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**Minor Fold Development And Evolution
Within The Palermo Mountains Thrust Belt**

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The structural setting of the Palermo Mts. thrust belt is characterized by a stack of imbricated Panormide, Imerese and Trapanese tectonic units, locally overlain by remnants of the uppermost Numidian and Sicilide Nappes (Catalano et al, 2000). Large clockwise rotations accomplished the thin skinned emplacement and internal deformation of the thrust sheets: the innermost units (Panormide and Imerese) experienced rotations as large as 120°, whilst the easternmost Trapanese Units was affected by lesser rotation (about 60°) (Channel et al., 1990).

In this study we analyzed the geometrical characters and the attitudes of the minor folds, surveyed during a detailed structural mapping of the Eastern part of the Palermo Mountains, in order to reconstruct the tectonic history of the region.

The Imerese Units crop out in the northern part of the studied area, structured as a relatively simple, South-dipping monocline. In the Southern part of the studied area, the superposition of the Imerese Units over the Trapanese Units crops out at M. Leardo (along the M. Kumeta-La Serra Ridge), and can be traced by seismic reflection profiles over a large area in western Sicily (Catalano et al., 2000).

Both Imerese and Trapanese Units are characterized by the presence of minor (or mesoscopic) folds, with wavelength ranging 1-10 m and amplitude 0.2-2 m, rarely singled and more often grouped. They nucleate preferentially in well, thin bedded sequences; the occurrence of alternated competent and less competent strata also favors fold occurrence. Their morphology can be regarded as sine waves and chevron folds, pertaining to classes 1B and 1C of Ramsay Classification (parallel folds with more or less pronounced hinge thickening).

Apart from the synsedimentary, ductile folds (named D1), developed in still soft sediments, two sets of tectonically generated minor folds (D2 and D3) were observed in both Imerese and Trapanese Units, nucleated during subsequent, distinct tectonic events. Well exposed examples of interference pattern were observed, particularly in the Imerese Units (fig. 1).

D2 fold hinges trend about N330° (with WSW-ward vergence) in the Imerese Units, and about N270° (with S-ward vergence) in the Trapanese Units, where they crop out along, and are parallel to, the M.Kumeta-La Serra anticline. D3 fold hinges trend about N60° (maximum horizontal stress NW-SE) in both Imerese and Trapanese Units.

The tectonic events these fold systems are related to, have been reconstructed by comparing their orientation pattern to the paleomagnetic data and to the structural setting of the region. We reconstructed a three-phase tectonic history, whose age is possibly indicated, based on the age of syntectonic deposits in surrounding areas:

Event 1- D2 Imerese folds were generated during the thin-skinned overthrusting of the Panormide and Imerese Units over the Trapanese Units (Late Miocene), accomplished with about 60° clockwise rotation of the allocthonous units: the folds nucleated with a NNE trend and were emplaced with a W-E trend.

Event 2 – D2 Trapanese folds were generated during the internal, “deep seated” deformation of the Trapanese Units (Lower-Middle Pliocene), accomplished with a further, 60° clockwise rotation: the folds nucleated with a NNE trend and were emplaced with their present, W-E trend. The D2 Imerese folds were passively rotated too, reaching their present, NNW trend.

Event 3 – Recent tectonic history of Northwestern Sicily is characterized by transpressive tectonics along steep faults, reactivating deep seated thrusts (Upper Pliocene-Quaternary). During this event, minor folds nucleate in both Imerese and Trapanese units, refolding previous structures and generating interference patterns. Minor, local rotations of D2 fold axes can be also related to this latter event.

References

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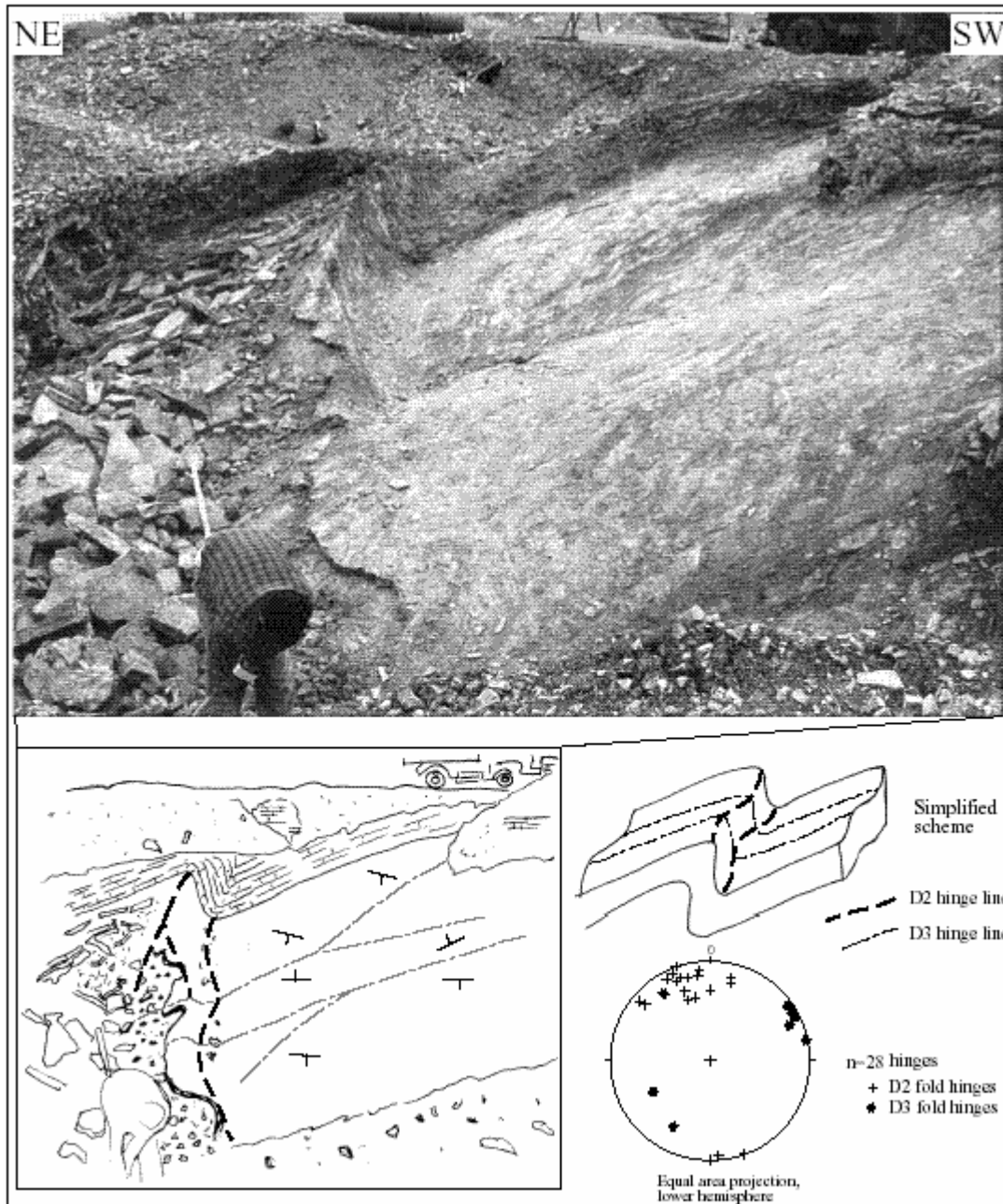


Fig. 1

Fig. 1 – Interference structures between D2 and D3 folds. Belmonte Mezzagno, Fm. Mufara (Imerese Units). The outcrop consists of calcareous, regular beds, with thin marly interstrata. Bold lines highlight D2 hinges; thin lines D3 hinges.