A conceptual model of fault behavior based on geomorphic, geologic and paleoseismic data along the North Anatolian fault

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We propose a new recurrence model of large earthquakes focused on fault geometry and slip per event based on geomorphological, geological and paleoseismological data along the 1944 Bolu-Gerede earthquake ruptures and the 1999 Izmit earthquake ruptures along the North Anatolian fault (NAF). The point of this model is that, even along the same fault system, individual fault segments have different characters of fault geometry, slip per event and recurrence patterns through earthquake cycles. The conceptual model focused on slip per event and recurrence interval, the segments along the NAF can be classified into three types of fault segments; 1) fault segment that have relatively large slip per event (ca. 5 m), and simple and straight fault geometry (c.f. Gerede segment); Such segments activate with highly regular recurrence interval to release most of accumulated moment at one large earthquake event, therefore seismic coupling rate can be nearly 100% calculated using slip per event, recurrence interval and long-term slip rate. When this type of earthquake occurs, the segment tends to trigger neighboring fault segments. 2) segment with minor fault discontinuities that have relatively small amount of slip per event (ca. 3 m; c.f. Tepetarla segment), type segment repeat with relatively irregular recurrence interval and slip per event. 3) middle of the above-mentioned segments. The amount of long-term slip rate along the entire NAF is not uniform due to the slip apportion to other adjacent faults. These different characters of fault segments in fault geometry, slip per event and recurrence patterns through earthquake cycles would provide us to understand the variety of fault behavior.