

# DEFORMATION FEATURES WITHIN THE SESTOLA-VIDICIATICO UNIT: A POTENTIAL CASE HISTORY OF A FOSSIL EROSIVE SUBDUCTION CHANNEL AT THE SUBDUCTION-COLLISION TRANSITION

Francesca Remitti, Paola Vannucchi and Giuseppe Bettelli

*Dipartimento di Scienze della Terra, Università di Modena e Reggio-Emilia, Italy.*

## ABSTRACT

In the Northern Apennines the evolution of the frontal wedge during the Miocene transition from oceanic subduction to continental collision is preserved in an extensive chaotic complex or *mélange* called the Sestola Vidiciatico Unit (SVU).

The SVU is sandwiched between the Oligocene-Miocene foredeep deposits and the overlaying Ligurian oceanic units. These latter units represent an ancient accretionary prism build up during the closure of the Ligurian-Piedmontese oceanic basin. From the Oligocene to the Miocene time, the Ligurian prism progressively overthrust the thick silicoclastic turbidite sequences deposited in an outwards migrating foredeep-basin. The SVU is entirely composed of huge debris flow deposits, large blocks/chunks and slabs (up to few km in size) of the already deformed Ligurian or sub-Ligurian units preserving their original internal state of deformation, alternated with slices of various sizes of Upper Eocene-Lower Miocene slope apron deposits.

Detailed structural analysis of all the different components of this *mélange* shows that:

- the contacts between the single components are usually structural;
- the slope apron deposits do not show any evidence that they experienced shortening and contraction, they instead

are pervasively sheared and cross-cut at all scales by sets of conjugate extensional mesoscopic faults, which have been originated before the complete lithification of the sandstone layers. Also the debris flow deposits and the blocks of the Ligurian units are split by extensional brittle mesoscopic faults sealed by shear calcite veins.

In the footwall of the SVU the upper part of the foredeep deposits shows evidence of soft-sediment deformation originated at very high fluid pressure (repeated events of hydrofracturing) and is characterised by sets of conjugate extensional mesoscopic faults.

Moving from SE to NW the SVU displays a clear change in composition as it recycles progressively more internal parts of the former Ligurian accretionary prism.

At the same time, the epi-Ligurian sequence shows an initial stage of rapid uplift followed by a progressive deepening. From present-day active subduction zones we know that erosive margins are marked by three main characters: extension in the prism, progressive subsidence and transfer of material from the upper to the lower plate. The second and the third characters have been identified in SVU which may be considered a fossil analogue for subduction erosion if we compare the first stage of collision to the subduction of thick crust at an active margin that shift the mechanism from accretion to erosion.

