

The evolution of the Kushiro submarine canyon, the southern end of the Kurile Trench.

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More than 4356 km long, densely-lined, high-resolution air-gun survey reveals the Pliocene–Pleistocene evolution of the Kushiro submarine canyon in East Hokkaido, the southern end of the Kurile Arc. The canyon is 190 km long and characterised by several hundreds metres incision from adjacent slope surface. Its incision occurs throughout the channel excepting the lowest, near the base level of the Kurile Trench. The canyon has no levee-complex at least present-day. Tokachi River, the largest river in the East Hokkaido, feed the terrigenous sediments into the forearc basin, but does not serve a submarine channel. The Kushiro submarine canyon runs on the marginal part of the forearc basin, and is offset from Kushiro River, which has only one-quarter of drainage area of Tokachi River. Reconstruction on the evolution of the canyon probably hints the causes of the incision and the controls on channel architecture.

Lower Pliocene sequence is characterised by two elongated thick parts. The thick parts consist of even to convergent moderate-amplitude reflections with mound-shape external package. It is interpreted to represent channel-levee complex. Heads of both two thick parts are offset from the present-day mouth of Tokachi River. One runs southeastward on the forearc basin. We name it palaeo-Tokachi submarine channel. The other runs toward SEE and takes its course along the present-day Kushiro submarine canyon where its course intercepts the present-day canyon. We name it proto-Kushiro submarine channel. These features suggest that Early Pliocene palaeo-Tokachi and proto-Kushiro submarine canyons were fed from Tokachi River, and acted as aggradation channels. The scheme of two channels had been kept until early Pleistocene with minor migrations. In the early Pleistocene, the SE trending channel was eliminated. In the middle Pleistocene, the upper course of proto-Kushiro submarine channel was eliminated excepting the course common to the present-day Kushiro submarine canyon. In other words, the serving river of the Kushiro submarine canyon jumped from Tokachi River to Kushiro River. There is no great levee along the canyon. After the late Pleistocene, the Kushiro submarine canyon has incised and numerous small gullies have been developed in the forearc basin.

The channel eliminations were due to the uplift of shelf/onshore anticlines, which would block the course of Tokachi River. Then, Tokachi River changed to feed the terrigenous sediments to the forearc basin without great channel. It probably reinforced slope progradation. The middle Pleistocene–present Kushiro submarine canyon probably has acted as erosional or non-depositional channel, because the serving river change from the large one to the small presumably decreased the sediment flux and sand/mud content. The incision of the Kushiro submarine canyon is highly contrasted whereas adjacent slope has prograded.