X. GEOLOGICAL HISTORY OF THE KURIL BASIN AND THE TARTARY TROUGH —PRELIMINARY CONCLUDING REMARKS—

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The surveyed area is divided in two parts of the Kuril Basin and the Tartary Trough, and is located in the junction of the Kuril (-Kamchatka) Arc and the Tohoku Arc. The formation of the both basins are postulated to be closely related with the orogenesis in the Tohoku and Kuril Arcs. The ridge in older stage, the Hidaka Mountains, which is extended throughout the central part of the Hokkaido Island with a N–S trend makes a complexity to understand the Late Mesozoic to Early Cenozoic development of the area. The Hidaka Mountaines are suggested to have a paired metamorphic belts of the high temperature and low pressure belt in the east side and of the low temperature and high pressure belt in the west side during Late Mesozoic to Early Cenozoic, neverthless it is not so typical as noted in the Seinan Japan Arc (MIYASHIRO, 1965). The fact suggests a island arc orogenesis in the older stage, having a trench in the western side of the arc where some kind of the oceanic plate was consumed. From these view point, a rotation of the Hidaka Mountains with clockwise (MATSUDA and UYEDA, 1970) or westward shift of the Mountains were suggested.

Okhotsk Sea Side

A relative wide shelf is distributed along the eastern coast of the Hokkaido and Sakhalin Islands where thick sediments in Late Cenozoic cover partly interrupted by a few discontinuous ridges with N–S trend consisted of the older sediments. The steep slope to the Kuril Basin in the northern area is covered by the terrigenous sediments in Miocene which is overlain by the thick horizontal layers in the Kuril Basin. The slope in the southern area is gentle and topographically rough where the acoustic basement is extended to that in the Kuril Basin. Ridges on the slope and on the outer margin of the shelf are discontinuously developed with weakly magnetized throughout the western flank of the Kuril Basin. One of them is extended from the Nakashiretoko Peninsula in the west side of the Sakhalin Island where is outcropes of granitic rocks. These ridges are suggested to have been formed, at least, since Miocene.

The late Cenozoic sediments are horizontally distributed in the Kuril Basin with slight declination toward southeast. The horizontal layers abut on the older layers with dragging out on the foot of the slopes in both the western flank and the southeastern flank of the Basin. It suggests a relative subsidence of the Basin since the deposition of the layers.

Soya Straits

Two dominant ridges with N–S trend are noted beneath the flat floor in the Soya Straits. Intense magnetic anomalies and high gravity anomalies are correlated with

the basement high in the reflection profiles, and magnetically quiet zones and low gravity anomalies are correlated with the sedimentary trough between the ridges. Gravitational discontinuities observed along western margin of the ridges are correlated with the fault scarps in the reflection profiles.

From the geology of the Islands, the basement in the west side ridge is suggested to consist of the older rocks in Jurrasic and that in the east side ridge in Cretaceous. Intense magnetic anomalies in the east ridge may be caused by the mafic to ultramafic rocks in Pre-Tertiary.

Tartary Trough

The central axis of the Tartary Trough is approximately parallel to the Siberia coast and is along the west side of the offshore area between the Hokkaido and the Siberia. Ridges and banks are ranged with the trends of NNW–SSE, NNE–SSW and NE–SW in the east shallower side of the area. The ridges in the southern area are noted to be the northern extension of the Okushiri Ridge which developes in the whole of the offshore areas along the Tohoku Arc (MOGI, 1972; SATO, 1971). The acoustic basement in the shallower horizon of the ridges and banks is well extended in the deeper horizon of the Tartary Trough. The basement is unconformably overlain by the Neogene sediments which have approximate seismic velocities with 1.7 and 3.6 in the Trough. The sediments are deformed and eroded subaerially in both the ridges and banks, and southern margin of the Trough. Some of the basements consist of the sedimentary rocks which are suggested in the reflection profiles and others consist of the igneous origin which are suggested in the magnetic anomalies.

Tilted block movements accompanied by faults are developed in the ridges and banks where the younger sediments are dammed up. Sediments in the Tartary Trough are slightly folded and eroded subaerially, but not accompanied by faults. The different tectonics in the ridges and banks, and the trough are suggested to be caused by the different mechanism or stage for the developments in the ridge side and the trough side.

Discussion

The formation of the Japan Basin and Kuril Basin is suggested to be caused by the subduction of the Pacific plate in the front of the arcs during Late Cenozoic, and three possibilities are suggested for the creation of the new oceanic basement, especially in the Japan Basin. The one is based on the gradual spreading in the whole area of the basin with spreading center in the central area of the basin (HILDE and WAGEMAN, 1973; ISEZAKI, 1975). The next is based on the stepped spreading toward west with spreading center in the Yamato Trough or along the coast of the Tohoku region (KARIG and MOORE, 1975; HONZA, 1976b).

The metamorphic belts in the central Hokkaido are extended to the Sakhalin Island where the belts are longer than that in the Hokkaido. Therefore, it is difficult to assume the rotation with clockwise and is reasonable to consider the relative sift toward west in which two cases are suggested. The one is the creation of the oceanic plate in the Tartary Trough which subducted under the Hokkaido-Sakhalin Mountains. The other is the sift of the Mountains toward west riding onto the Tartary plate, i.e. a collision type sift accompanied by the Kula plate motion toward northwest. In this

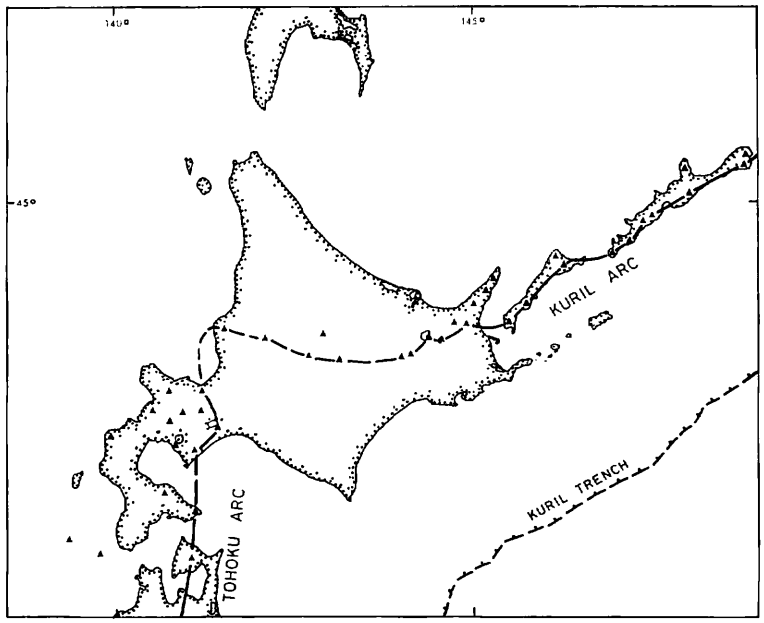

Fig. X–1 Tectonic superimposion of the Kuril and Tohoku Arcs on the older Hidaka–Sakhalin Mountains, which is well demonstrated in the volcanic fronts of the both Arcs.

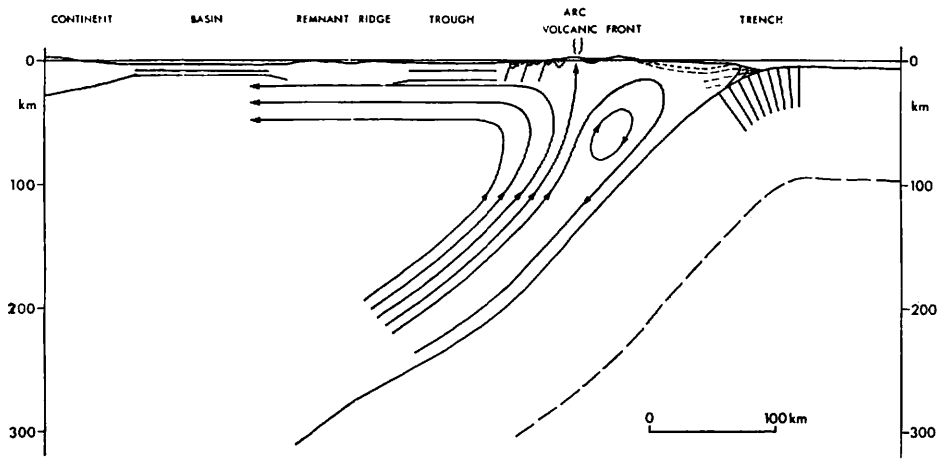

Fig. X–2 Convection current in the back arc area. The model is based on the hypothesis that the marginal sea was created by the convection current accompanied by the frictional heating on the upper surface of the subducted slub (HONZA in prep.).

case, the northern shallower basin in the Okhotsk Sea is suggested to be the remnant of the older oceanic plate. The reflection profiles in the northern shallower basin suggest the continuation of the basement in the Kuril Basin and also dammed sediments in the central part of the basin (SOLOVIEV *et al.*, 1977).

Orogenesis since Neogene is quite different in the direction as compared with that in Cretaceous to early Paleogene which is observed in the Hidaka-Sakhalin Mountains. Neogene and Quaternary volcanism is superimposed on the Hidaka Mountains which is suggested to be caused by the subduction of the Pacific plate in the front of the Tohoku and Kuril Arcs (Fig. X–1).

It is very difficult to ascertain the spreading center in the back arc basins, rather westward motion of the plate are suggested in the back arc basins of the West Pacific margin (HONZA, 1976a; KARIG, 1975; WATTS and WEISSEL, 1975).

When the creation of the marginal basin is caused by the frictional heating along the subducted slub, it might be followed by a convection current in the upper part of the subducted slub in which the spreading center is correlated to the volcanic front on shore and the westward motion occures in the deeper mantle of the back arc area (Fig. X–2). In this case, the horizontal compressional stress or subduction in the margin of oposite side of the arc might be suggested, which is well noted in the reflection profiles in the Okinawa Trough (EMERY and NIINO, 1961; HONZA, 1976b; WAGEMAN *et al.*, 1971), in the east coast of the Siberia and in the northern margin of the Kuril Basin (SOLOVIEV *et al.*, 1977). The consumption of the marginal plate is observed along the Nankai Trough and along the Ryukyu Trench.

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