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Low Angle Extensional Faults in a Thrusting/Compressive Regime

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Contractional architecture within the compressive edges of mountain belts is dominated by thrust faulting. Thrust faults of regional extent produce the emplacement of thrust nappes along low angle faults spanning for of kilometres. The erosion, and related removal, of connecting portions of a nappe may isolate remnant portions of the nappe, or klippen. The process results in exotic rock blocks of different sizes resting on the hanging wall of low angle faults. This simple structural architecture may be misinterpreted because as the result of a more complex deformation history. Studying the meaning of exotic rock blocks along a thrust fault of regional extent in the Southern Apennines, Italy, we show that previously interpreted thrust-related klippe are the products of a subsequent deformation stage overprinting the thrust features. A suite of low angle, foreland direct, brittle faults developed during the younger deformation stage were recognised in the studied exotic rock blocks. Low angle faults merge at the basal tectonic contacts of the rock blocks, and truncate thrust-related structures in the footwalls. The low angle faults cut down-section into the footwalls, and appear extensional. The meaning of the low-angle extensional faults is discussed in the framework of the transition tectonics from syn-orogenic contraction to late/post orogenic extension, accompanied in the Southern Apennines by intense uplift. We interpret the extensional tectonic fabrics as the products of a heterogeneous deformation resulting in progressive tilting of weak interfaces. In the structures, gravity sliding processes can induce normal faulting compatible with a thrust regime. The findings has implications for the reconstruction of the history of deformation of a large sector of the Southern Apennines, Italy.