

Modeling of the 1703 Genroku Kanto earthquake tsunami based on historical documents in Choshi City, Chiba prefecture

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The 1703 Genroku Kanto earthquake and tsunami caused catastrophic disaster in Kanto region. According to the previous studies, the modeling of the 1703 earthquake is mainly performed by the inversion analysis from observed fault deformations on land. However, it is difficult to model an offshore fault along the Sagami trough from land deformations because an offshore fault has an insignificant effect on land deformations. Thus, it is important to consider historical tsunami data to model the 1703 Genroku Kanto earthquake. We study the tsunami heights focusing on historical documents in Choshi city which locates at eastern edge of the Kanto region. There are three historical documents for the 1703 Genroku Kanto earthquake tsunami: 1) Tanaka Genba Sendaisyu kan no maki 2) the historical document of the Homan temple 3) the historical document of the Tokai shrine. Based on these documents, we estimated the tsunami heights of T.P. 5.9 m, T.P.11.7m, T.P. 7.7 m, T.P. 10.8 m, T.P. 4.8 m in Iseji, Kobatake-ike, Nagasaki, Tokawa and Na-arai, respectively. Although tsunami heights have been assumed from 0.9 m to 4.0 m in Choshi in previous studies, we found that the significant tsunami with more than 10 m attacked Choshi area. We further study the fault model of the 1703 Genroku Kanto earthquake using new data of the tsunami heights in Choshi. We first confirmed whether the previous models (Cabinet Office, 2013; Namegaya et al., 2011; Satake et al., 2008 (ShishikuraABC)) can reproduce the inundation of Kobatake-ike pond where reliable descriptions are in historical documents. As results, we found that previous models cannot inundate Kobatake-ike area. To reproduce the tsunami heights in Choshi, we modified the fault model with extending the fault length along Sagami trough. Consequently, the fault model with more than 120 km fault length along Sagami trough can inundate Kobatake-ike area. From this result, we estimated that the fault of the 1703 Genroku Kanto earthquake could rupture about 120 km offshore along Sagami trough. A future study will be to provide detailed fault model with more evidence other than Choshi area.

Keywords: The Genroku Kanto earthquake tsunami, Historical document, Numerical simulation, Fault model, Choshi city, Chiba prefecture