

Geomorphological evolution of Notsukesaki barrier spits resulting from seismotectonics along the southern Kuril Trench

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An active barrier system is developed in the Nemuro Bay area along the Okhotsk Sea in eastern Hokkaido, Japan. This presently rare feature consists of a lagoon (the Notsuke Bay), a flood tidal delta, barrier spits, and a tidal inlet that opens into the outer sea of Nemuro Bay and the Sea of Okhotsk. The Notsukesaki barrier spits are active along the northeastern side of the Notsuke Bay, and four spit groups (NBS1~NBS4) can be observed clearly. Using geomorphological and sedimentological methods, we analyzed Holocene sediments around the Chashikotsu lowland and Natsukesaki barrier spits. We dated them using radiocarbon and tephrochronological methods. The Notsukesaki barrier system has been established before 4.0 ka presumed by Ma-d tephra. NBS1, the modern transgressive spit was formed after the 17th century, and NBS2 was caused by the last seismic uplift in the 17th century because Ta-a and Ko-c2 tephra covered the surface of NBS2. NBS3 was uplifted in the 12~13th century, and NBS4 was caused by seismic uplift maybe before the 10th century because Ma-b tephra covered the surface of NBS4. These great earthquakes (Mw8.5~9.1) have occurred at an approximate 500-year interval along the southern Kuril subduction zone. Coastal areas were raised by 3~ m during or just after the earthquakes due to postseismic displacement. Conversely, land subsidence has been ongoing at a rate of about 1.5 mm/year since the 17th century. We conclude that the geomorphological evolution of the Notsuke barrier system has been controlled by the seismotectonics along the Kuril subduction zone.

Keywords: Notsukesaki barrier spits, seismotectonics, southern Kuril trench, geomorphological evolution, eastern Hokkaido