Geophysical Research Abstracts, Vol. 9, 09755, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-09755

1 Meso-cenozoic tectonic evolution of Lebanon

C. Homberg (1), P.-Y. Collin (1), S. Ferry (2), C. Müller (3), E. Barrier (1), M. Mroueh (4), W. Hamdan (4), F. Hijazi (4), A.Mancinelli (5).

(1) Lab. Tectonique, University Paris VI, France, (2) Lab. Géologie, University Lyon 1, France, (3) Consultant, France, (4) Université libanaise, Lebanon, (5) Dep. Scienze della Terra, University de Camerino, Italy

Using new structural, stratigraphic, bio- stratigraphic, sedimentologic, and fault data acquired under the frame of the MEBE (Middle East Basins Evolution) program, we present an updated Meso-Cenozoic tectonic evolution model of Lebanese part of the Levant domain. A first extensional episode occurred during Early Cretaceous. It produced E-W to NW-SE kilometric normal faults, particularly in central Lebanon, with offset as large as several hundreds meters. The related stress field corresponded to a normal stress regime with the minimal principal stress trending NNE-SSW. Thickness and facies variations of the Early Cretaceous sequence indicate that this tectonics led to the development of an WNW-ESE basin in Lebanon. A Late Jurassic volcanic activity (an very moderate vertical movements) preceded this rifting event and continued until Late Aptian. The lebanese basin is the onshore expression of a major rifting event that likely took part to the opening of the offshore Levant basin. Comparing the NE-SW Early Cretaceous extension (this study) and the NW-SE Early Mesozoic extension recognized along the southern Levant basin, the mechanisms driving the development of the Levant basin and its margins drastically changed during Mesozoic.

The Cenomanian to Paleoocene period corresponds to a quiet period. Lebanon thus escaped the Late Cretaceous compressive tectonics that affected the southern part of the Levant margin. Normal faulting renewed during Eocene (and maybe Oligocene). The Eocene event corresponded to a NNE-SSW extension and was responsible of vertical movements along E-W faults, but did significantly controlled the sedimentation. Since

Miocene, compressive and strike-slip movements prevailed in Lebanon as the result of the interaction between the Arabia, Nubia, and Eurasia plates. The first, but moderate, folding episode occurred at Early Miocene and is characterized by an WNW-ESE compression. A possible origin for this early compressive deformation is the collision between the Nubia and Eurasia plates. The Late Miocene period corresponds to a drastic change in the plate interaction in Middle East with the development of the Dead Sea transform plate boundary. In Lebanon, the main plate boundary structure, the Yammouneh fault initiated under a N160˚E compression with a NE-SW strike, that is oblique to the plate motion. Folding along N-S to NNE-SSW axis developed synchroneously to faulting due to the transpressive characters of the plate boundary. At Pliocene time, strike-slip movements dominated except in the relay zone between the Lebanese and Syrian fault segments where shortening was accommodated by thrusting and folding. The late strike-slip dominated deformation suggests a westward migration of the structures accommodating the transverse plate motion.