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faults role in geological processes. Repeated changing of activity mode and magnitude from basin formation to mountain belt staking: the case of the Sicilian Chain (Central Mediterranean)

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Faults reactivation (positive, oblique or negative inversions) often drives mountain building processes, from basin formation to accretionary wedge emplacement and its syn- and post-orogenic modifications.
Several analytical studies on faults reactivation highlighted the importance of pre-existing fault orientation in the stress field, even though reactivation processes have only recently been considered as an important control in fault propagation. A better understanding of reactivation is essential to establish whether a fault is extinct or not, to better evaluate possible episodic fault activity and to determine the effects of reactivation on fault-growth behaviour and scaling relationships.
Inherited normal faults pattern deriving from basin formation (i.e.: passive margin evolution), involved later in orogenic processes, may represents a constraint feature that controls the chain architecture and so the emplacement pattern and kinematic partition.
In fact, these faults form zones of mechanical weakness that influence the architecture, kinematic pattern and distribution of crustal-scale deformation in both continental and oceanic regions. As long as a pre-existing fault remains mechanically weaker than its surroundings, strain is preferentially concentrated in the fault zone. This occurs, irrespective of whether the deformation is continuous or interrupted by periods of little activity, because pre-existing faults are surfaces along which the cohesive strength and the friction coefficient are lower than those of unfractured rock volumes.
Otherwise, new-timed of thrust geometries firstly activated in convergent settings may act as a preferential strain partitioning zones during intra-collisional kinematic evolution processes driving the chain building, for example related to the mechanical status of the chain-foredeep-foreland system (i.e.: wedge subcritical, critical or supercritical stages).
Multistep faults activities may be recognised through mesostructural analysis of master and minor faults populations recorded within the basin successions that experienced afterwards positive inversion to form thrust sheets in collisional-dominated settings.
In Sicily (Central Mediterranean) a lot of pre-, syn- and post-orogenic brittle structures have been analysed. These faults have often recorded overprinted kinematic indicators, suggesting repeated interplay between extensional/oblique/compressional stress fields during geologic time.
A comparison of structural and syn-deformational stratigraphic features allow us to recognise the palaeotectonic history of the Sicilian Chain and to hypothesise its kinematic evolution, from basin formation to the chain building and -earlier- chain modification of this segment of the Maghrebides African Margin. These faults experienced repeated changing of activity mode (positive and negative reactivations), magnitude and surface geometries, determining obstacles or preferential ways for strain partitioning, with regards to their size and orientation, during the syn- and post-orogenic processes.