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New data and interpretation on Ligurian Brianconnais foreland fold and thrust belt

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A new structural setting for the External Ligurian Briançonnais (ELB) has been recently proposed (Piana et al., 2009). ELB is interpreted as the inner part of the post-Eocene sub-Alpine foreland fold and thrust belt, placed in a southernmost part of the Western Alps belt. ELB is characterized by flexural folds and non-metamorphic shear zones that deform a Triassic–Eocene stratigraphic succession largely detached from its volcanoclastic Permian basement. This last was instead locally affected by low-grade metamorphism. The stratigraphic features of the ELB sedimentary succession are partially similar with those of the Brianconnais units cropping out in the central part of the Western Alps arc.

The Alpine structural evolution of ELB domain was strongly controlled by primary features as paleofaults and paleo-escarpments that allowed partitioning of deformation into different-order sub units that show different structural associations and different intensity of deformation. The pre-Alpine geological features are well preserved in many places and at several stratigraphic levels at all scale, as evidenced by macro-, meso- and microscale features. The ELB succession still displays major thickness and facies variations with anomalous internal stratigraphic contacts and with abrupt lateral changes due to the presence of paleo-escarpment representing the morphological expression of paleofaults with displacements of several hundred metres, sealed by younger sediments and successively reactivated by Alpine fault movements (Bertok, 2007). Along the fault-related paleo-escarpments peculiar and anomalous stratigraphic features can be observed, such as erosional stratigraphic contact covered by stratified breccias and authigenic mineral crusts, or chaotic levels including re-sedimented metre-sized blocks. The preservation of such km-scale continuous syn-sedimentary features demonstrates that the ELB did not suffer significant volumetric reorganization, neither diffused transposition phenomena. This is also confirmed, at most stratigraphic levels, by ubiquitous preservation of depositional or diagenetic fabrics such as bedding and laminations, mineralized hard grounds with delicate stromatolite structures, neptunian dykes and sills, bioturbations, graded bedding, desiccation shrinkage pores and dolomite pseudomorphs of gypsum crystals, original shape of pebbles and chert nodules, macro- and microfossils with preserved morphological details etc. The high degree of preservation of these primary features suggests the absence of metamorphic transformations.

The role of the primary features on the kinematic evolution and definition of the present geometric setting of ELB domain is here discussed. In addition to the cases where the paleofaults can be directly observed, the presence of similar structures may be also inferred on the basis of contrasting structural settings. Paleofaults in fact acted as lateral transfer during the Alpine contractional evolution, separating different-order tectonic subunits, characterized in some cases only by minor detachment along the weakest stratigraphic layers, or conversely by development of superposed fold systems or, in the case of the main shear zones, by closely spaced dissolution cleavages; the litho-stratigraphic setting strongly controlled the development of the regional dissolution foliations and the amount of the bedding-parallel displacement.

The deformation mechanisms that affected the ELB sedimentary succession mainly consist in non-metamorphic dissolution processes giving origin to widespread dissolution cleavages. Minor occurrence of transposition of bedding is recorded, while a recurrent evolution of fold axial plane foliations into frictional slip cleavages is observed.

Although a gradual decrease in the intensity of deformation from the Internal Ligurian Briançonnais to ELB and Dauphinois Domain is observed, the ELB boundaries correspond indeed to several Km-long transpressive shear zones. The ELB final geometry and deformation patterns result from the interplay between structural and stratigraphic factors, as well as erosional vs. depositional processes. The resulting strong horizontal and vertical

heterogeneities should be carefully considered in the reconstruction of the post-Eocene kinematic evolution of south-western Alps.

References:
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