

Tectonics of the Miocene Median Tectonic Line in the west of Ina-Valley, central Japan

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1. None

Consider the tectonics of geological bodies A and B which are in contact with a fault in a shallow crust. Rotation of the geological body B occurs with respect to A. The rotation axis is assumed to be vertical or horizontal, but in either case, overlap and void of the geological bodies occur at the boundary between the geological bodies A and B. This virtual overlap and void are actually eliminated by the tectonic movement and deformation of geological bodies around the boundary fault. A tectonic zone is formed between the geological bodies A and B after the rotation.

It is reasonable to assume that geological body A is the inner zone of the Ina-Valley area and geological body B is the Akaishi Mountains of the outer zone in view of the geology and tectonics of these areas. Figure A is a schematic geological map of the area in question. Bedding planes of the Miocene Moriya and the Tomikusa basins are dipping gently below 20°. On the other hand, the Miocene Wada Formation of the Akaishi Mountains is highly deformed and bedding planes are steeply tilted. The marked tilting of the bedding planes can be regarded as a rotating motion with the almost horizontal rotation axis.

The geological structure of the Akaishi Mountains is not a layered structure of gently inclined geological bodies that is found in the Kanto and Kii Mountains. Various geological bodies of the Akaishi Mountains are complexly deformed as shown in Figure B, and many geological units are partially missing. This complex geological structure was formed during the expansion period of the Sea of Japan. Moreover the Akaishi Mountains greatly rotated counterclockwise with respect to the inner zone of the Kinki region. The rotation axis was vertical and lateral movements in the N-S direction were also very intense.

In the western edge of the Mino belt and the northwestern edge of the Ryoke belt, i.e. the Ina-Valley area, the strikes of bedding planes are about N45°E (Figure C). In these areas, the rotational motion around the vertical axis is estimated to be almost the same everywhere. According to the paleomagnetic study of the Miocene andesite dike swarm in the eastern part of Takayama City, Gifu Prefecture, located at the west end of the problem area, the paleomagnetic data are almost the same as those of the inner zone of the Kinki district. In the opening period of the Sea of Japan, the Takayama and the Ina-Valley areas suffered no counterclockwise rotational movement relative to the inner zone of the Kinki region.

Considering the large differences in the Miocene tectonics mentioned above, a tectonic zone may be formed between the Ina-Valley area and the Akaishi Mountains during the opening period of the Japan Sea. It is reasonable to consider large-scale horizontal and vertical movements of geological bodies in the tectonic zone. However, this kind of tectonic zone has hardly been confirmed. This contradiction can be resolved by assuming that most of the geological bodies in the tectonic zone were transported toward the earth surface. The missing geological bodies may be found as clastic materials in Miocene subduction zone. The current eastern border of the Ryoke belt near the Akaishi Mountains may have suffered similar tectonics during the formation of the Miocene Median Tectonic Line. In this area, narrow geological units elongated in N-S directions are found, and this is evidence for the missing tectonics.

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