S045-005 Room: Convention B Time: May 28 10:00-10:15

Detailed aftershock distribution of the 2000 Tottori-ken Seibu Earthquake

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The 2000 Western Tottori Earthquake (Mj=7.3, about 10km deep) occurred near the border of Tottori-Shimane prefectures at 13:30 on October 6, 2000 (JST). The points of the earthquake are (1) active swarm-like earthquakes have occurred near the source region since 1989, (2) the earthquake occurred in an area of low density of active faults, (3) there was no documented active fault corresponding to the rupture surface of this earthquake. Japanese University group of seismologists conducted an intensive observation of aftershocks in this area (Joint Group for Dence Aftershock Observation of the 2000 Tottori-ken Seibu Earthquake, 2001). In the present study, I aimed that I develop a new method that a large amount of data from aftershocks picked in a short time and accurately, determine detailed aftershock distributions of the 2000 Tottori-ken Seibu Earthquake by the new method, have discussions about the nature of the main shock and the structure of the source region that can be estimated from aftershock distributions.

We processed the data of waveforms that recorded by the joint observation of the amount of aftershocks (October 13, 2000 to November 30, 2000) by the win system (Urabe and Tsukada, 1992), and determined the hypocenters (Hirata and Matsu'ura, 1987). In the present study, we developed a new algorithm for automatic phase picking. First, we estimate an arrival times from an initial hypocenter using an assumed velocity structure. The arrival times are picked automatically in the vicinity of the estimated arrival times (time window). We picked to determine hypocenters by using those of JMA as the initial hypocenters. Then, we repeated pick and locate events by using the determined hypocenters as the initial hypocenters again. We determined the velocity structure and the station corrections by the joint hypocenter determination technique (Kissling et al., 1994).

The final one dimensional velocity structure has two layers : the P-waves velocity in the first layer is 5.88km/s and that in the second layer is 6.04km/s. We determined about 7000 hypocenters by using this one dimensional velocity structure and the station corrections. The distributions of the hypocenters divided into three parts. The most aftershocks are distributed in a 30km long narrow region with a strike of NW-SE, where the main shock is located. There are two secondary aftershock regions. One is located 30km SW of the main shock. The other is 30km NE of the main shock. The distributions of the most aftershocks, where the main shock is located have the clear difference between north and south region. The boundary is at near the main shock. In the southeastern region, epicenters are distributed linearly with a width of about 2 to 3km, and a length of 10km. The hypocenters are distributed on a vertical plane if we look at three dimensionally. In the northwestern region, epicenters are distributed in a slightly wide region(about 10km x 15km). There are several clusters in a volumetric region of three dimensionally.

We compared the 2000 earthquake aftershock distributions with the past swarm-like earthquakes, the slip distribution of the main shock, and the surface transformation by the main shock. The area of past swarm-like earthquakes, the area of large slip during the main shock, and the area of the aftershocks are located on a same vertical plane, where these three areas are not over lapping. Then, the aftershock distributions by the present study show the possibility that the earthquake source faults branch into many secondary faults at a shallow depth. We can understand that this is one of the reasons that the earthquake faults did not appear on the earth's surface during the main shock.