

Crustal structure of Dewa Hills and earthquake source fault of Akita Senpoku Earthquake (M7.1, 1914)

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In the area surrounding the epicenter of Akita Senpoku Earthquake 1914 which occurred in 'Strain concentration zone at the eastern edge of the Japan Sea', new surveys and analyses using seismic reflection survey, gravity analysis, and seismic refraction survey were carried out. The following results were obtained.

The results of deep seismic reflection survey suggest that the Dewa Hills consist of three blocks separated from each other by Toridame Fault/Nakatyo Fault, and Takinosawa Fault based on characteristic features of reflection surface. The central block shows no reflection and interval speed is high, while other blocks in the east and west have comparatively thick sediments and folding structures. Re-interpretations of the results of seismic refraction survey suggested that speed contour of 5 km/sec becomes shallow to the east. Toridame Fault was located at the point where sudden change of speed occurred. Shallow seismic reflection survey, with the survey line of which is across the Takinosawa Fault, confirmed existence of west dipping low angle reverse fault.

Those survey results are internally consistent to each other, and also to the geologic structures described in the previous records. Therefore, the interpretation of the Dewa Hills consisting of three blocks separated by Toridame Fault and extended part of Takinosawa Fault seems to be real. The central area, both sides of which are cut by faults, forms uplifted block.

Unified data base of Meteorological Agency shows that most epicenters are distributed immediately beneath Takinosawa Fault. No earthquakes have occurred immediately beneath Toridame Fault, but if the dip of the fault is assumed to be towards east, the earthquakes may be related to Toridame Fault. The results of temporary dens earthquake observation we carried out show that the epicenters distribution is dipping toward east.

In conclusion, Dewa Hills seems to have formed by folding, related to Toridame Fault. The earthquake source fault of Akita Senpoku Earthquake (M7.1, 1914) is reverse fault which is located in deeper extension of Toridame Fault.

Keywords: Dewa Hills, Akita Senpoku Earthquake, Toridame Fault, Takinosawa Fault, fault-related fold, source fault