Geophysical Research Abstracts
Vol. 16, EGU2014-3040, 2014
EGU General Assembly 2014

The paradox of vertical $\sigma 2$ in foreland fold and thrust belts

Stefano Tavani

Dipartimento di Scienze della Terra dell'Ambiente e delle Risorse, Università Federico II, Napoli, Italy
(stefano.tavani@unina.it)

Occurrence of aesthetically appealing thrust systems and associated large scale anticlines, in both active and fossil foreland fold and thrust belts, is commonly interpreted as an evidence for Andersonian compressional framework. Indeed, these structures would testify for a roughly vertical $\sigma 3$. Such a correlation between thrusts occurrence and stress field orientation, however, frequently fails to explain denser observations at a smaller scale. The syn-orogenic deformation meso-structures hosted in exposed km-scale thrust-related folds, in fact, frequently and paradoxically witness for a syn-thrusting strike-slip stress configuration, with a near-vertical $\sigma 2$ and a sub-horizontal $\sigma 3$. This apparent widespread inconsistency between syn-orogenic meso-structures and stress field orientation is here named "the $\sigma 2$ paradox". A possible explanation for such a paradox is provided by inherited extensional deformation structures commonly developed prior to thrusting, in the flexural foreland basins located ahead of fold and thrust belts. Thrust nucleation and propagation is facilitated and driven by the positive inversion of the extensional inheritances, and their subsequent linkage. This process eventually leads to the development of large reverse fault zones and can occur both in compressive and strike-slip stress configurations.