A new tectonic model and fault segmentation controlling the evolution of the inner margin of the Gulf of Saros, NE Aegean Sea

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This study is focused on the definition of tectonic elements in the Gulf of Saros, a highly active seismic region within the North Anatolian Fault Zone. The previous reflection seismic studies trying to characterize the structural setting of the gulf were not presenting sufficient and efficient seismic data at the inner part of the gulf, so we studied this part in detail. For this purpose, we have collected more than 350 km-line high-resolution seismic data by a small research vessel at the inner side in May 2016. All of the obtained seismic profiles were interpreted on a workstation using the commercial software packages known as Kogeo and Kingdom. The Ganos fault, that generated the 9 August 1912 earthquake (Mw=7.2) in western Turkey, enters into the Gulf of Saros from the east, cuts the southern margin of the gulf forming a valley which is deepening westward. The deepest part of this valley cuts into the basement surface and divides the gulf into two. The seismic data revealed that the fault was not a single segment or a pair of border faults bordering the valley. According to the seismic images of the fault segments, the emanating earthquake energy will possibly be carried by two different fractures; the Ganos and Saros segments. The Ganos segment controls the northern margin of the valley while the recently defined Saros segment will control the centre of the valley. This segment causes the development of a new active basin and forms the deep canyon structure through the main valley structure. The new fault map defined using the new seismic data confirms a tectonic escape model for the gulf, which was also proposed by some of the previous geophysical researches. The Saros fault, which is a more active one if compared to the Ganos Fault, developed due to southwest movement of the gulf block. Such a kinematical model causes the deepening canyon structure.

Keywords: Gulf of Saros, Ganos fault, NE Aegean Sea

