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3D GEOMETRY OF THE NORTH ANATOLIAN FAULT SYSTEM IN THE CINARCIK BASIN : PRELIMINARY RESULTS (SEISMARMARA 2001)

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The North Anatolian Fault (NAF) has been responsible for the last two earthquakes in Turkey (Izmit and Duzse, 1999). To the west, a seismic gap exists in the Marmara Sea, which is formed as series of pull apart basins along the NAF. Initial bathymetry and seismic reflection profiles show the presence of several faults on various scales in the Marmara Sea, from a few kilometers to tens of kilometers, in the three pull apart basins. The stress field (Coulomb) study suggests the possibility of a large earthquake in this area, which could have a devastating effect on the region and on Istanbul, which is located only 10 km from north of the northern branch of NAF. In order to understand the earthquake activities in the Marmara Sea and image major seismogenic faults at depth, a combined seismic reflection, refraction and earthquake experiment was carried. Half of the 4000 km of deep seismic reflection profiles were acquired as a very detailed 3D grid survey at 600 m line spacing in the Cinarcik Basin, where NAF enters the Marmara Sea and bifurcates into two strands. On-board raw stacks show the presence of active faults down to 10 km in the basin. The 3D data provides a detailed 3D geometry of the NAF fault system in the Cinarcik basin, which suggests that it is an active NW-SE trending a kite-tail shaped pull-apart basin, with the two known strands of the NAF as its the long limbs. The relationship between the sedimentary strata, the basement and the faults provides insight on the evolution of basin. The extensive set of faults along the southern limb suggests that this limb has played a key role in the evolution of the basin, from east to west. A small pull-apart basin at the corner of two adjoining faults in the south-west shows the role of a change in stress regime. A complex fault system in the Cinarcik basin suggests that is not a classical pull-apart basin, like the central basin, but may be representative of a basin at the tip of a long strike-slip fault, such as NAF. The 3D results will be discussed in the light of the formation and evolution of the whole Marmara Sea.