

Accuracy of the determination of earthquake source fault -comparing geological structure with aftershock distribution-

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[Introduction] Iwate-Miyagi Nairiku Earthquake occurred around the southern area of Iwate prefecture on 14 June in 2008. Around the epicenters of this earthquake, active fault had never been identified. Recently, group members for the aftershock observations have pointed out "fault between mountains and plain: FMP" based on distribution of main and aftershocks and geophysical prospecting (Saito et al., 2008; Abe et al., 2008; Sato, 2009 etc.). In this study, we survey geological structures and age to search active fault and relationship among faults. In addition, we compare aftershocks distribution analyzed by the dense seismic network data with geological structures, and consider accuracy of the determination of earthquake source fault position based on geological information.

[Geological outline] In this area, the stratigraphy is composed of granodiorite as basement rock, Miocene strata (Shimokurosawa F. and Gembi F.), Pliocene strata (Ariga F., Yushima F., Kazawa F. and Kunimiyama andesite) and Quaternary volcanic rocks. Shimokurosawa F., Gembi F., Yushima F. and Kunimiyama andesite deposited in 12.9-11.5Ma, 7.0Ma, ca. 5Ma and 4.77Ma based on diatom fossil analysis, FT and K-Ar age measurements (Uchida et al., 2009). In addition, Quaternary volcanic rocks correspond to Yakeishidake volcanic rocks erupted in 0.97-0.45Ma (Yashima et al., 1995).

[Geological structure and aftershock distribution] In the southern area of the earthquake, an old fault (Mochikorobashi-Hosokura Tectonic Zone: MHTZ) was found by Katayama & Umezawa (1958), and displacements occurred by the earthquake were reported by Suzuki (2009) and others. In this study, we cleared that strata have been deformed along the MHTZ, and that the MHTZ extend to northward and connect with Dedana Fault (a part of the active fault zone along the western margin of the Kitakami Lowland). The northern part of the MHTZ had been deformed since 5Ma, but most recent event is not cleared. In addition, earthquake fault occurred by the earthquake was found by Suzuki (2009) at 5km west from the MHTZ. It is considered that this earthquake fault is FMP and that extend to southward and northward as active concealed faults based on geological characters. Thus, main two faults are recognized around the epicenter. The hypocentral distribution show main west dip and 4-5km width. In this distribution, the eastern and western margins of shallow extension correspond to the MHTZ and FMP respectively. It is considered that the epicenter of the main shock was located in deep extension of FMP and that destruction had spread from FMP to the MHTZ.

[Summary] The old fault may be acted by spreading of destruction in the case that earthquake source fault is located near it. When we estimate upper part position of earthquake source fault from geological information, we must consider about 5km horizontal error at least. This is related to geological condition as thick depositional rocks.