

## Discovered nine outside tsunami deposits from the past 4000 years at Kiritappu marsh along the southern Kuril subduction zone

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Large earthquakes in the Kuril subduction zone have caused tsunami damage along the Pacific coast of eastern Hokkaido, including Kiritappu marsh, northern Japan. We carried out large-scale excavation at Kiritappu marsh using the new sampling machine. Then, we discovered two historical tsunami deposits in the peat bed between an AD 1739 historical tephra and the marsh surface that may correspond to the AD 1843 Tempo Tokachi-oki tsunami (M 8.2), the AD 1952 Tokachi-oki tsunami (M 8.2), and/or the AD 1960 Chilean tsunami (M 9.5) events. Furthermore, we found nine outside tsunami sands (OTS1 to OTS9); because of their wide distribution, we suggest they record great tsunami events. These sands cover an area larger than the inundation areas of the historical tsunamis since the 19th century, including the two historical tsunami deposits in this marsh. They were dated by radiocarbon dating and tephrochronology. OTS9 to OTS7 are below the regional tephra Ta-c2 (ca. 2.5 ka) and represent prehistoric events. OTS6 to OTS3 are between the two regional tephtras Ta-c2 and B-Tm (AD 937-938). In addition, OTS3 is just below B-Tm, so it is dated to the 10th century as well. OTS2 and OTS1 are between the two regional tephtras B-Tm and Ta-b (AD 1667). OTS2 is estimated, based on the sedimentation rate, to date to the 13th century and OTS1 to the early 17th century. We calculated the recurrence interval of great earthquakes ( $M_w \sim 8.5$ ) causing tsunamis in this area along the Kuril subduction zone as about 365-553 years.