

Paleotsunami record in Hachinohe, Aomori Prefecture, northern Japan.

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Along the 120 km of the coast of the Shimokita Peninsula, only two previous studies have recorded sand deposits related to paleotsunami events. Seismic activity and historical events on the Kuril and Japan trenches and its flexion showed the presence of seismic asperities and its capacity to generate damaging earthquakes and ensuing tsunamis. However, the information is still limited to develop an adequate hazard assessment. Hence, finding new evidence is vital to unveil tsunamigenic behavior in the neighboring subduction area. Here we present the results derived from the geophysical, sedimentological, paleontological, geochemical, and mineralogical analyses of coastal sedimentary records at Hachinohe City. On a transect of ~500m, we conducted a total of thirteen GPR lines and extracted thirteen core samples. Sedimentary features, authigenic minerals and paleontological evidence revealed that there are seven sandy event deposits related to marine origin out of a total of ten sand events recorded. Sedimentary features, and diatom analysis suggest the sedimentary environment consisted of a marsh complex formed by sequential ponds. Numerical modeling of storm and tsunami surges shows the limited inundation and transportation capacity of storm surges of our study site on the 5m-uplifted marine terrace. The numerical calculation allowed us not only to improve the survey site selection criteria but also to rule out storms as a possible genetic source. Based on ¹⁴C dating, we estimated a recurrence interval of 310 to 435 years (1 σ) from 5500 yr. BP to 2500 yr. BP. Based on a pure chronostratigraphic correlation, this interval is shorter than the calculated from the sedimentation ages calibrated by Takada et al. 2016 in Harashinai, northern Sanriku Coast, near our survey site, that suggests an interval of 530 to 956 years (1 σ) for the same time frame. Such geological record and recurrence interval reaffirm the importance of Hachinohe as a paleotsunami record site since it has recorded more events than the adjacent study site, evidence that could be related to the activity of both trenches.

Keywords: Paleotsunami deposits, Hachinohe, tsunami recurrence, X-Ray Tomography, Numerical modeling, ITRAX