

## Internal deformation and paleo-earthquakes of the interior of the Anatolian plate, Turkey

# Koji Okumura[1]

[1] Dept. of Geography, Hiroshima Univ.

<http://home.hiroshima-u.ac.jp/kojiok/>

The North Anatolian fault is usually regarded as a simple shear zone with a constant GPS slip rate of 20 to 25 mm/yr. However, geologic data indicate the fault system is much more complicated. Geologic slip rates are significantly smaller than GPS slip rates and recurrence intervals are different among 20th century segments. The most reliable slip rate estimates come from the 1944 segment. They are 14 m for 3 earthquake cycles in 910 years, 21 to 23 m for 5 cycles in 1550 years. The slip rate is about 15 mm/yr. On the 1943 segment 10 to 15 mm/yr is estimated in Aslancayir. In Erzincan a higher slip rate of 20 mm/yr in past 750 year is estimated. Recurrence intervals are 150–250 yr (historic) in Marmara, 300+/-30 yr on 1944 segment, 280–600+ yr on 1943 segment, and 180–220 year in east of Erzincan. The fault activities are high in 1939 segment and farther east and in Marmara region, and are evidently low in the 1943 segment. In order to explore the possible intra-plate deformation inside the Anatolian plate, the author initiated archaeoseismological investigation of archaeological sites in central Anatolia. There are many archaeological sites of Assyrian, Hittite, and Phrygian ages. Among the numerous sites, the Kaman Kalehoyuk site in Kirsehir region is one of the very well studied sites. Japanese archaeologists have been excavating the tepe (mound) since 1986 to expose well-dated sections. In 2006 and 2007, thorough examination of entire sections and structures of Assyrian colonial period (20th to 18th century BC) to Phrygian (9th to 5th century BC) revealed several failures, deep fissures, and systematic tilts of the ground. Strong ground shaking is probably the cause of the deformation. Though the stratigraphic horizon of the deformation not well constrained, it seem to have taken place during the later half of the 2nd millennium or possibly around the end of the Hittite Empire. If an earthquake deformed the tepe, the Tuz Gol fault or the Amasya branch of the North Anatolian fault are possible sources. There are many Hittite sites in Anatolia but the search for paleoearthquakes has just began.