Geophysical Research Abstracts
Vol. 12, EGU2010-5622-2, 2010
EGU General Assembly 2010

Relationship between subsidence history, heat flow and fault activity in the Sea of Marmara

P. Henry (1), C. Grall (1,2), L. Géli (2), B. Mercier de Lépinay (3), J.-X. Dessa (3), and C. André (2)

(1) CEREGE, CNRS-U. Aix Marseille III-Collège de France, Aix-en-Provence, France (henry@cdf.u-3mrs.fr), (2) Géosciences Marines, Ifremer, Brest, France, (3) GéoAzur, Univ. Nice-Sophia, Villefranche-sur-mer, France

Maps of the seafloor traces of active faults in the Sea of Marmara have now mostly converged, at least in their geometry. Questions still debated are the evolution in time of these faults and their connection with underlying crustal or lithospheric faults. Recent studies, and notably those following Seismarmara and Marmacore cruises showed that the distribution of subsidence in the deep basins changed through time (Becel, 2006; Carton et al., 2007), but little is known on the timing of this evolution. Heat flow data and basin thermal modeling is one tool we propose to further constrain the history of subsidence.

Heat flow in the deep basins is low, down to less than 20 mM/m2, compared with background heat flow values of 50-60 mW/m2 North of the Sea of Marmara. This low heat flow may be explained by the blanketing effect of sedimentation, that dominates the heat flow increase from crustal stretching. The Holocene sedimentation rate reaches a maximum of 2 to 3 mm/yr in the depocenters. These rates still appear insufficient to explain the low heat flow but higher sedimentation rates during the last few glacial cycles may, however, be considered.

In the Central Basin, the recent subsidence is constrained assuming the top of a homogeneite deposited 15500 yrs BP is a paleo-horizontal (Beck et al., 2007). A simple model of steady-state subsidence and compaction reproduces the shape of horizons on MCS data for the last 130000 years. At older times, the vertical velocity on the main faults varied. The geometry of the basement is not compatible with the present day subsidence and the southern part of the basin has a distinct history. In the Cinarcik Basin, sequences of onlap are presumably related to sea-level high stands (Seeber et al., 2006) and the recent subsidence pattern with northward tilting may have been taking place no more than 250000 or 330000 years. Thermal modeling performed with TEMIS (IFP) basin modeling program loosely constrain the beginning of syn-tectonic subsidence to 1.5-3.5 Ma. However, a change in the subsidence pattern is implied over the last 200000-400000 years in the Cinarcik Basin and possibly earlier in the Central Basin. We tentatively relate this change to the connection of the Ganos fault to the northern scarp of the Cinarcik basin and to a progressive de-activation of southern fault branches.