

Quaternary Tectonic Environments in North-Central Japan

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The present-day central Japan is located at the convergent junction area among four tectonic plates, Amur, Okhotsk, Philippine Sea and Pacific plates. The Toyama Trough - Fossa Magna region is a major tectonic depression bounding the contrasting, tectonic provinces, i.e. the Northeast Japan (NEJ) arc on the Okhotsk plate and the Southwest Japan (SWJ) arc on the Amur plate. The north-central Japan on the Japan Sea side of Honshu Island is characterized by the latest Cenozoic thrust/fold belts, which are considered as the results of a series of inversion/conversion tectonics in relation to the Quaternary changes in relative motion between Eurasia/Amur and Philippine Sea plates.

This paper aims at describing these changes in crustal movements including active tectonics, and evaluates the existing hypotheses on the plate tectonic framework.

At the end of Pliocene in the NEJ arc, typical basin inversion has been occurred along the NE-SW trending, boundary faults of the Miocene sedimentary basins. While, on the side of SWJ arc, boundary faults of the Miocene basins were not reactivated, but other preexisting fractures have been reused to form the reverse fault and strike-slip fault provinces in response to N-S compression due to the Early Pleistocene northward subduction of the Philippine Sea plate, and to E-W compression due to the eastward motion of Amur plate, although the Present tectonic zone of strain concentration is probably related to the subduction of Pacific plate. In order to account for the Quaternary tectonic environment with a widespread stress field of strike-slip faulting in the basement as inferred from focal mechanism solutions, an accommodation mechanism is likely to have been worked in the asthenospheric mantle of the present arc-arc collision zone.

Considering the above neotectonic circumstances from the existence of the tectonic inversion of north-central Japan and stress field of the seismogenic layer, the hypotheses on eastward motion of Amur plate and on the nascent plate-boundary along the eastern margin of Japan Sea were positively evaluated.

Keywords: Amur Plate, Toyama Trough, Fossa Magna, Quaternary, neotectonics, north-central Japan