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Tsunami source consideration of the 1662 Hyuga-nada earthquake occurred off Miyazaki Prefecture, Japan

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Hyuga-nada region is located at the south-western part of Nankai Trough, in the Pacific Ocean. M7-class interplate earthquakes are repeatedly occurred by the subducting Philippine Sea plate beneath the Eurasian plate. The largest earthquake in this area was the 1662 Hyuga-nada earthquake (M=7.6) which occurred off Miyazaki Prefecture, south-eastern area of Kyushu region, Japan, and generated tsunami (after called the 1662 tsunami). Strong ground motion hit and many structures were broken near the coast of Miyazaki Prefecture. The tsunami heights were estimated at least 4-5 m along the coast of Miyazaki city, and more than 200 people died by the earthquake and tsunami by historical records. This region is also active area of the shallow slow earthquakes. The 1662 tsunami was much larger than tsunamis generated by usual M7-class interplate earthquakes. It is known by the 2011 Tohoku earthquake that focal area of shallow slow earthquakes also become a tsunami source area. So, we hypothesized that the 1662 unusual large tsunami was caused by the coseismically slipping of focal area of shallow slow earthquakes. We firstly constructed the fault model of the 1662 earthquake based on the recent result of geophysical observation. To examine the tsunami source of the 1662 earthquake, we surveyed the 1662 tsunami deposits in the lowland along the coast of south-eastern Kyushu region. As a result, sandy event deposits interbedded with clay (organic clay) were recognized at several surveyed points. Based on facies features, these event deposits were possibly formed by the 1662 tsunami. Numerical simulation of the tsunami was carried out using the constructed fault model. Calculated tsunami inundation area can explain distribution of the likely tsunami event deposits at Komei, Miyazaki Prefecture. Furthermore, this study compares calculated tsunami inundation areas, distribution of other surveyed tsunami deposits and tsunami heights of historical records. Tsunami source of the 1662 earthquake proposed by our study could better explain geophysical, geological and historical records.