Japan Geoscience Union Meeting 2010
(May 23-28 2010 at Makuhari, Chiba, Japan)

SSS024-P13 Room: Convention Hall Time: May 25 17:15-18:45

Reconstruction of coastal environmental changes due to the Kanto earthquakes in Ena Bay, Miura pen. from diatom analysis

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Geological and geomorphological surveys are important for earthquake forecast because they provide information not only of earthquake occurrence time and magnitude but also on environmental changes during co-seismic and inter-seismic intervals. The recurrence interval of the Kanto earthquake is now estimated to be 200-400years(Earthq. Res. Com., 2004). However, earthquake histories prior to the 1703 Genroku Kanto earthquake have not been revealed from historical literature. It is reported that damaging earthquakes have frequently occurred prior to the previous Kanto earthquakes and therefore, revealing histories of the previous Kanto earthquakes is also important to forecast an activation time of damaging earthquakes. Miura Pen. has been uplifted and tsunamis attacked along the coast of the Kanto region accompanied by the previous Kanto earthquakes(Hatori et al., 1973). Shimazaki et al.(2009) conducted Geo-slicer surveys in Koajiro Bay, Miura Pen. and investigated histories of the previous Kanto earthquakes using radiocarbon dating of samples, diatom analysis, grain size analysis and correlation with historical documents. As a result, they suggested that the 1293 earthquake, pointed out by Ishibashi(1991), was the Kanto earthquake prior to the 1703 Genroku earthquake. The purpose of this study is to reveal histories of the previous Kanto earthquakes and processes of uplift and subsidence from a reconstruction of paleo sealevel using diatom analysis in Ena Bay, Miura Pen.. We conducted surveys using 3m-long handy Geo-slicers in May and Nov., 2009 at Ena Bay. We have basically analyzed 2 cores(ENA-E and ENA-F). As a result, three(ENA-E) or four(ENA-F) coarse layers including shell fragment and gravel are recognized. These event deposits erode a subsurface layer indicating that they accompanied with a strong current. Therefore, they are supposed to be tsunami deposits, named as T1, T2, T3 and T4 unit from the top to the bottom, respectively. In addition, diatom analysis indicates an increase or a decrease of relative abundance of marine species, suggesting a change of sea depth. That is to say, planktons gradually increase prior to the deposition of tsunami deposits indicating coastal uplift(or sea level fall) and benthos increases above tsunami deposits indicating coastal subsidence(or sea level rise). It is revealed that Miura Pen. uplifted about 1.5 m at the time of the 1923 Kanto earthquake and now subsides with a rate of about 3.6 mm/y, based on tide gauge record at Aburatsubo. The tendency described above suggests that environmental changes corresponding to these co-seismic and inter-seismic crustal movements. This is consistent with the results in Koajiro Bay(Shimazaki et al., 2008). We concluded that these event layers are tsunami deposits accompanied with the previous Kanto earthquakes based on characteristics described above. Radiocarbon ages such as a wood and shell indicate that the T2, T3 and T4 unit deposited about 3000yBP, 3300yBP and 3700yBP, respectively. These are consistent with the previous Kanto earthquake histories estimated from marine terrace in Boso Pen.(Shishikura, 2003). Moreover, the T1 unit is concluded as a tsunami deposit accompanied with the 1923 Taisho Kanto earthquake using Pb-210. On the other hand, deposition ages beneath T1 are significantly different from the one in Koajiro Bay. The age difference is about 3000years between the T1 and T2 units though the thickness is only 20-50cm, indicating a definite decrease of deposition rate. Ena Bay has uplifted by previous Kanto

earthquakes. If a sedimental environment changes to the one that the erosion due to ocean waves is active such as subtidal zones, deposits including radiocarbon age samples hardly remain and a preservation condition of tsunami deposits becomes worse. However, diatom analysis indicates a tendency of continuous sea level fall, and it suggests a possibility of reconstruction of paleo sealevel changes from detail diatom analyses.

Keywords: Kanto Earthquake, Tsunami deposit, Ena bay, Paleo sealevel change, Diatom analysis