A Geophysical Study of the Aegean Sea

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The Aegean Sea was resurveyed with gravity, magnetic and seismic methods. The gravity and magnetic profiles, spaced at between 1.5 to 6 n.m., covered the entire area and yielded extremely precise data. These confirm to a large extent the existing models and provide new information which can be used to refine the geological concepts for the development of the Aegean Sea.

In the past the evolution of this area has been explained using the back-arc spreading model. Our interpretation however suggests that the deformation is a consequence of the large-scale shearing associated with the East Anatolian Fault System, and of the way that continental crust and lithosphere react under shearing forces. The Aegean microplate responds to the kinematic pattern in the east with extension and partial strike-slip, and in the west with compression and the building-up of a thrust belt and nap systems. The factor controlling the tectonic development of this area is the shear movement and not the subduction. Seen under this aspect, the Aegean Sea can be understood as a "pull-apart" basin.

The crustal profiling across the Aegean Sea revealed a stretched thinned continental crust, resting on a "soft" upper mantle characterized by low Pn velocity, high heat-flow and low density distribution. Mapping of the sedimentary record of recent and subrecent subsidence events and the major tectonic lineaments confirmed the continuing stretching and subsidence of the Cretan Trough. The newly compiled gravity and magnetic anomaly maps of the Aegean Sea show a strong correlation with the tectonic elements of delineation and weakness.

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