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The relationship between shallow seismicity and geologic structure in the Sambagawa belt, northwestern Kii Peninsula

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Background seismicity is significant in both Tamba and Wakayama regions, Kinki district, southwest Japan. Although Katao and Ando (1996) and others already pointed out that the geologic structure controls their hypocenter distributions, no detail study has been performed. Here we examine the spatial relationship between seismicity and geologic structure in the Wakayama region, northwestern Kii Peninsula, analyzing the hypocenter relocations by the hypoDD method, and seeking more fault plane solutions of microearthquakes. In addition, we perform a three-dimentional comparison between deep geologic structure estimated from the Bouguer gravity anomalies and the relocated hypocenter distribution.

As a result of the hypoDD relocations, E-W trending seismic clusters have become more visible. Other trends of linear seismic clusters are also discernible. Linear and elongated seismic clusters in the western Sambagawa metamorphic belt are unconcealed. Numerous fault plane solutions sought from smaller earthquakes using the Kyoto University SATARN system increase the ratio of strike-slip mechanisms to the reverse ones, which may associate with the visible EW-trending seismic clusters. Two 20-km-long, EW-trending high gravity anomaly zones, which are robust features (Kakuta et al, 2002, Komazawa et al, 1999), is characterized as aseismic zones. These zones, evidently corresponding to the Mikabu ultramafic rocks, hold higher density than those from schist and other sedimentary units. We interpret that significant difference in mineral compositions between the Mikabu zones and the other areas in the Sambagawa belt plays an important role to differentiate their brittle-ductile transition depths, thus the thickness and strength of the seismogenic layer.

Keywords: northwestern Kii Peninsula, Sambagawa belt, shallow seismicity