

## **Causes and effects of putting Iberia under stress**

*B. Andeweg, Vrije Universiteit Amsterdam, andb@geo.vu.nl, www.geo.vu.nl/~andb*

Widespread Cenozoic intraplate deformation in the interior of the Iberian Peninsula has recorded the nature of its Cenozoic stress field. New observations and a compilation of available data show that the stress field changed rapidly in type, orientation and magnitude as a response to differential motion between Iberia, Africa and Eurasia, related to the opening of the Atlantic Ocean. Collision of northern Iberia with Eurasia generated a NNW-SSE direction for the maximum horizontal stress ( $S_{hmax}$ ) in Earliest Tertiary. This orientation rotated to N-S or NNE-SSW during Paleocene-Eocene. M. Miocene collision of southern Iberia with Alboran/Africa caused a stress field with  $S_{hmax}$  oriented NNW-SSE. During the L. Miocene E-W extension in the Valencia area adjusted the regional stress field significantly. From L. Pliocene to present  $S_{hmax}$  is oriented NNW-SSE again. Superposition in time and place of the stresses that were transmitted from the active plate boundaries to the interior created locally varying stress fields in the Iberian Peninsula.

To test the effect of changes in first order sources of stress (active plate boundary processes) on the Tertiary stress field, finite element modelling has been carried out. A reasonable fit to the observed directions of  $S_{hmax}$  can be obtained, however, the state of stress does not fit the observations for major part of the models.

For the present day setting an important second order stress source, the potential energy differences due to (crustal) topography, has been included. The results indicate that the general present day stress field in Iberia is the resultant of predominantly ridge push force of the opening of the Atlantic and collisional forces to the southern plate boundary. Regional deviations from this general stress field can be explained in terms of (crustal) topography. As shown for the present day stress field, forces induced by lateral density variations will have to be incorporated in models of the Tertiary stress fields in the Peninsula.