Geophysical Research Abstracts
Vol. 12, EGU2010-2219, 2010
EGU General Assembly 2010
© Author(s) 2010

deducing the sequence of deformations during chain building from the analysis of minor structures: the case of the Sicily Belt (Central Mediterranean)

fabrizio nigro (1), pietro renda (2), and rocco favara (1)

(1) Istituto Nazionale di Geofisica e Vulcanologia, Sezione di Palermo, via U. La Malfa n. 153, 90146, Palermo, Italy (f.nigro@pa.ingv.it), (2) Dipartimento di Geologia e Geodesia dell'Università, via Archirafi n. 20, 90100, Palermo, Italy

Kinematics of mountain belts is often very difficult to decipher. Main problems consist in the linkage between different stages of deformation which define the chain building, their significance in the context of lithospheric evolution dominates by plate collision and the interaction with previous structures recorded in the rocks. Also, the overprinting of structures developing later with respect to the chain building may further make complicate the way to unravel the tectonic evolution of the wedge.
Folding and faulting are the dominant modes for strain partitioning during chain building. The micro-to-macroscopic related structures represent shortening accommodation in the shallow crustal levels during plate collision. The structures defined by both modes are often geometrically and kinematically linked. Folding and faulting may also be representative of distinct episodes of tectonism.
Meso-scale structural observations provide a powerful tool to unravel the evolution of map- and regional-scale structures.
Several studies are known worldwide, regarding the deformative history during a single contractional episode. Also in the Mediterranean region, several outcrop- and map-scale examples are consistent with a progressive deformation model, where folding and thrusting are interpreted as kinematically linked.
The connection between thrusting-and-folding evolution and the wedge failure towards the extensional collapse in collisional settings is poorly argued. Different opinions are known about this concept: i) one view is that extension post-date thrusting and wedge growth and is due to thermal processes in the inner zones of the chain built; and ii) the other view is that extension develops during the chain building processes and is related to the wedge taper evolution.
In Sicily, located in the Central Mediterranean, lack a kinematic model relative to the chain building, including folding-and-thrusting and extension. Our aim is to provide constraints to help unravel the structural evolution of the Sicily chain using overprinting mesoscopic fabrics and their relationships to larger structures.
The geometric differences existing between some types of structures within the belt and their overprinting relationships allow delineating the timing of deformations during chain building and post-collision tectonic history.
The overall structural setting of the mountain chain reflects therefore the deformation and the progressive thrusting migration forelandwards, with extensional faulting overprinting and inverting formed thrusts.
Most of the data available for this work come from detailed analysis in a few key areas, ranging along the Northern Sicily, where minor structures are overprinted to form a single sequence.
Our study of outcrops throughout the region has recognised that the progression of deformation is represented by four regionally-significant structural stages (layer-parallel shortening, folding-and-thrusting, extension and renewed thrusting). The first stage of deformation includes several sub-stages (layer-parallel shortening, bed-parallel simple shear and fold nucleation). Deformation continued in a second stage, where thrusting was coupled by fold amplification and tightening. Kinematic evolution is provided by a third stage, where dominantly negative inversion of previous weakened zones and mechanical discontinuities occurred, coupled by normal faults activation.
Out-of-sequence thrusting follows the chain thinning phase, as the late orogenic deformation phase of the contractional tectonics which affected Sicily.
Each stage is defined as a discrete phase of deformation, characterised by the development of a characteristic set of structures, such as cleavage, folds, faults and veins. Each deformative step may be sequentially framed in a kine-

matic history, where a continuous shortening process, halted by an extension episode due to chain overthickening, in a tectonic setting dominated by collisional tectonics.