

Estimation of the crustal motion of the 1938 Fukushimaken-Toho-Oki earthquake by using the tidal record at Onahama port

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An earthquake swarm broke out in the sea region east off Fukushima Prefecture in November 1938, and seven eminent earthquakes accompanied with small tsunamis occurred in the period of the most active stage of it.

The first eminent event occurred at 17h43m (JST), 5th November, and it has a magnitude of M7.5, and a small tsunami was accompanied. The heights of the tsunami of this event were 113cm at Shiogama, and 107cm at Onamaha. About two hours after the first event, the second event broke out at 19h50m, and a small tsunami was also accompanied. The heights of this event were 112cm at Shigama, and 79cm at Onahama.

Abe(1977) estimated the fault parameters of these events by using the data of Love waves observed far places including several points in Europe.

Tidal record was obtained at Onahama port, the nearest point from the source region. By reading the tidal record before and after the events we can clarify the vertical crustal motion of the ground of the tidal station Onahama.

We calculated the astronomical tide of this day by using harmonic coefficients, fit it exactly to the observed tidal curve at 17h43m, and found the difference of average of the level of the curve of the observed tide and that of the prolonged curve of the astronomical tide for the time interval (I) from 17h43m to 19h 50m and (II) from 19h50m to 6h20m in the morning of the next day.

The obtained result shows that, the shift of the observed curve was -3.4cm for the time interval (I), and -10.3cm for that of (II). The value of (I) shows the crustal motion accompanied with the first event, and (II) shows the sum of these of the first and the second events.

The fault parameters proposed by Abe(1977) gives the crustal motion of -16cm for the first event, and -6cm for the second event at Onahama port, so, his fault parameters were possible to be overestimated.

We will make a discussion on the result of the numerical simulation of the tsunamis.