

Timing and recurrence interval of uplift events deduced from emerged beach ridges in the Kiritappu marsh, eastern Hokkaido

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Along the Kuril trench, unusually large earthquakes which differ from characteristic earthquakes occurring every one hundred years was recently proposed by Nanayama et al.(2003). The latest event of this type which occurred at 17th century was accompanied with coastal uplift (Sawai et al. 2004; Atwater et al. 2004). Emerged shoreline topography related to this event is identified in the eastern coast of Hokkaido (Kelsey et al., 2002). In the Kiritappu marsh, a number of emerged beach ridges are developed parallel along the present shoreline. This geomorphic feature suggests that same type of uplift event have occurred repeatedly. Therefore the timing and recurrence interval of large earthquake can be clarified by analyzing these beach ridges.

We conducted topographic measurement at 250 points using total station and geologic coring at 100 points using peat sampler and hand auger on the 2.2 km of survey line across the beach ridges. The beach ridges can be recognized as mounds of 0.5-1.0m beneath an altitude of 3.0m, and are composed of beach sand covered by 0.5-2.0m thick peat or peaty mud which contains 15 intercalated thin sand sheets of tsunami deposit.

At least 10 paleo-shorelines named PS1-10 from inland can be detected from surface micro-topography and buried topography beneath peaty deposit. Ta-b tephra (AD1667) which directly covers beach deposit was observed in the marsh between the PS10 and present beach ridge. This indicates that the PS10 was emerged during the 17th century event.

Because micro-topography and subsurface structure around the series of PS1-9 is similar to those of the PS10, the PS1-9 have been emerged by almost same magnitude uplift as the 17th century event. Based on ¹⁴C ages of seeds collected from basement of peaty deposit, emergence ages, namely the timing of large earthquakes are inferred to be PS2: 5300-5000 cal yBP, PS5: 3700-3600 cal yBP and PS7: 2700-2500 cal yBP. Recurrence interval of events can be estimated to be the averages of 500 years between the PS2-5, 525 years between the PS5-7 and 765 years between the PS7-10. This result is in agreement with the recurrence interval of large tsunami (an average of 500 years; Nanayama et al., 2003).