

Detailed Distributions of Seismic Intensities of the 1828 Bunsei Echigo-Sanjo and the 1751 Horeki Echigo-Takada earthquakes

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Ten earthquakes with the magnitudes over than 6 occurred in the inland region of Niigata prefecture since the beginning of 17th century. Among them, we study the 1827 Bunsei Echigo-Sanjo and the 1751 Horeki Echigo-Takada earthquakes. Old documents show that strong motions and severe damage took place in these earthquakes. The mid Niigata prefecture earthquake broke out in the same region as these earthquakes on 23 October, 2004. In order to clarify the locations of the epicentral areas of these two historical earthquakes, we estimated seismic intensity at individual village on the Niigata plain and obtained the distribution map of the seismic intensity of them.

The Bunsei Echigo-Sanjo earthquake occurred on December 18, 1828, and its magnitude is estimated at 6.9 by Usami (2003). It is recorded that about ten thousands houses were destroyed and about one thousand and five hundred people were killed.

There are many descriptions of the old documents for the 1828 Bunsei Echigo-Sanjo earthquake and we know the detail of it. For example, in the description of Takizawa Hachirobee Nikki, which was the diary kept by Takizawa Hachirobee, all of the houses in Iguri town, Sanjo city, were destroyed due to the earthquake. On the basis of this description, we can judge the seismic intensity at 7 there. The description of Shiryo-Sanjo Jishin (Materials of the Sanjo Earthquake), mentions that the 18 houses in Kumanomori village (Bunsui town, Nishi-Kambara county at present), were entirely destroyed due to the earthquake. According to the geographical dictionary for Niigata prefecture (Heibon-sha, 1986), the 178 houses existed in Kumanomori in 1817. We can estimate the ratio of the completely destroyed houses to total of them at 10%, which shows the seismic intensity in Kumanomori at 6 weaker.

In the same way, we made the detailed distribution of seismic intensities of the 1828 Bunsei Echigo-Sanjo earthquake. The region of the strong motion of the 1828 Echigo Sanjo earthquake distribute within the circle whose center is located at the point close to the JR Tsubame-Sanjo station and the radius is about ten kilometers.

We also made the detailed distribution of seismic intensities of the 1751 Horeki Echigo-Takada earthquake in the same way as we made for the 1828 Bunsei Echigo-Sanjo earthquake.

As a result, it is clarified that the source area of the 2004 Mid Niigata prefecture Earthquake occupies the area between the source areas of those two historical earthquakes.