Possibility of a huge earthquake rupturing a region from Tokai to Ryukyu region, Japan

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The occurrence of the 2005 Sumatra-Andaman Sea earthquake (M=9.3) raises an issue of locations where such a huge event takes place. We must examine a possibility that a huge event occurs along the subduction zones around Japan. The segment from Tokai to Ryukyu region is one of the regions that should be examined first, since the tectonic setting of the region is similar to the source region of the Sumatra-Andaman Sea event. I here propose a working hypothesis that huge events have taken place with an average interval of one thousand and several hundred years along the subduction zone from Tokai to Ryukyu region.

The uplift of Muroto Peninsula has been often attributed to the accumulation of crustal deformations associated with great earthquakes along the Nankai trough. However, the uplift is resulted from large deformations whose average interval is longer than 1000 years, i.e. much longer than that of ordinary great earthquakes (Maemoku, 1988). Similar uplift of the crust are observed also in Tokai (Azuma et al. 2005) and Ryukyu regions (Nakata, 1980). Since an uplift in an episode is very large, it is hardly attributed to only a local phenomenon; it is rather well explained by a large deformation associated with a wide fault area with a regional scale. The spatial distribution of the uplift in Muroto Pen. in a geological time interval is different from that observed at the time of the 1946 Nankai earthquake. The hinge line of the geological uplift locates more inland side than that of the Nankai event, suggesting that the cause of the geological uplift expands to a deeper part of the subduction zones than the ordinary great earthquakes. The large uplifts took place several times in the past 6000 years. Although the exact times of the uplifts remain unknown, there is a possibility that the episodes observed in different regions have taken place simultaneously.

Based on these features of the crustal uplifts, I would like to propose the hypothesis described above. To examine it we need to study more other data such as tsunami data in Japan and other countries.

References

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