

Geologic significance of the Koze-Matsuda active fault for the estimation of tectonic erosion along the Japan Trench

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Tectonic history of the Japanese islands can be well explained by eastward or westward migration of the Japan Trench, controlled by Philippine Sea Plate motion. In this tectonic framework, convergent direction between the Tanzawa Mts., southern margin of NE Japan, and the Izu Peninsula on the Philippine Sea Plate changes in association with tectonic erosion along the Japan Trench.

(1) If there is no erosion, the relative motion between the Tanzawa Mts. and Izu Peninsula is N-S direction, because NE Japan should be moved westerly at the same velocity of westward vector of northwesterly moving Philippine Sea Plate. The arc crust of westerly migrating NE Japan should be contracted because the oceanic lithosphere of the Japan Sea is extremely sturdy, and therefore, the stress field becomes E-W compression in this case.

(2) When the tectonic erosion increases, westward motion of NE Japan is reduced, and the compression stress field becomes weak. Convergent direction between the Tanzawa Mts. and Izu Peninsula changes to the NNW in this case.

(3) If the all component of westerly motion of the Japan Trench is cancelled out by tectonic erosion, NE Japan does not move anymore and no contraction occurs. In addition, the convergent direction of the Izu Peninsula with respect to the Tanzawa Mts. is just the same to the Philippine Sea Plate motion (NW) in this case. Therefore, the Koze-Matsuda active fault, boundary between two, should be acted as a normal fault, because it runs NNW-SSE trend.

Thus the tectonic erosion along the Japan Trench affected to the convergent direction between southern-margin of NE Japan (Tanzawa Mts.) and Izu Peninsula on the Philippine Sea Plate. As the geologic evidence that the Koze-Matsuda active fault is apparently reversed fault, so that the tectonic erosion along the Japan Trench is restricted as the Izu Peninsula converges to the Tanzawa Mts. along the Koze-Matsuda active fault. This also means that there should be some westward component of NE Japan in this tectonic framework. As conclusion, some portion of the westward movement of the Japan Trench is cancelled by tectonic erosion, and the rest is acted for NE Japan to move westward.