

Seismic intensity data rectification and inversion analysis of the Off-Miyagi earthquakes in the 19th century

Katsuhisa Kanda[1]; Masayuki Takemura[1]

[1] Kobori Res. Comp., Kajima Corp.

The Off-Miyagi earthquakes have repeatedly occurred near the seacoast of Miyagi prefecture at intervals of 30 to 40 years. The source characteristic of the 1936 and 1978 Off-Miyagi earthquakes has been clarified by using waveform inversion analysis. As for the earthquakes in 19th century, however, since there is no seismic waveform record, the source characteristic has not clearly identified yet. We have been developed the inversion analysis using seismic intensity data. It can evaluate energy distribution on the fault plane to identify short-period radiation zone (SPRZ). Since the seismic intensity data presumed from old documents are also available for the analysis, it can be applied to historical earthquakes.

According to the inversion analysis, the following remarks may be indicated. Three earthquakes of M7 class occurred in this area in 1897 and 1898. The seismic intensity scale of those days has a problem regarding obscure definition. We reexamined the seismic intensity data based on damage records for every cities, towns and villages. The SPRZ of the February 20, 1897 earthquake was similar to that of the 1978 earthquake. Furthermore, the SPRZ of the August 5, 1897 earthquake was located near the Japan Trench. That of the April 23, 1898 earthquake was just beneath the coast of northern Miyagi prefecture and might be identified as the type of the May 26, 2003 event that was an intermediate-depth intraslab earthquake.

As for the Bunkyu earthquake in 1861, the fact that the range of seismic intensity 4 spread to the Kanto district resembled the 1978 earthquake extremely and was different from the inland shallow earthquake on July 26, 2003 and intermediate-depth intraslab earthquake on May 26, 2003. The inversion analysis indicates that the 1861 earthquake was quite similar to the 1978 earthquake and can be identified as an interplate earthquake.

During the 1835 Tempo earthquake, seismic intensity 5 spread from the Iwate southern part to the Fukushima northern part and the range of seismic intensity 4 was extended to the Tokyo district. It can be identified as the 1978 Off Miyagi typed earthquake.