



## **Relation between soft sediment and brittle deformation in a melange formed at the transition from subduction to collision**

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The Sestola-Vidiciatico Unit is a 500 to 1 km thick melange, cropping out on the Adriatic side of the Northern Apennines and formed starting from the Miocene during the transition from subduction to collision. This unit is sandwiched between the foredeep deposits (Cervarola Unit and Marnoso-Arenacea Unit) and the Ligurian Late Cretaceous - Middle Eocene accretionary prism. Recent studies suggest that the SVU is a fossil example of the shallow part of a subduction channel in an erosive margin.

This melange has been produced at the orogenic wedge toe by tectonic and gravitational processes recycling both the Cretaceous material belonging to the previously deformed Ligurian units and the Late Eocene-Early Miocene slope deposits. Massive debris flows are here in tectonic contact with slivers of slope and prism toe deposits, occurring as broken formations. Slope and foredeep deposits have been deformed when they were not yet lithified and entered the system with a very high water content.

In spite of the convergent structural environment the mesoscopic analysis has revealed features as conjugate sets of normal faults that suggest an extensional stress field at least in the shallow part of the system.

The detailed study of these units and the comparison with the structures inside the already lithified and deformed Ligurian Units allowed the reconstruction of the structural evolution from soft sediment to brittle deformation giving evidence for different rheological behaviour depending on lithology and stage of lithification.

For example, despite several features are testifying large fluid circulation, mineral

precipitation on fault surfaces developed in the unlithified rocks is absent and rather characterized by “hydroplastic” wavy appearance. Instead, in the lithified rock, there are evidence of cyclic high fluid pressure, with a widespread development of veins. A possible explanation for this difference can be found in the relationship between the fluid pressure, the vertical stress and the shear resistance of the deforming rocks.