

Consistent crustal stresses around the Western Mediterranean
during the African-European approach

Karlheinz Schäfer
Geologisches Institut
der Universität
75 Karlsruhe 1
Fed. Republic of Germany

Various tectonic features of stable Europe, of the European non-stable area south of the Alps and Pyrenees, and of northern Africa indicate different tectonic regimes during the Cenozoic. All areas have been subjected to intensive crustal shortening during two periods. The first paroxysm occurred from end-Cretaceous to Upper Oligocene with a climax during Middle to Upper Eocene. The second tectonic regime began in the Middle Miocene and is still active today.

The paper deals mainly with horizontal stylolites that have been selected as evidence for the existence of horizontal paleo-stresses within Mesozoic and Cenozoic platform carbonates. From stable Europe (Germany, France) data of more than 5000 sites are available. Measurements of trends of horizontal stylolitic pillars have been carried out at more than 150 sites in mobile Europe (Spain, Sardinia), and at 30 sites in Tunisia and Libya.

Two different main trends of horizontal stylolites are characterized for all investigated areas. The older generation of Paleogene age is NNE-SSW-directed and the younger NW-SE-oriented horizontal stylolites which offset the older ones are of post-Burdigalian to Recent age.

The two Cenozoic tectonic regimes with an earlier Paleogene horizontal main compressive stress directed NNE-SSW and a Neogene stress-field revealing NW-SE-oriented main compressive stress in Europe and Africa can be underlined also by the formation of other tectonic features such as grabens, folds, and faults. Thus, it is suggested that the African plate while drifting northeastward until 53 m. y., being stationary from 53 m.y. to 9 m.y., and moving NNW-ward relative to stable Europe since then, has induced the two tectonic regimes during both Cenozoic collisions with the European plate.