Estimation of the subsurface structure in Yumigahama area using gravity exploration

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1.Introduction

The severe earthquake damage was appeared on the Yumigahama Peninsula by the 2000 tottori Prefecture western earthquake. Gravity exploration was carried out to detail the subsurface structure in this area. Then, the subsurface structure was estimated by supposing two layers of the surface and the basement layer.

2.Observation areas and the observation method

The gravity observation carried out comparative gravity measurement as a standard point at Tottori university gravity point at 371 points. LaCoste & Romberg gravimeter and Scintrex gravimeter were used for the gravity measurement. The measurement of the position (latitude, longitude, altitude) was detailed by using the Magellan Pro Mark X-commercial(GPS surveying).

3.Data analysis

Geological Survey of Japan(575 points), and Nagoya university group measured (1490 points) was measured, and it had them analyzed. The estimation of the assumed density of the bedrock used CVUR method and G-H function method. For four points densities calculated are the value of 2.38-2.42g/cm3. And, it was obtained the value of 2.42g/cm3 by the G-H function method. The density value of the sand layer of the Yumigahama Peninsula was 1.9g/cm3 from the result of the density survey of the borehole data. A general tendency is as the following with Bouguer gravity anomaly from the unusual figure (2.4g/cm3). The high anomaly area in the north and the low anomaly area around the Nakaumi of belt-like zone are spread out. This can be estimated at the distribution by the Shinji fault.

Homogeneous two-layer structure was estimated this analysis (Komazawa, 1995). The line C-C', which passed through the central part of the Yumigahama Peninsula, was adopted. The density of the upper layer is 1.9g/cm**3 and the lower layer is 2.4g/cm**3. Four control points were put on the outcrop of the north and the south. It becomes rapidly deep around the border water service, and a boundary side reaches about depth 900m from the result. Then, it is shallow with showing gentle unevenness.

A three-dimensional structure analysis (Komazawa, 1995) was carried out. Homogeneous two-layer structure was assumed, and the configuration of the boundary was found three-dimensionally. The subsurface of the Yumigahama Peninsula has a little complex structure. Especially, Shinji fault is seen clearly in the northern part. Moreover, the rising up part of the depth 200m exists in the southern part of the Yumigahama Peninsula, and there is the deep area around the Daikon Island.

4.Conclusion

The result, which could get it from the gravity exploration in the Yumigahama area, is found in the following.

1) It guesses that the density of the rock around Shimane Peninsula is 2.4g/cm**3.

2) Bouguer gravity anomaly was decreased to the distribution rapidly around Sakai Suidou, and it was being raised gradually. This change is extended in Matsue City direction in the obi-shaped. Low burger is unusual around Diakon Island.

3) Underground structure makes the density of the lower layer 2.4g/cm**3, and makes the density of the upper layer 1.9g/cm**3. It becomes rapidly deep around Sakai Suidou, and the boundary reaches it to the depth of about 900m. Then, it is shallow with showing smooth unevenness toward Yonago City.

4) The underground northern structure of the Yumigahama Peninsula is a little complex structure. It is a certain structure that it raises underground in the southern part in the Yumigahama Peninsula. And, Daikon Island is the structure that the surface of the earth layer is heavy.

References

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