Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

SSS38-P11 Room:Convention Hall Time:May 24 15:30-17:00

Possibility of a hyper earthquake in Southwestern Japan

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Recently it has been recognized that the subduction zone along the Suruga and the Nankai troughs in SW Japan has a potential for an M9-class earthquake, which will be much larger than the 1707 Hoei earthquake. In this assumption, while the source area comprises many fault segments including a deeper part of the subduction zone, the maximum dislocation on the fault is postulated to be smaller than that of the 2011 Tohoku earthquake (M=9.0). However, there is a possibility that the largest earthquakes along the subduction zone may involve a dislocation as large as the Tohoku event, several tens of meters. In order to investigate such a possibility we should invoke data from geological and/or archeological fields, since historical records on earthquakes for the last 1000 years must be insufficient. Based on data of coastal terraces formed in the last 6000 years, I report it is likely that huge events took place repeatedly in the relevant region. Three or four remarkable terraces have been formed at the coasts on the peninsulas, Omaezaki, Shiono-Misaki, and Muroto-Misaki, along the subduction zone (Fujiwara et al., 2004; Shishikura., 2008; Maemoku, 2001). Since the vertical displacements between the terraces are large and the average interval is longer than that proposed for the Hohei-type evets, the terrace forming events should be different from the Hoei-type earthquake. The reported ages of the terraces at Siono-Misaki and Muroto-Misaki are similar to each other. They were formed 4500-4800 years ago, 2700-3000 years ago, about 1800 years ago, and several hundreds years ago. Although the ages of the terraces at Omaezaki are not given accurately, the number of the terraces agrees with those at the other two sites. It is likely that the events forming the terraces are not local phenomena but regionally wide ones. Moreover, there are similar terraces in a wide area in SW Japan. These crustal movements suggest a possibility that hyper earthquakes with large fault areas and dislocations have repeated in SW Japan as well as the Tohoku region of Japan.

Keywords: subduction zone, terrace