Fault models of the AD 869 Jogan earthquake inferred from tsunami deposit and computed tsunami inundation area

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The AD 869 Jogan earthquake occurred off Miyagi prefecture, and produced unusually large tsunami. We assumed ten fault models (Satake et al., 2008, Annual Report on Active Fault and Paleoearthquake Researches) and carried out tsunami numerical computations including inundation. The fault models include outer-rise normal fault, tsunami earthquake, interplate earthquakes with various fault depth, width, length, and slip amounts. In addition an active fault in Sendai bay is modeled. The computed inundation areas were compared with the observed distribution of the Jogan tsunami deposit in Ishinomaki and Sendai plains. As a result, two fault models are estimated as possible models. One is an interplate earthquake with length of 100 km, upper depth of 31 km, and slip amount of 10 m (Model 8). The other is that with the length of 200 km, the depth of 15 km, and the slip amount of 7 m (Model 10). The source area of Model 10 extends to the south from that of Model 8. The computed inundation areas in Ishinomaki and Sendai plains from the two models are similar with each other, and it is unclear which model is better.

Recently, tsunami deposit was surveyed along the Joban coast, Fukushima prefecture (the south of Miyagi prefecture) by AIST and Tohoku university. Tsunami deposit associated with the Jogan tsunami was found in Ukedo district, Namie town, Fukushima prefecture, from field surveys (Imaizumi et al., 2008, JPGU). The distribution of the Jogan tsunami deposit extends more than 1 km inland from the present coast. We computed tsunami inundation in Ukedo district from Model 8, Model 10, as well as the other models. Comparison of the computed inundation areas with the distribution of tsunami deposits indicates that Model 10 can reproduce the observed distribution of tsunami deposits, but the computed inundation area from Model 8 does not reach the locations of the tsunami deposit.

Keywords: the 869 Jogan earthquake, tsunami deposit, tsunami simulation, Joban coast, fault model