Miocene tectonics of the Ryoke belt near the Median Tectonic Line of the Hase area, Ina city, central Japan

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The Hiji tonalities are gneissose and banding granitoids with various rock textures which are exposed near the Median Tectonic Line (MTL) of the Hase district (Figures A and B). The Hiji tonalities suffered deformation and recrystallization during the cooling periods of the solidified magmas. Meta-granitoids were formed at high temperatures and mylonites were formed at about 420°C. The strikes of the planar structures are N10-30°E in the area to the south of the Bungui Pass. They are N30-50°E to the north of the Bungui Pass. The mylonites are distributed along the MTL. The sizes of groundmass minerals of the mylonites were measured along the Y-Z line (Figure B). They decrease toward the MTL (Figure C). However, they are nearly constant along the strikes of the planar structures [1]. The relationship between the sizes of recrystallized minerals and strikes of foliations is unclear in the Magoi-Nakao area because of the existences of the N-S trending Hase fault and the absence of outcrops due to the Mibu River.
Pelitic, psammitic and siliceous metamorphic rocks are often exposed in the surveyed area. Radiolarian fossils are found in many fine-grained mylonites which are distributed along the MTL (Figure A). This fact suggests that low- or medium-grade schistose meta-sediments were metamorphosed to fine-grained mylonites. On the other hand pelitic gneisses and coarse-grained pelitic mylonites are distributed in the western parts of the surveyed area. Small amounts of partially dissolved garnet crystals are found in the coarse-grained pelitic mylonites. They are relict garnets of gneissic rocks. A fault is supposed between the gneissic rocks and schistose rocks. The fault was formed before the late Cretaceous intrusions of the Hiji tonalites.
The supposed fault was deformed during the formation of the Miocene MTL. The Hase fault (Figure B) is important to reveal the Miocene tectonics. In the Magoi area, pelitic and siliceous very fine mylonitic rocks are widely distributed to the east of the Hase fault, while granitic rocks are exposed to the west of the Hase fault. Granitic rocks were highly altered near the Hase fault. In the Nakao region, the Hase fault is supposed near the Mibu River. Many N-S trending faults are observed near the supposed Hase fault. The extension of the Hase fault actually exists to the north of the village Nakao [1]. The strikes of planar structures in the Magoi-Nakao area are approximately N40±10°E regardless of the existence of the Hase fault (Figure B).
Based on the above-mentioned geology the tectonic history of the surveyed area may be described as follows. Gneissic rocks and schistose rocks were in contact with a fault. The strike of the fault plane was about N45°E. The Hiji tonalities were intruded into the metamorphic rocks in the late Cretaceous time. Gneissose granites, meta-granitoids and mylonites were formed during the cooling stages of the Hiji tonalities. Strikes of the planar structures of the granitic and metamorphic rocks were about N45°E. The geological structure suffered intense deformations during the formation of the Miocene MTL. Anti-clockwise rotation of the planar structures took place in some areas. In other areas many faults trending N-S or NW-SE were formed. These faults were characterized by systematic left-lateral displacements as shown in Figures D and E. The distribution of the fine-grained mylonites was changed from the NE-SW trend to the N-S one after the fault movements. Thus the late Cretaceous geological structure of the surveyed area was largely changed during the Miocene opening of the Japan Sea.
[1] A. Ono, 2012, Japan Geoscience Union Meeting 2012, SGL44-P04.

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