



## **On the meaning of 'regional stress field' and 'tectonic phase'.**

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The terms 'regional stress field' and 'tectonic phase' are commonly used, and sometimes abused, in the geological and geophysical literature. The former usually represents the stress distribution in space, while the latter indicates the persistence of a specific stress field during a specific time window. The characterisation and the identification of both a 'regional stress field' and of a 'tectonic phase' by a unique (and uniform in space and time) stress tensor is clearly an oversimplification of geological reality (Caputo, 1995). Indeed, the occurrence of temporal and spatial variations of the stress tensor during brittle deformation of a rock volume is a crucial problem from outcrop (Caputo and Hancock, 1999) to crustal scale (Caputo, 2005) and it should be carefully faced by researchers when attempting to estimate the stress field or to reconstruct the tectonic stratigraphy of a region.

Several field examples and literature data from complex tectonic structures are reviewed and used to present relevant case studies and to argue about small- and large-scale spatial variations as well as about short- and long-term temporal variations of the stress trajectories and of the stress magnitudes which continuously occur during a brittle deformational process.

In order to discuss the possible causes of this rock behaviour during fracturing process, a genetic partitioning of the stress tensor is proposed, showing that any stress field within a crustal volume can be considered as the sum of relatively simple stress tensors associated with specific 'genetic' components like the gravitational, the tectonic, the fluid pressure, the thermal and the diagenetic one among others. Each genetic component is a function of several parameters, though the variable 'time' always plays a crucial role. Having documented and discussed the stress variability during brittle deformation showing case studies from different tectonic conditions, the ensu-

ing challenge is represented by the definition of the two above terms, their correct use as well as their limitations as regards space and time dimensions.

Caputo R. (1995): Evolution of orthogonal sets of coeval extension joints. *Terra Nova*, **7**, 4, 479-490.

Caputo R. (2005): Stress variability and brittle tectonic structures. *Earth-Science Rev.*, **70**, 1-2, 103-127.

Caputo R. & Hancock P.L. (1999): *Crack-jump* mechanism of microvein formation and its implications for stress cyclicity during extension fracturing. *J. Geodyn.*, **27**, 45-60.