

# Segmentation model of a long fault zone based on the size and temporal stability of the segment boundaries

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Through a review of segmentation models of the Median Tectonic Line fault system in Shikoku, following two main issues were recognized. Firstly, the segmentation model based on the geometry and distribution of vertical movements cannot confine segments because the model mixes up spatial phenomena of various size and magnitude. Secondly, the chronological constraints in geologic data on past earthquakes are too poor to define the segments. In this paper, the author examined the 20th century segmentation of the North Anatolian fault from the view points of the size of the segmentation boundaries and their stability through time. The area between the eastern end of the 1999 Izmit earthquake ruptures and the western end of the 1944 rupture, namely the Bolu-Mudurnu Gap is a 70 km long and 25 km wide discontinuity of the North Anatolian fault system. This area is regarded as a gap because the rupture history to the west (16th century, 18th century, and 20th century) is completely different from that to the east (14th? century, 1668, and 1939--1944), and because the size of earthquake inside the gap is much smaller than the earthquakes on both sides. If we take this gap as a segment boundary, it has been stable over a few earthquake cycles. On the other hand, the other minor segment boundaries have not been stable over earthquake cycles. Especially, the segment boundaries less than a few kilometers in width or in length like the 1943 and 1944 boundary did not behave as a boundary in former series of earthquakes. Okumura et al. (2000) estimated the amount of the subsided mass in a small pull-apart formed in 1999 Izmit earthquake and estimated the depth of the pull-apart structure is around 3 to 5 times of the width. If the dimension is similar to the larger pull-apart, a jog less than several kilometers wide does not affect the most part of the seismogenic fault. Therefore, the larger segment boundaries remain stable over time. On the Median Tectonic Line, only the gaps around the Okamura fault has significant size and coincide with a paleoseismological segment boundary. The area between the Komatsu fault and the Iyo fault may be taken as a large area of discontinuity.