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Evolution of the Northern Apennine orogenic wedge: combining data from structures of deep and shallow units, thrust-top and foredeep deposits

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The Northern Apennine fold and thrust belt consists of structural units derived from both oceanic and continental domains now represented in the Ligurian, Subligurian and Umbria-Tuscan Units. These units record the long term history of the orogenic wedge during its main evolutionary stages, from the oceanic subduction to precollisional and collisional continental underthrusting. During this evolution, the different units experienced diachronous vertical and horizontal motions due subsidence, tectonic loading and exhumation. The evolution of Northern Apennine orogen is here discussed by combining data from units underthrusted and accreted at different structural levels. In particular, our contribution is focused on the structural evolution of the metamorphic and unmetamorphic Tuscan Units and the tectono-sedimentary reconstrution of Oligo-Miocene siliciclastic successions of thrust top and foredeep basins.

The Chattian-Langhian time-migrating foredeep deposits, the Aquitanian-Burdigalian thrust-top and the Burdigalian-Langhian piggy-back basins are lacking in wedge-derived debris. This suggests a submarine nature of growing wedge and allows to exclude the importance of active surface erosional processes during coeval pre-Pliocene exhumation of the metamorphic units.

Structures recording nappe-excision are described in the superficial units (e.g. the Tuscan Nappe) where low angle faults are locally involved in later large scale regional folds. In the deeper units, superimposed syn-metamorphic fabrics can be connected with underthrusting and syn-contractional exhumation with vertical movement of the unit within the deeper part of the wedge.

On the basis of overprint relationships and time-correlations we compare the major Burdigalian and post-Tortonian tectonic evolution of the external part of the wedge with the evolution of the more internal one.

Regional cross-sections through the Northern Apennine will be presented including all the available structural, thermocronological, biostratigraphic and vitrinite data. These data integrated with available subsurface (seismic and well logs) data will be used to unravel the evolution of the Northern Apennine wedge showing that the exhumation of the internal metamorphic units was contemporaneous with thrusting in external part of the wedge while the wedge itself was internally thinned in a continous contractional setting.