Inferring location and activity of the Iriyamase fault, the Fujikawa-kako fault zone, based on boring core sample analyses and physical fault model

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The Fujikawa-kako (estuary) fault zone, located in the northern end of the Suruga-Nankai-trough, is claimed to be possible to be activated with the Nankai megathrust earthquakes, resulting in fatal damage in this region. However, it is difficult to accurately estimate the activity of the Iriyamase fault, which is considered as one of the most active faults in this fault zone, because no clear tectonic landform is found on the alluvial fan developed in the Fujikawa estuary area. Recently, three boring cores drilled in the Fujikawa estuary area are preliminarily analyzed by Shisikura et al. (2018). The KNB core is taken at the west side of the Fuji river as well as the hanging wall side of the Iriyamase fault, whose location is estimated by AIST (2016); The SKB core is at the west side of the Fuji river and the footwall side; the FGB core is at the east side of the river and the footwall side.

Based on the result of these analyses, it is estimated that the average displacement rate of Iriyamase fault is about 1~3 m / ky, which is smaller than the previous estimates (Yamazaki, 1992). Moreover, it is also pointed out that the both hanging wall and footwall sides of Iriyamase fault has been subsiding in the long term because Late Holocene terrestrial sediments are buried at the depth beneath the present sea level even in the KNB core located at the hanging side. According to the depth of layers deposited in the peak of the postglacial transgression, this subsiding rate is estimated to be at the 3m/ky.

In this presentation, we show the result of radiocarbon dating and a diatom analysis in these three cores based on more detail analyses of the core samples. Furthermore, we construct physical models based on these results to consider the underlying tectonic conditions.

The diatom analysis of the SKB core shows that diatoms are rarely found at depths shallower than 56 m, and the shallower strata are found to be terrestrial sediments. This result agrees with the long-term subsidence suggested by Shisikura et al. (2018). Moreover, the average displacement rate of Iriyamase fault is estimated about 2 m / ky by comparing the results of the diatom analyses of two cores (KNB and SKB). In order to understand the tectonic origin of the long-term subsidence in the Fujikawa estuary area, we construct the two physics-based models, called the Fuji volcano model and the fault model. In the Fuji volcano model, we calculated the amount of the subsidence caused by the isostasy effects due to the development of the Fuji volcano; the amount of subsidence is calculated to be about 0.7m by the volume increase of Fuji volcano in the past 17 thousand years, 41.37 km^3 (Miyazi, 2007). Thus, this result is far smaller than the amount of the long-term subsidence based on the boring core analysis. In the fault model, we calculate the average displacement rate of the Iriyamase fault, assuming faults as the finite rectangles in the semi-infinite elastic medium based on Okada (1992). We assume two faults to explain both the subsidence at the KNB core and the vertical offset between KNB and SKB; fault A is located between KNB and SKB and Fault B is located in the western side of KNB. The result shows that the average displacement rate of fault B is required to be much larger than that of fault A, because subsidence due to fault B in its footwall side must overcome the uplift due to fault A in the hanging side of fault A.

Keywords: Fujikawa-kako fault zone, Suruga trough, Tōkai earthquake, Active fault, Boring survey

