

Regional fold structure analysis in the Eastern Alpi Apuane, Northern Apennine

Poster

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The Alpi Apuane represent a large tectonic window within the Northern Apennine in Italy. In this area, not only a complete succession of the tectonic units of the Northern Apennine can be studied, but also the structures that result from at least two Alpine deformational events.

The rocks of the Alpi Apuane have been deposited from Triassic to Tertiary times on the Hercynian basement of the passive continental margin of the Apulian plate. The sedimentary succession included meta-dolostones, marbles, metacherts, schists, and turbiditic arenites. During late Oligocene more internal units (the Tuscan Nappe together with the overlying Ligurides and Sub-Ligurides) were thrust over the External Tuscan Domain (Alpi Apuane). The Alpi Apuane stratigraphic sequence was subject to greenschist facies metamorphism and severe deformation within a crustal scale shear zone. Kilometre-scale tight recumbent folds developed during a first deformation event (D_1). The successive crustal shortening resulted in a further tightening of folds and the formation of an antiformal stack geometry with a central culmination. This late phase of D_1 produced a curving of N-S (Apenninic) trending folds towards an E-W (anti-Apenninic) trend (Fig. 1a). During Miocene the over-

thickened antiform underwent gravitational collapse resulting in the refolding of D_1 structures producing D_2 open and back folds.

The studied field area is located in the Eastern Alpi Apuane between Arni and Isola Santa in an area of anti-Apenninic trending D_1 folds. The purpose of this study is to contribute to an understanding of

1. how the anti-Apenninic fold trend is developed in the Eastern Alpi Apuane,
2. how the D_2 deformational event influenced the D_1 folds in the area, and
3. how the anti-Apenninic fold trend developed.

Hence, field work focussed on the structural analysis of folds at all scales (from kilometre-scale to micro-scale).

In the field area, D_1 folds are commonly highly non-cylindrical and sometimes even sheathfold-like. This fold geometry can be found in thin sections, hand specimen, to outcrop- and /cartographic scale. The development of D_2 structures showing sub-horizontal axial planar crenulation cleavage is to a great extent dependent on the lithology and on the orientation and the intensity of the development of D_1 structures. The results of our studies suggest that the anti-Apenninic is due to a complex interference pattern between two generations of isoclinal sheath-like folds (D_1 and Late D_1) refolded by later collapse folds associated to a sub-horizontal crenulation cleavage (regional D_2).

References

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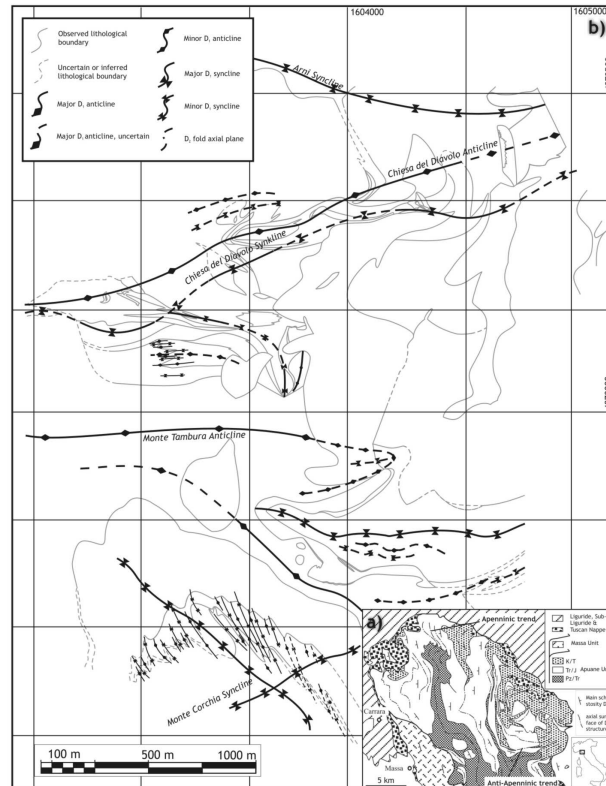


Figure 1: a) Geological setting of the Alpi Apuane region. Apuane Unit: Pz//Tr = Paleozoic to Triassic metavolcanics, phyllites, quartzites and metaconglomerates, Tr/J = Upper Triassic to Liassic carbonate platform deposits, K/T = Cretaceous to Tertiary phyllites and metasediments. The axial surfaces of D₁ folds show two different trends: Apenninic and anti-Apenninic. Map by courtesy of G. Molli (modified after Carmignani & Kligfield 1990). b) Structural geology map of the area between Arni and Isola Santa in the Eastern Alpi Apuane. The main fold trend of D₁ folds is anti-Apenninic. Modified from Burchardt (2005).

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