures as seismically-induced is not an obvious practice: liquefaction and/or fluidization processes can be induced by a large number of trigger mechanisms (including overloading, unequal loading, wave-induced cyclical and/or impulsive stresses, sudden changes in groundwater level, earthquakes, etc.). In this work, we report an example of interpretation of the trigger mechanism of some deformed beds in the Pleistocene lacustrine deposits of the San Lorenzo Cycle (Sant'Arcangelo Basin - southern Italy).

The lacustrine deposits of the San Lorenzo Cycle belong to the infill succession of the Sant'Arcangelo Basin, a Pliocene to Pleistocene satellite basin, developed close to the front of the south-Appennines thrust belt. The lower to middle Pleistocene lacustrine succession is made up of siltstone and claystone interbedded with sandstone, carbonate and volcanoclastic beds, arranged in fining-upward sequences. The upper to middle part (about 50 m thick) of the succession (about 200 m thick), has been investigated in detail in the depocentral sector of the lacustrine basin. Here, soft-sediment deformation structures occur in fine-grained sandstone and claystone alternations and show a

wide morphological variability (deformed laminations, slumps, load structures, large vertical water-escape structures and neptunian dykes). Their formation occurred during and after sedimentation, with different mechanisms of deformation: some structures are related to liquefaction and fluidization processes (viscous fluid behaviour) while others occurred when sediment had already undergone lithification and its behaviour was plastic and/or brittle.

Facies analysis and detailed morphologic study of the soft-sediment deformation structures indicate that the main trigger agents for deformation were seismic shocks and overloading induced by sudden deposition of coarser sediments onto clays due to the arrival of density currents. Thus, the soft-sediment deformation structures provide a continuous record of the tectonic and sedimentary processes that acted in the lacustrine basin from sedimentation until diagenesis.